Acknowledgements

The organizers 2nd ICOLIB 2017 express sincere appreciation and grateful thanks to all those who have contributed their kind support to facilitate this conference.
WELCOMING ADDRESS

The International Conference of Life Science and Biotechnology (ICOLIB) was organised by Biology department Faculty Mathematic and Basic Sciences, The University of Jember, Indonesia. This conference has been held biannually at different venues. The last one, (First ICOLIB) held in Aston Hotel Jember 2015, Indonesia. Now, we are held the 2nd ICOLIB at Panorama Hotel and Resort Jember, Indonesia. The ICOLIB is a forum for students, researchers, educators, observers and practitioners from university, research institutions, industry and general public, policy maker to exchange ideas and latest information in the field of life science and its application. The theme of the 2nd ICOLIB 2017 ‘Integrated Biological Sciences for Human Welfare’ will underpin the need for collaboration and cooperation of individuals from a wide range of professional backgrounds. The scope of the 2nd ICOLIB covers several fields of studies, namely life sciences, environmental sciences, medical and pharmaceutical sciences, science of renewable energy, agricultural science and food security. This conference will also offer opportunities for discussion and sharing as well as encouraging for international research collaboration. Furthermore, the scientific articles will be peer-reviewed and published in Serial book volume publish with Cambridge Scholar Publishing UK. The selected scientific articles in the 2nd ICOLIB will be further reviewed and will also be published in Scopus-indexed Journal.

The 2nd ICOLIB have been fortunate to have Prof. Harald zur Hausen, 2008 Nobel Laureate in Physiology or Medicine for his discovery of human papilloma viruses causing cervical cancer. Prof. zurHausen and his team has made a breakthrough in 1982 and 1983 when they were able to isolate HPV 16 and HPV 18 as the virus types responsible for cervical cancer. Based on these findings, vaccines have been developed against cervical cancer, one of the most common forms of cancer among women. This work led to improved methods for predicting which women are in the risk zone. We are very honoured to present Prof. Harald zur Hausen, as a keynote speaker, and 6 distinguished scientists as invited speakers.

I sincerely hope that the results of this conference will enable all participating scientists from all over the world to have the opportunity to exchange knowledge through lectures and posters.

Purwatiningsih

Chairwoman of The 2nd ICOLIB 2017
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General Information for the Participant

Registration Information

Conference Venue

- The venue for the conference is the Panorama Hotel, Jember, East Java, Indonesia

Registration

- Registration includes:
  - 2nd ICOLIB Abstract Book
  - ID Card
  - Document Bag
  - Refreshment (coffee & tea) during the conference day
  - Buffet Lunch

ID Card

- Participants are requested to display their ID Card during the conference for entry to scientific sessions, melas and the welcome reception. Please also show the ID Card to the committee before transportation to the conference venue.

Instruction for the Moderator

- Please ensure that the sessions and speaker presentations are kept strictly on time

Instruction for Speakers (Keynote Speaker and Oral Presenter)

- Speaker are requested to submit their presentation to staff in the audio-visual room at least 1 hour before each presentation, then upload and ensure that the proper presentation is in the computer provided
- 45 minutes have been allocated for each keynote speaker (please allow time within this period for answering questions)
- Free oral presenter will last 10 minutes only (please allow time within this period for answering questions)
- Please be aware that the above times must be strictly adhered to

Instructions for Poster Presenter

- Poster presentations will be located in the front of the conference space along the second floor.
- Poster will be displayed throughout the conference, and presenters are responsible for putting them and removing them.
2
nd
ICOLIB
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Secretary

Dr. Retno Wimbaningrum, Indonesia
Syubanul Wathon, S.Si,M.Si, Indonesia

7-8 August 2017: Jember, Indonesia
## SCIENTIFIC PROGRAM

### MONDAY, 7TH AUGUST 2017

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13.00-13.45 **Invited speaker 2.** Quality Management in Thai Mango Supply Chain to Meet the Needs of Consumers: A case Study of Mango Exporting to Japan Market

Prof. Sirichai Kanlayanarat, Postharverst Technology Program, School of Bioreources and Technology, King Mongkut’s University of Tecnology Thonburi, Bangkok Thailand

Chairperson: M.Su’udi, Ph.D

**VENUE: PHOENIX BALLROOM**

14.00-15.30 Parallel Oral Session

Chairperson: Edwin Setiawan and Jamsari

1. **CHARACTERIZATION OF NPR1 ANKYRIN DOMAIN FROM CHILLI PEPPER (Capsicum annuum L.)**
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9. **IN VITRO FERMENTATION OF PREBIOTIC XYLOOLIGOSACCHARIDES FROM CASSAVA WASTE BY *Lactobacillus* spp.**

Anak Agung Istri Ratanadewi, Marena Thalita Rahma, Nurhayati, Agung Budi Santoso, Wuryanti Handayani

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**Venue: ROOM ARGOPURO 1**

14.00-15.30

**Parallel Oral Session.**

Chairperson: Rike Oktarianti and Merites M. Buot

1. **ANTIGENICITY AND EPITOPE MAPPING OF 33 kDa ANTIGENIC PROTEIN FROM SALIVARY GLAND OF *Anopheles sundaicus***

Yunita Armiyanti, Widodo, Locki Enggar Fitri, Teguh Wahju Sardjono

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2. **Myrmeleon sp. AS POTENTIAL ANTI-DIABETIC AGENT DECREASE THE DAMAGE OF LIVER AND KIDNEY HISTOLOGY OF HYPERGLYCEMIA MICE**

Dwi Wulandari, Jekti Prihatin, Alief Kurniawan, Anjar Putro Utomo, Slamet Hariyadi, Erlia Narulita

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3. **INTRANASAL IMMUNIZATION WITH 54 KDA HEMAGGLUTININ PILI PROTEIN OF *Streptococcus pneumoniae* INCREASE EXPRESSION OF pIgR**

Diana Chusna Mufida, Kusworini Handono, Sumarno Reto Prawiro, Sanarto Santoso

---

4. **ESTRADIOL LEVELS AND UTERUS HISTOLOGY OF FEMALE MICE (*Mus musculus*) INDUCED BY SYNTHETIC PROGESTERONE**

Fikri Ainur Risma Hardiyanti Oktavia, Jekti Prihatin, Khoirul Anam, Erlia Narulita

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5. **ANTIBACTERIAL ACTIVITIES OF SEA MANGO (*Cerbera odollam G.*) LEAF EXTRACT AGAINST PATHOGENIC BACTERIA**

Septiana Isni Maharani, Toshifumi Sakaguchi, Wachju Subchan

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Dian Handayani, Harrizul Rivaı, Netty Suharti, Rizka Mulyani, Roslaili Rasyid

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7. **PROTEIN DOMAIN ANNOTATION OF *Plasmodium* sp.CIRCUMSPOROZOITE (CS) USING HIDDEN MARKOV MODEL**

Arli Aditya Parikesit, Didik Huswo Utomo, Nihayatul Karimah

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Ayu Dewi Ni Nyoman, Natacha Klages, Dominique Soldati-Favre, Carsten GK Lüder

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Nurhayati, Aldina Bonita Br S. Pelawi, Heru Handoko

--

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1. **EVALUATING THE GEOGRAPHICAL DISTRIBUTION OF COI HAPLOTYPES OF Nannophya pygmaea (ODONATA: Libellulidae)**
Trina E. Tallei

2. **THE DIVERSITY OF PTERIDOPHYTES HAVE MEDICINAL POTENCY BASED ON ALTITUDE IN SOUTHERN SLOPES AREAS OF MOUNT SLAMET BATURRADEN**
Lia Rahmi Adriani, Susanti

3. **PHYLOGENETIC ANALYSIS OF FUNGAL ENDOPHYTE FROM QUINA PLANT (Cinchona calisaya Wedd) BASE ON ITS rDNA SEQUENCE**
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4. **MOLECULAR CHARACTERIZATION OF FOUR GIANT GOURAMI STRAINS FROM JAVA AND SUMATERA**
Agus Nuryanto, Gina Amalia, Dainty Khairani, Hendro Pramono, Dian Bhagawati

5. **UNEXPECTED SPECIES SHIFTING OF THEANOPHELESDIVERSITY IN BANGSRING VILAGE, WATUDODOL DISTRICT BANYUWANGI, INDONESIA**
Kartika Senjarini, Renam Putra Arifianto, Maulana Jauharil Habib, Muhtar Gunawan Wibisono, Syubbanul Wathon and Rike Oktarianti

6. **ISOLATION AND CHARACTERIZATION OF BENEFICIAL BACTERIA FROM THE GUT OF TILAPIA (Oreochromis niloticus) FOR PROBIOTIC PROPERTIES AGAINST FISH PATHOGENS**
Elmi Nurhidah Zainuddin and Rika Wulandari

7. **ISOLATION AND SCREENING INDIGENOUS ACTINOMYCETES FROM RHIZOSPHERE OF CACAO AND EDAMAME SOYBEAN: THE POTENTIAL OF ACTINOMYCETES AS MICROBIAL AGENT IN BIOFERTILIZER**
Esti Utarti, Yulin Lestari and Anja Meryandini

8. **DIVERSITY OF JUVENILE AND SMALL FISH IN MANGROVES WITH DIFFERENT ROOT TYPES IN LABUHAN COASTAL AREA, SEPULU – BANGKALAN**
9. **FIRST EXTENSIVE SURVEY OF HETEROBRANCH SEA SLUGS (Mollusca, Gastropoda, Heterobranchia) FROM BUNAKEN NATIONAL PARK, WITH EMPHASIS AROUND BUNAKEN ISLAND**

Fontje Kaligis, Jobel Dialao, Dorothee Schillo, Till Schäberle, Nils Böhlinger, Robert Bara, Sven Reumenschüssel, Jan-Hendrik Eisenbarth, Gabi König, Heike Wägele

Venue: ROOM PAPUMA

14.00-15.30 Parallel Oral Session.

Chairperson: Hari Sulistiyowati & Suseno Amien

1. **SELECTION OF EFFECTIVE SGRNAS FOR CLEAVAGE OF PALMITOYL-ACP THIOESTERASE (PATE) EXON-1 GENE IN OIL PALM USING CRISPR/CAS9 SYSTEM IN VITRO**

Victor Aprilyanto, Andrea P. Subroto, Chris Darmawan, Zulfikar A. Tanjung, Reno Tryono, Condro Utomo, and Tony Liwang

2. **CLIMATE CHANGE IMPACT TOWARD FISHERIES CATCH DIVERSITY IN EAST JAVA**

Nova Maulidina Ashuri, Dewi Hidayati, Salman Al Farisyi, Ilham Ramadhan, Dwi Oktafitria, Indra Wirawan

3. **CHARACTERIZATION OF BIOFILM POLYMERS TO DEVELOP BIOFILM AS AN ADSORBENT FOR WATER TREATMENT**

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4. **SOIL PHOSPHATE AND POTASSIUM DISSOLVING ACTIVITIES BY SOIL BACTERIAS**

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6. **CONSTRUCTION OF AMPEROMETRIC BIOSENSOR FOR DETECTION OF AGING BIODIESEL**

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7. **CHEMICAL HYDROLYSIS OPTIMIZATION OF CASSAVA (Manihot esculenta) var. GAJAH FOR BIOETHANOL PRODUCTION**

Krishna Purnawan Candra, Kasma, Marwati

8. **THE USE OF SIGMOIDAL DOSE RESPONSE IN ASSESSING ECOTOXICOLOGICAL RISK OF AGROCHEMICALS ON MICROBIAL ACTIVITY IN SOILS**
9. MOLECULAR IDENTIFICATION AND DETECTION OF ALKB GENES OF BACTERIA POTENTIAL AS BIODEGRADABLE AGENT OF POLYETHYLENE PLASTIC WASTE
Norma Sainstika Pangestu, Isworo Rukmi, Anto Budiharjo

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16.00-17.00 Parallel Oral Session.
Chairperson: Esti Utarti

1. ENFLEURATION AND CHARACTERIZATION OF ESSENTIAL OIL FROM Cananga odorata
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2. DETECTION OF PADDIES REFLECTANCE TO CLASSIFY THEIR AGE USING RGB PHOTOGRAPH IMAGES
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3. THERMAL AND PASTING PROPERTIES OF CORN STARCHES WITH DIFFERENT COMPOSITION ANDAMYLOSE CONTENT
Niken Widya Palupi, Purnama Darmadji, Yudi Pranoto, Sutardi, Jayus

4. AMYLOSE CONTENT AND FUNCTIONAL PROPERTIES OF SECOND GRADE TRADITIONAL CASSAVASTARCH TREATED BY OXIDATION USING HYDROGEN PEROXIDE: INFLUENCE DIFFERENTCONCENTRATION AND REACTION TIME
Niken Widya Palupi, Yhulia Praptiningsih

5. MUNG BEAN SPROUTS FLOUR (Vigna radiate L.) AND CORNSPROUTS FLOUR (Zea mayz) AS MODIFICATION OF FORMULAWHO 75 FOR MALNUTRITION CHILD WITH LACTOSEINTOLERANCE
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6. COMMERCIAL USE OF BIOLOGICAL AGENTS AS BIOLOGICAL CONTROL FOR PLANT PESTS AND DISEASES : STATUS AND PROSPECTS
Mutia Erti Dwiasutti

Venue: ROOM ARGOPURO 1

16.00-17.00 Parallel Oral Session.
Chairperson: Yunita Armiyanti

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2. EXPLORATORY STUDY ON SUPERCRITICAL EXTRACTION OF PROPOLIS: CENTRAL COMPOSITE DESIGN APPROACH
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3. THE EFFECTS OF GALLIC ACID AND ITS SYNTHETIC DERIVATIVES FORM ON TNF-Α CYTOKINES AND VIABILITY OF ENDOMETRIOSIS CELLS IN VITRO
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5. THE EFFECTIVENESS OF Syzygiumsamarangense LEAVES ON HEALING PROCESS OF BURNS BASED ON COLLAGEN
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6. THE EFFECT OF ENCAPSULATION MATERIAL ON THE QUALITY OF PROBIOTIC CONTAINING Lactobacillus fermentum
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Chairperson: Trina Tallei

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2. TRANSCRIPTOMIC ANALYSIS OF DEFENCE-RELATED GENES IN Musa spp.
Yunus Effendi, Arief Pambudi, Lulu Nisrina, Heny Isrochawati ……………………………………………………………

3. THE USE OF MARINE FUNGI IN CARRAGEENAN EXTRACTION
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4. THE EFFECT OF REFUGIA BLOCK ON THE ARTHROPOD DIVERSITY IN PADDY FIELDS IN MALANG, EAST JAVA
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5. FAR-FIELD METHODS FOR THE EVALUATION OF TROPICAL TUBER PROPERTIES
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6. FLOWER CHARACTERISTICS ASSOCIATED WITH INSECT ABUNDANCE IN Santalum album Linn. TREE
Ananto Tiyogo, Yeni Widyana NR, Arina Damayanti

Venue: ROOM PAPUMA
16.00-17.00 Parallel Oral Session.
Chairperson: Retno Wimbaningrum

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Eliyani

2. HIGH THROUGHPUT SCREENING METHOD FOR BIODEGRADATION TEST OF VARIOUS AZO DYES
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3. COUNTING METHODS OF OPHIUROIDEA AT SOLID ROCK SUBSTRATES TIDAL ZONE AT BATULAWANG AND PANCUR BEACH, ALAS PURWO NATIONAL PARK
Fike N, Hidayat Teguh W., RendySetiawan

4. SALIVARY GLAND'S PROTEIN PROFILES OF DOMINANT Vectors FOR MALARIA IN BANGSRING VILLAGE, WATUDODOL DISTRIC, BANYUWANGI – INDONESIA
Hasa Bella, Suci Ummi Roziqotul, Hidayat Teguh Wiyono, Syubhanul Wathon, Rike Oktarianti, Kartika Senjarini

5. DIVERSITY OF MALARIA’S VECTOR Anopheles spp. IN CAMPUREJO VILLAGE, BOJA DISTRICT, KENDAL REGENCY, CENTRAL JAVA PROVINCE
Kurniawati Diyah Pusparini, Hidayat Teguh Wiyono, Syubhanul Wathon, Rike Oktariantiand Kartika Senjarini

6. OPTIMAZATION OF RAPD-PCR CONDITION FOR GENOTYPIC IDENTIFICATION OF LACTIC ACID BACTERIA ISOLATED FROM BEKASAM
Agus Wijaya, Philip Wiedemann, Andreas Lux, and Basuni Hamzah

Certificate Distribution
TUESDAY, 8 AUGUST 2017
TIME VENUE: PHOENIX BALLROOM
07.30-08.00 Registration
08.00-08.45 Invited speaker 3. The importance of N-terminal domain on the post-translation regulation of sucrose-phosphate synthase from sugarcane(Saccharum officinarum)
Prof. Bambang Sugiharto, Biology department, Faculty of Math and Natural Science, The University of Jember

Chairperson: Ach. Sjaifullah, Ph.D

08.45-09.30 Invited speaker 4. Ecology, Biodiversity and Human Welfare

Prof. Inocencio E. Buot Jr., Botany, Ecology & Biodiversity (University of The Philippines Los Banos-Philippine)

Chairperson: Ach. Sjaifullah, Ph.D

09.30-10.00 Coffee break

10.00-10.45 Invited speaker 5. Long-Term Changes in Water Quality in Lake Biwa With Special Reference to Organic Matter Dynamic, Microbial. Ecology and Diversity

Prof. Shin-Ichi Nakano. Centre for Ecological Research, Kyoto University, Hirano Shiga, Japan

Chairperson: M. Su’udi, Ph.D

Venue: ROOM PHOENIX

Parallel Oral Session.

Chairperson: Tri Candra dan Anak Agung Istri Dewi

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Parallel Oral Session

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**15.00-15.30 Coffee Break**  
**Venue: ROOM PAPUMA**

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**13.30-15.00 Parallel Oral Session.**  
Chairperson: Yudi Wicaksono and Hari Sulistiyowati

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2. **1D MAGNETOTELLURIC MODELLING AT TIRIS GEOTHERMAL AREA USING RECURSIVE FORWARD MODELLING**  
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3. **A MODEL OF RELATIONSHIP BETWEEN ABIOTIC FACTORS AND RIPARIAN VEGETATION RELATED TO THE BENTHIC MACROINVERTEBRATE AS WATER QUALITY INDICATORS IN THE LOTIC ECOSYSTEM**  
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INFECTIONOUS AGENTS IN BOVINE RED MEAT AND MILK AND THEIR POTENTIAL ROLE IN CANCER AND OTHER CHRONIC DISEASES

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Abstract

A large number of global epidemiological studies linked specific cancers and neurodegenerative diseases to the consumption of red meat and dairy products. The geographic pattern suggested a species-specific role for the consumption of such products from Eurasian cattle. We initiated a search for potential infectious agents from serum and dairy products of these cattle and isolated and sequenced more than 30 single-stranded circular DNAs, consisting of ~1,000 to ~3,000 nucleotides in length. Four different families were identified and named as bovine meat and milk factors (BMMF). Except for one group, the other isolates revealed remarkable nucleic acid homologies to plasmids of Acinetobacter and Psychrobacter bacteria. Upon transfection of human cells, all those tested were transcriptionally and translationally active. In some human cells replication and synthesis of infectious progeny was noted. The infectivity depended on specific sialinic acid components, apparently required as components of cellular receptors. Four isolates were obtained from sera or an autopsy brain sample of multiple sclerosis (MS) patients. Serological analyses with consensus protein epitopes of BMMF-1 group revealed antibodies in healthy controls, but significantly elevated titers in MS patients. A model for the pathogenesis of MS has been published. Presently we analyze the seroreactivity of patients with malignant tumors and neurodegenerative diseases against antigens of all four isolated BMMF groups. Our data represent a first example of bacterial plasmid-derived sequences adapted to gene expression, autonomous replication and synthesis of infectious progeny in human cells. This opens new approaches to study their involvement in diet-linked cancers, neurodegenerative disorders, and autoimmune diseases.
STUDY ON MOLECULAR MECHANISMS ON PLANT ARCHITECTURE IN RICE

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Abstract
Crop grain yield is simply determined by grain number per unit area and grain filling rate. In rice, around 40% of biomass is carbon and over 1% is nitrogen. 80-90% of the whole carbon in biomass are made from light photosynthesis. In order to increase yield, total photosynthesis (net carbon gain) per unit area and grain filling capacity should be enhanced. Plant architecture determines the efficiency of canopy photosynthesis and plant number per unit area. In rice, lamina and tiller angles are ones of the key agronomical characters determining plant architecture. MPT1 (Modifier of Plant Type 1) belongs to a transcription factor family carrying a zinc finger "ID" (indeterminate) domain in rice. The study shows that MPT1 determines plant architecture. Studies demonstrated that MPT1 is an ortholog of Arabidopsis SGR5 (Shoot Gravity Response 5) that has been shown to be involved in shoot gravity response. MPT1 is specifically expressed in metaxylem and pulvinal tissues (gravity sensing organ in grasses). Mutant shoots exhibit severely reduced gravitropism while overexpressors showed hyper-response to gravity. Meanwhile, a main action of MPT1 on lamina inclination has been demonstrated to suppress the interaction between IAA (auxin) and BR (brassinosteroids) compounds. In order to further understand molecular mechanisms of MPT1-mediated molecular mechanisms, Y2H (Yeast Two Hybrid) and RNA transcriptome analysis have been performed to identify MPT1-interacting and target genes, and subsequent studies have been conducted to elucidate their functions. Current progresses will be presented in the seminar. Since overexpression of MPT1 leads to erect phenotype, current efforts will be discussed to create ideal plant types by manipulating MPT1 expression and evaluating agricultural utilities of MPT1.
PRESENT STATUS OF INSECTICIDE RESISTANCE IN URBAN INSECT PESTS IN INDONESIA

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Abstract

Some insects such as the house fly, Musca domestica, the German cockroach, Blatella germanica, and the mosquito, Aedes aegypti are the most common pests in public areas. To control these pests, insecticides are mostly used by many professional pest control operators as well as home owners. Unfortunately, these insects are very difficult to control, due to their ability to develop resistance to many types of insecticides, as has been reported in many parts of the world. As for Indonesia, to the best of our knowledge, resistance of urban insect pests to insecticides is poorly documented. For example, until 2011, the only available information about resistance of the German cockroach, Blatella germanica to permethrin was only from one report published in 2009. Therefore, knowing that the information on the resistance of Musca domestica, Blatella germanica and Aedes aegypti to commonly used insecticides from Indonesia is still limited, this report describes the present resistance status of Musca domestica to pyrethroid and neonicotinoids; Blatella germanica to pyrethroid, carbamate, and phenylpyrazole; and Aedes aegypti to pyrethroid and organophosphate. To monitor insect resistance to various group of insecticides, the insects were bio-assayed. The results showed that in general, the majority of cockroach strains exhibited very high resistance levels to pyrethroid (permethrin), low to high resistance to carbamate (propoxur), and were still susceptible to phenylpyrazol (fipronil). Meanwhile for Musca domestica, the majority of all strains showed very high resistance to pyrethroid (permethrin), and showed no to very low resistance to neonicotinoids (imidacloprid). Whilst for Aedes aegypti, all strains exhibited high resistance to pyrethroid (permethrin), but were still susceptible to organophosphate (malathion). The findings recommend that monitoring of resistance levels, as well as understanding the possible underlying mechanism of resistance, can be used in formulating potential strategies for insects resistance management.

Keywords: Musca domestica, Blatella germanica, Aedes aegypti, resistance status, insecticides, Indonesia
QUALITY MANAGEMENT IN THAI MANGO SUPPLY CHAINS TO MEET THE NEEDS OF CONSUMERS: A CASE STUDY OF MANGO EXPORTING TO JAPAN MARKET

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Abstract

Thaimango cv. ‘Nam Dok Mai’ is an important commercial fruit of Thailand for exporting to Japan market where sets up a very high quality standard of the fruit. A Thailand exporter established the capital infrastructure for preparing high quality mango for Japan market under the Japan-Thailand Economic Partnership Agreement (JTEPA). Since the high stringency of investigation of pesticide residue remaining as well as fruit fly and disease contamination at the Japan plant quarantine, the mango quality management has to be started from the upstream supply chain at farm level and followed by the supply chain operation to the market. The mango growers must affirm their orchards under the Japan Good Agricultural Practice certification when the best practice manual was prepared by the Department of Agricultural, Ministry of Agriculture and Cooperatives, Thailand. GAP-certified orchards were selected to be a partner of mango exporting company. Mango fruit were bagged 40 days before harvesting in order to minimizing anthracnose disease caused by Colletotrichum gloeosporioides which is a very serious postharvest problem at the market places. A week before harvesting, the fruit were randomly sampled to check pesticide residues under the plant quarantine regulation whereas after harvested, the fruit were thoroughly checked for a suitable maturity, primarily sorted and uniformly weighed at local farm packing houses. At the packing house of exporting company, the fruit have to be washed and cleaned by chlorinated water, then dipped in 50°C hot water for 5 minutes. All fruit were cooled down in normal temperature water for 1-2 minutes, quickly dipped in 400 ppm ethephon, and then air dried. After graded and sized according to the quality standard, the fruit were passed through vapor heat treatment at 47°C constant of pulp temperature for 20 minutes for killing habitat insects. Fruit were then protected by individual foam net and packed in a carton box containing 3/5 kg/box. Boxes were transported by refrigerator trucks at 13°C to the airport and shipped by airfreight.

Keywords: Supply chain, quality management, mango
THE IMPORTANCE OF N-TERMINAL DOMAIN ON THE POST-TRANSLATION REGULATION OF SUCROSE-PHOSPHATE SYNTHASE FROM SUGARCANE (*Saccharumofficinarum*)

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Abstract
Sucrose-phosphate synthase (SPS; EC 2.4.1.14) is believed to be the key enzyme controlling photosynthetic carbon flux into sucrose in plants. Studies on carbon assimilating enzymes revealed that among photosynthetic enzymes, the SPS activity determined sucrose synthesis and accumulation in the *Saccharum* species. Further study at molecular levels found the presence of SPS gene family in sugarcane; they were photosynthetic *SoSPS1* and non-photosynthetic *SoSPS2* genes (Sugiharto, *et al.* 1997 [Plant Cell Physiol. 38: 961-965]). To identify their function, the *SoSPS1*-cDNA was overexpressed in plants and resulted in elevation of SPS activity and sucrose accumulation in leaves of transgenic tomato and sugarcane. However, when the *SoSPS1*-cDNA was overexpressed in *Escherichia coli*, two forms of SPS1-A and SPS1-B proteins were detected by immunoblotting, one with a full length size equivalent with the authentic enzyme from sugarcane leaves and the other with a truncated form shorter by ca 20 kDa, respectively. Molecular and biochemical characterization of the truncated SPS1-B showed that the protein was lacking N-terminal domain, but has higher specific activity and no regulation by an allosteric effector of glucose 6-phosphate (G6P) (Sawitri, *et al.* 2016 [J. Biochem. 159:599-607]). These results indicated that the N-terminal region of sugarcane SPS is play a crucial role for the allosteric regulation and may the function like a suppressor domain for the enzyme activity. In addition, it is well documented that SPS activity is regulated by light/dark transition facilitated by phosphorilation-dephosphorilation processes, active during light and less-active in dark time, and the regulation is envolved metabolite of G6P. Thus, in planta studies on the importance of N-terminal domain on theregulation of the SPS are needed to determine the regulation. The N-terminal digested of *SoSPS1*-cDNA was constructed in an expression binary vector and overexpressed in transgenic tomato. This presentation will also discuss about a possibility regulation of SPS by the allosteric effector in respond to dark/light transition. The structural analysis on sugarcane photosynthetic SPS1 is also necessary to have a better understanding on the allosteric property.

Keywords: sucrose-phosphate synthase, sucrose accumulation, post- translational regulation, sugarcane. This research was supported by Ministry of Research, Technology and Higher Education of the Republic of Indonesia (PUSNAS, 2017) and International Collaborative Research Program of Institute for Protein Research, Osaka University, Japan (2016).
LONG-TERM CHANGES IN WATER QUALITY IN LAKE BIWA WITH SPECIAL REFERENCE TO ORGANIC MATTER DYNAMICS, MICROBIAL ECOLOGY AND DIVERSITY

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Abstract

During the last three decades, the water quality of Lake Biwa, the largest freshwater lake in Japan, has been improved through collaboration among multiple stakeholders. Mysteriously, a portion of organic matter expressed by chemical oxygen demand (CODMn) in the lake has been gradually increasing every year. Some researchers have reported that the increase in CODMn might be due to the accumulation of refractory and/or semi-labile DOM, and those DOM might be autochthonously produced. We have partly clarified the microbial processes with special reference to production of those DOM in Lake Biwa, especially in the lake’s hypolimnion. In the epilimnion of the lake, phytoplankton biomass is produced through primary production, followed by sinking into the hypolimnion. In the hypolimnion, a part of the phytoplankton biomass is converted into and produced as humic-like DOM through decomposition by planktonic bacteria. Fluorescence in situ hybridization (FISH) showed that bacterial clade, CL500-11 (phylum Chloroflexi), predominates in the hypolimnion. We made further analyses on prokaryotic community composition by high throughput 16S rRNA gene amplicon sequencing which showed the dominance by members of Planctomycetes exclusively occurred in the hypolimnion. In addition, FISH on eukaryotes showed that bacterivorous kinetoplastid flagellates are the dominant eukaryotes in the hypolimnion. So, the results indicate the presence of unique microbial food webs in the hypolimnion of Lake Biwa, where humic-like DOM is produced by the hypolimnion bacterial assemblages, and those bacteria are grazed by the dominant kinetoplastids and other hypolimnion dwelling bacterivorous protists.

Keywords: Eutrophication, Chemical Oxygen Demand, Dissolved Organic Matter, Phytoplankton, Bacteria, Decomposition, Microbial loop, Protists
ECOLOGY, BIODIVERSITY AND HUMAN WELFARE

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Abstract

The paper discusses the interaction between ecology, biodiversity and human welfare. Mountain forest zonation and environmental science research studies of the author from the Cordillera mountain ranges, southern Luzon mountains, Cebu remnant forests in comparison with other mountains in Asia are cited. One common characteristic in these mountains is the general ascent of lower altitude dominants once higher altitudes underwent disturbances like deforestation. The pines of the Cordillera encroached and dominated higher altitudes after oaks were cut. Definitely, there is reduction of ecosystem services with the destruction of oaks. Sound ecology means meaningful human-nature interaction, resulting to rich biodiversity and sustainable ecosystem services enhancing human wellbeing amidst changing climatic regime. Hence, there is a need to have an in-depth study of the general trend and zonation pattern in Philippine mountains to come up with appropriate ecosystem landscape management strategies to have sound ecology and healthy environment. A number of strategies are discussed to enhance sustainability and resiliency. These include land use planning, establishing landscape corridors, and an effective community biodiversity education among others.

Keywords: Ecology, ecosystem services, landscape, resiliency, land use, climate.
ABSTRACT ORAL PRESENTATION
CHARACTERIZATION OF NPR1 ANKYRIN DOMAIN FROM CHILLI PEPPER (*Capsicum annuum* L.)

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Abstract

The study aims to determine the genomic structure of the NPR1 ankyrin domain isolated from *Capsicum annum* cv. *Cabai Berangkai* and predict its secondary and tertiary structure by homology protein modeling. The three weeks old chili leaves were taken as samples for DNA isolation. The NPR1 gene was amplified using specific primers by Nested and Touch-Down PCR for two rounds. The second round PCR products were cloned into pGEM T-Easy vector and transformed into *E.coli* DH5α via heat-shock method. The transformants were verified by colony PCR and sequencing. The sequencing data was used for genomic analysis and to determine the 3D structure of the NPR1 ankyrin domain. The sequence analysis of ankyrin domain between CbNPR1 and AtNPR1 resulted in 62.5% identity and 78.1% similarity. The conserved important amino acid of Cys216 and His334 were also observed. In the secondary structure ankyrin repeat containing helix-and β sheet conformation was observed. These conformations were confirmed by tertiary structures using Ankb 24 protein as a template. In conclusion, all of the results suggested CbNPR1 and AtNPR1 are predicted for having similar structural conformation and biological function in the plant defense system.

Keywords: *Capsicum annum*; NPR1; Ankyrin; Homology Modeling Protein
GENETIC PERFORMANCE OF FOUR SOYBEAN VARIETIES GROWING ON THE LAND POLLUTED BY FLY ASH SEWAGE

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Abstract

Fly ash sewage was treated to soybean with 300 ppm/plant could be increased plant height, generative parameter, and to make earlier the first flowering and harvest time. There are indicated that soybean eight weeks after planting with 300 ppm / plant treated to four soybean varieties significantly increase the plant height from 86.17 cm into 95.0 cm for ijen variety, 89.67 cm into 91.33 cm for kaba variety, 96.83 cm into 101.67 cm for tanggamus and 87.83 cm into 93.17 cm for anjasmoro. Dose of 300 ppm / plant treated to four soybean varieties significantly increase the average of seed weight 184.17 g into 191.25 g for ijen, 185.57 g into 188.83b for kaba, 214.13 g into 293.13 for Tanggamus and 148.50 g into 213.63 cm for anjasmoro. Between four varieties tested that tanggamus was shown a good genetic performance compared to other varieties. Fly ash is not only polluted environment, but it could be also increased growth and production of seeds of four soybean varieties. Fly ash waste treated to soybean with suitable doses could be increased growth and dry weight of seed. Fly ash is became a fertilizer in low doses to plant and it could be used as fertilizers and all at once to save our environment.
ISOLATION AND BIOASSAY OF PHOSPHATE BIOFERTILIZER FOR MAIZE

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Abstract

Phosphate biofertilizers is a low cost and environmentally friendly of tropical bioresources for increasing the P availability, soil health, the fertilizers efficiency and the productivity of maize on acid soils. The Phosphate-Solubilizing Rhizobacteria (PSR) were screened and isolated from agricultural soils (maize rhizosphere) and natural forest ecosystem. Laboratory work and green experiment has been conducted to selected the best of PSR isolate and to investigate the response of maize to PSR as inoculant for P biofertilizer. Based on the phosphate solubility and phosphatase activity were isolated five of PSR isolates The bioassay test of the five isolates using the maize seedling until 21 days were obtained three isolates of PSR that the most potential for P biofertilizers which have capability in improving plant root length and ratio of plant-root dry weight of maize seedling.

Keywords: Bioassay, Bio-fertilizers, Phosphate Solubilizing rizhobacteria (PSR), Bioresouces, Maize
FORMULATED BIOMELIORANT AS BIOFERTILIZERS AND
SOIL CONDITIONER FOR ENHANCING SOIL HEALTH,
BENEFICIAL RHIZOBACTERIA POPULATION AND THE
PRODUCTIVITY OF SOYBEAN

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Abstract

Intensive use of inorganic fertilizers and others chemical product has boosted and accelerated the declining of soils health and the levellingoff of crops productivity. Soybean as one of important and strategicfood ‘crops is highlyinfluenced by the soil acidity and the usage of conventional ameliorants (lime, dolomite and compost). We formulated organic based bioameliorant containing activated carbon,organic extract, humic substanaces and nitrogen fixer (*Bradyrhizobium japonicum*) phosphate soilubising bacteria as biofertilizers and soil conditioner for improving the soil properties and enhancing the beneficial rhizobacterial population, growth and yield of soybean on acid soils. The experiment was arranged as randomized block design, consisted of 7 treatments (0, 4, 8, 12, 16 kg ha⁻¹ of bioameliorant, 1 ton ha⁻¹ dolomite and 1 ton ha⁻¹ manure) and provided with 4 replications. The experimental results revealed that enriched organic bioameliorant with relative low dosage gave significant effect on improving the soil chemical properties, and increasing the activity of beneficially rhizobacteria (PGPR) in soils (*Azospirillum sp.*, *Pseudomonas sp.*, and *Bacillus sp.*) and grain yield,Application of 8-12 kg ha⁻¹ of bioameliorant increased the grain yield of soybean significantly (about 48,6-51,4 % higher than control) and this result was not different significantly either with application 1 ton ha⁻¹ dolomite or 1 ton ha⁻¹ organic manure.Consequently, application of 8-12 kg ha⁻¹ of bioameliorant can be applied to substitute the use of conventional ameliorant and increase the soil health and productivity of soybean in acid soils.

Keywords: bioameliorant, biofertilizers, soil conditioner, beneficial rhizobacteria, soybean
SOIL VARIABILITY AND SUGARCANE \((Saccharum officinarum \text{ L.})\) BIOMASS ALONG ULTISOL
TOPOSEQUENCES

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Abstract

Uniforming sugarcane management without any knowledge of soil variability could result in some parts of a sugarcane field receiving insufficient inputs, while other parts receive an excess input. The research aimed was to assess soil variability and sugarcane biomass along Ultisol toposequences in Central Lampung. Two sugarcane catenas and one forest catena were fully described in the fields. Soil horizons are represented by Ap/Ah/M, E, B, Cc and Cg with dominant clay translocation. Gleying symptom was found only in the lower slope to depression. Concretion depths can be used as an erosion indicator if the soil parent material is well characterized. Soil P has a maximum value of Ap horizon and decreases with depth and no effect of internal erosion in the form of soil P accumulation in subsoils, except for the colluviated horizon. Kaolinite clay is dominantly found to buffer changes in pH, except Ap horizon of sugarcane. The organic C depends on the pedogenesis and catena form. Al saturation indicates the dominant soil weathering intensive. Al saturation in the Ap horizon (Catena G1; G2) was reduced from 80 % to 20-40 % caused by liming and fertilization. Catena position was the main factors causing the increasing soil variability, which was responsible for the variability of sugarcane biomass. The sugarcane biomass increased with decreasing the slopes. The highest biomass was found in the depression (105 tones/ha) if the sedimentation process is characterized by the formation horizon M and accompanied by the nutrient accumulation from the hilltops.

Keywords: Soil variability, sugarcane biomass, Ultisol toposequences
MORPHOLOGICAL CHARACTERISTICS OF SENGON STAND (*Paraserianthes falcataria*) IN AREA FOREST KPH BLITAR JAWA-TIMUR

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Abstract

*Paraserianthes falcataria* (sengon) Family of Fabaceae that grows in East Java province based on observations in the field, these plants show the potential to accelerate the process of soil fertility. Character of shape, morphology and intensity of sunlight that is required by sengon stand for the process of soil enrichment in the forest, is not known for certain. This research is carried out to determine the symptoms of morphological characters, sengon tree as a contributor to the process of soil fertility. Dependence intensity of sunlight for sengon is still needed every season. Plant morphology can be from various literature while characterization observed by observation method such as light intensity, irradiation time, field height whereas sengon stand include, number of branches, width of crown, number of canopy, tree height and tree age. There are 9 types of Sengon varieties in East Java, especially shade KPH Blitar. The amount of litter loss contain polifenol that is under the headings in the class age of 5 years about 0.323 %. The intensity of sunlight from the age of 5 years decreased from 45.520.6 lux in 30% and will become 2543.8 lux at the shade level of 80%.

Keywords: Intensity, Fertility, Varieties, Stands, Age
The paper aimed to analyze and to understand why farmers avoid deep peatland for food crop farming. This research has been conducted from August to November 2016 in South Sumatra Province. Socio-economic data were collected by using a purposive sampling method, while spatial data were recorded with GPS and data processing of Landsat image and field survey using GIS program. There are two main reasons why farmers avoid deep peatland for food crop farming, firstly the deep peatland has a lot of limiting factors for food crop farming, and secondly most of the deep peatland area (around 70%) has been devoted by the Government to private large companies for oil palm plantation and acacia timber plantations (HTI), while the remaining about 30% of peatland is reserved for food crop farming (local farmers) and conservation area. The deeper peatland is described, the lower rice yield and income of farmers will be achieved; the local farmers prefer to cultivate food crops in shallow peatland only. Judging in managing peatland success is mainly dependent on our intention and perception to peatland, especially regarding its function and vulnerability and the understanding of its all natural processes.

**Keywords:** Analyzing, farmers, deep peatland, food crop, farming
OPTIMATION OF PALM EMPTY FRUIT BUNCH AND PALM KERNEL SHELL BIO-BRIQUETTES CHARACTERISTICS USING RESPONSE SURFACE METHODOLOGY

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Abstract
Palm empty fruit bunches (EFB) and palm kernel shells (KS) are the abundant waste of palm oil plantation and the palm oil industry. This study used the raw material of EFB and KS to produce bio-briquettes. The research objectives were to determine the effect of EFB to KS ratio and starch adhesive concentration on the quality of the bio-briquettes, the optimal ratio and adhesive concentration were studied using Response Surface Methodology. The raw materials were carbonized in less oxygen conditions and sieved to 40/60 mesh. The ratios of EFB to KS were 0:1; 1:3; 1:1; 3:1; and 1:1 (w/w) were mixed, and 4%, 6%, 8%, 10%, and 12% (w/w) starch adhesive were added. Each bio-briquet was shaped with a cylindrical mold and pressed by hydraulic pressure. Furthermore, they were dried under the sunshine. The heating values were carried out using bomb calorimeter K88890. Response Surface Methodology was applied in order to obtain the optimal result among the response variables. The results showed that bio-briquet made of KS with 8% starch adhesives, gave a heating value up to 5634 cal/g. The other characteristics such as moisture content, relaxation, and density were respectively 7.62%, 3.03%, and 0.857 g/cm$^3$. The bio-briquettes meet the national standard and suitable to apply as green energy.

Keywords: bio-briquettes, palm kernel shells, palm empty fruit bunches, starch, heating value, response surface methodology
IN VITRO FERMENTATION OF PREBIOTIC XYLOOLIGOSACCHARIDES FROM CASSAVA WASTE BY 
*Lactobacillus* spp.

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Abstract

Xylooligosaccharide widely used as a prebiotic. Xylooligosaccharide can be generated from waste such as cassava waste. The study was carried to analysis cassava waste xylooligosaccharide as prebiotic. Production of cassava waste xylooligosaccharide from by hydrolysis cassava waste xylan by endo-1,4-β-D-xylanase from *Bacillus subtilis* in abdomen termites. Xylooligosaccharide added into MRS Modification (MRSM). MRSM made with a concentration of 0%, 1%, 3% and 5% and MRSB made as a comparison. Media is fermented in an incubator and analysed of fermentation products on the hour-0, 12, 24, 36, and 48. The analysis was conducted of the growth of *Lactobacillus acidophilus*, types and levels of short chain fatty acids (SCFA), pH changes, and reducing sugar levels. The results of this study were XOS (5%) hydrolysis endo-1,4-β-D-xylanase (31.3 U/mg) as a prebiotic potential indicated by an increase in the growth of *L. acidophilus* to 8.61 log CFU/ml and produce fermented products such as short chain fatty acids (acetic acid 14.42 mM, propionic acid 0.25 mM, isobutiric acid 0.13 mM, n-butiric acid 0.41 mM, n-valeric acid 0.02 Mm, isovaleric acid 0.25 mM, and lactic acid 25.08 mM).

**Keywords:** endo-β-1,4-D-xilanase, cassava waste xylooligosaccharide, *L. acidophilus*, SCFA
ENFLEURATION AND CHARACTERIZATION OF ESSENTIAL OIL FROM *Cananga odorata*

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Abstract

Enfleuration is a method for extracting essential oils using cold fat as an adsorbent. This research has explored the use of enfleuration for extracting essential oils from *Cananga odorata* using snow white (butter). The enfleuration were carried out in the duration of 1, 3, and 5 day enfleuration, with a 24-hour interval of flower change; and without any flower changes during enfleuration. The results showed that the longer duration of enfleuration will increases the yield of Cananga oil extract in both methods, even by changing or without changing the flower samples. However, changing the flower samples in every 24 hour during five day enfleuration resulted in the highest yield of Cananga oil extract, 0.777 %, while the lowest yield of cananga oil was obtained from one day enfleuration, only 0.090 %. The physical characteristics of Cananga oils obtained in this research corresponded to SNI 06-3949-1995. Five major chemical content on this Cananga oil extracts were quite similar, i.e β-caryophyllene, α-humulene, germacrene, δ-cadinene, and α-bergamotene.

Keywords: cananga, enfleuration, essential oils
DETECTION OF PADDIES REFLECTANCE TO CLASSIFY THEIR AGE USING RGB PHOTOGRAPH IMAGES

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Abstract

Rice is a very important food in the world, a staple food for more than half of the world's population, especially Asia. People in Asia plant rice crops, more than 90% of the world's rice crops which are grown. In the current technological era the conditions of agricultural crops such as rice can be monitored rapidly from the air. This study aims to classify the age of rice plants based on cartesian coordinate position vectors from the extracted basic, red, green, and blue color spectrum of reflectance. The research was done by taking the image of rice plants based on age classification and Furthermore, the extracted values of each spectrum is normalized and then be plotted on cartesian coordinate The result obtained from this research is the position vector of normalized RGB values be able to differentiate the age classification of rice plant. The each vector position represented a single group of age classification. The three vector units i.e. red, green and blue figure every axis on the 3 dimensional Cartesian coordinates. This research concluded that the 3-dimensional position vector method of cartesian coordinates, can classify the age of rice plants.

Keywords: Rice, RGB, position vector, cartesian coordinates
PRODUCTION OF NITROGEN-PHOSPHOR-SULPHUR (NPS) SLOW-RELEASE FERTILIZER USING POLYSTYRENE-STARCH WITH SPRAY COATING TECHNIQUES

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Abstract

Conventional fertilizer granules are generally used for agricultural growth and development. However, most phosphorus fertilizers face to inefficient using by plants. The aim of this research was to formulate the Nitrogen-Phosphorus-Sulphur slow-release fertilizer granules using polystyrene-starch as coating polymer. The coated fertilizer granules were prepared using spray coating method. The uncoated original, and the coated granules were evaluated by Fourier Transform Infrared Spectroscopy and Scanning Electron Microscopy in order to evaluate the chemical interaction between the granules and polymers, and the surface morphology of the granules. Infrared spectra of Nitrogen-Phosphorus-Sulphur slow-release fertilizer granules showed that no chemical interaction between fertilizer granule and coating polymer. The release rate of P2O5 from original and coated Nitrogen-Phosphorus-Sulfur fertilizer granules were 1.882 ± 0.065, and 0.941 ± 0.049 mg.h-1 (p <0.05), respectively. The release efficiency of P2O5 from uncoated and coated Nitrogen-Phosphorus-Sulfur fertilizer granules were 34.40 ± 1.03, and 71.32 ± 1.37%, (p <0.05) respectively. The release profile of the coated granules followed the Langenbucher kinetics (r = 0.980). It is depicted that polystyrene-starch bioblend polymers used are sufficient for coating NPK granules, leading to decrease the release efficiency and release rates of phosphor in distilled water.

Keywords: slow-release NPS fertilizers, polystyrene, starch.
IDENTIFICATION OF POLYKETIDE SYNTHASES IN *Elaeis guineensis* AND THEIR POSSIBLE ROLE IN RESPONSE TO *Ganoderma boninense* INFECTION

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Abstract

Polyketide synthases (PKSs) are essential catalyzing enzymes in a secondary metabolite biosynthesis pathway found in bacteria, fungi and plants to produce polyketide products which have diverse beneficial functions such as antibiotic and antiparasitic, including phytoalexin. In this study, we identified 38 PKSs in the genome of African oil palm, *Elaeis guineensis*, based on the presence of PKS domains in the amino acid sequences. Signal peptide signature motif was absence in all PKSs suggesting their intracellular functions. A molecular phylogeny showed relationship between PKSs in *E. guineensis*, *P. dactylifera* and *A. thaliana* that clustered into PKS-A, PKS-B and PKS-C clades. Most of the members in the first branch of PKS-A i.e. PKS01, -02, -03, -04, -06, -07, -08, -12, -14 and PKS37 were highly up-regulated after *G. boninense* treatment, the main fungal pathogen on oil palm, based on two RNA sequencing datasets. Among them, PKS12 and PKS14 were mapped into chromosome 3 and located in two neighboring secondary metabolite gene clusters. Others were unmapped and thus their loci remained unknown. All of these up-regulated PKSs were thought play an important role in producing one or more polyketide products that acts as plant defense compounds of oil palm against *G. boninense* invasion. According to our knowledge, this is a first report identifying PKSs in *E. guineensis*.

Keywords: *Elaeis guineensis, Ganoderma boninense*, phytoalexin, polyketide synthase, secondary metabolite.
STUDY OF YEAST CELL IMMOBILIZATION USING CELLULOSE BASED ON WASTE OF WOOD IN OPTIMIZING PRODUCTION OF BIOETHANOL

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Abstract

In this work, the production of bioethanol process has been done using immobilization of yeast cells in cellulose based matrix. The immobilization of microbial cells was carried out by trapping method into a cellulose polymer matrix. Cellulose is obtained from the waste of wood powder purified by the process of delignification and dehemicellulose. Fermentation is carried out with continuous cycles to determine the effectiveness of repeated use of immobilized cells. The effect of cellulose-alginate ratio on fermentation rate, content of ethanol, microbial leaching, and surface matrix morphology have studied. The results of FTIR spectrum show that the obtained cellulose has a spectral pattern similar to that of pure MCC. The fermentation process is effective up to four times of reuse. Analysis of the fermentation rate using ethanol sensors shows that the matrix made from cellulose-alginate yields a greater fermentation rate than those made from alginate alone. Cellulose-alginate ratio of 3: 2 and 1: 1 gave the largest fermentation rate than the other ratio. Analysis of ethanol content showed that cellulose-alginate (3:2) produced the highest ethanol for various cycles than other compositions. The results of the microbial leaching test showed the greater the cellulose composition used as the matrix, the smaller the occurrence of microbial leaching. This suggests that the presence of cellulose makes the yeast cells stronger bound in the matrix, because the density is greater than the matrix made of alginate only. Matrix density test results are in accordance with the results of SEM analysis.

Keywords: bioethanol, immobilization, cellulose, fermentation rate, leaching, Yeast cells
STUDY THE EFFECT OF DROUGHT STRESS AND BIOLOGICAL FERTILIZER TOWARD THE GROWTH OF MEDICINAL PLANT *Bracea javanica* (L.) Merr

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Abstract

Drought is known as the most destructive abiotic stress affecting the plant growth and productivity. The ability to tolerate is crucial for plant grown under drought conditions. The research to evaluate the effect of biological fertilizer to overcome drought stress was conducted to a medicinal plant, *Bracea javanica* (L.) Merr. The experiment was arranged in a completely randomized design with two factor treatments, namely drought stress and fertilizer treatments, with four replications. The drought stress treatments were performed in plants by three levels of watering period, i.e. watering every day, every 3 days, and every 7 days, whereas the fertilizer treatments consist of two types of medium, i.e. soil medium without fertilizer and a mixture of soil medium with compost as the biological fertilizer at a ratio 2:1. Observations were performed on 24-week *B. javanica* plants to obtain the data about water status in the medium and the vegetative growth parameters of *B. javanica*. The results showed that the drought stress treatments had a significantly effect on the water potential of the medium, but not to its temperature. The presence of fertilizer in the medium had the ability to improve the growth parameters of *B. javanica* plants subjected to drought stress treatments, such as in fresh and dry weight of the shoot, fresh weight of the roots, length of the shoots, the numbers of leaves, and steam diameters.

**Keywords**: *Bracea javanica* (L.) Merr, drought stress, fertilizer
EFFECTIVENESS OF FUNGI ISOLATED FROM RHIZOSPHERE PALM OIL FOR CONTROL \textit{Ganoderma boninense}

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Abstract

Stem rot disease causes major losses in the palm oil industry in Indonesia. \textit{Ganoderma boninense}, a virulent species triggers more leaf growth, leaves are pale green and withered, fractures, followed by the death of palm trees. Research on the effects of pathogenic \textit{G. boninense} stem rot disease of coconut palm and inhibition of \textit{G. boninense} growth inhibition and parasitation mechanism. The research method was done by exploration of fungi on rhizosphere of palm plantation around the main plate of oil palm plantation attacked by \textit{G. boninense}. The soil sample is processed by serial dilution and grown on PDA media. Identification is done through direct observation of the hypha, conidia and propagule. Inhibitory test was conducted by dual test method, the parasitation mechanism was done by observing the inhibition zone between antagonist fungi against \textit{G. boninense}. The results showed several species of fungi namely \textit{Aspergillus niger, Coclilobolus} sp. \textit{Geotrichum} sp. \textit{Mucor} sp. \textit{Penicillium} sp., \textit{Paecilomyces} sp. \textit{Rhizomucor} sp., \textit{Trichoderma koningii} and \textit{Trichoderma lignorum}. The dual test test showed that inhibition of \textit{Trichoderma} sp was inhibited when it was grown with \textit{Trichoderma} spp with inhibitory capacity of 27\% - 47\%. Parasitation is penetration by \textit{Trichoderma} sp in hyphae of \textit{G. boninense}. In general it can be concluded that \textit{Trichoderma} spp obtained from rhizosphere has potential as biocontrol agent of \textit{G. boninense}.

Keywords: Rhizosphere, Oil Palm, Biocontrol Agents, \textit{Ganoderma boninense, Trichoderma} spp.
UTILIZING OF AGRICULTURE WASTE AS POLLUTANT CONTROL: A REVIEW

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Abstract

Increasing of human and industrial population will be caused of environmental problem such as increasing pollutants in the environment. Heavy metals, chemical pesticides/fertilizers, industrial wastes are common pollutants that cause a bad effect for our health. Agriculture waste can be alternative natural product to reduce some pollutants. This paper presents a review on some agriculture waste such as rice husk or fruit skin waste can be utilized to reduce some pollutants. The purpose of this review article is to provide some information about utilizing of agriculture waste for environment. Further this information can be literature review to seeking another agriculture waste for pollution control.

Keywords: agriculture waste, heavy metals, industrial waste, pollutants, pollutant control
EFFECT OF PROCESSING METHOD AND FERMENTATION TO ENHANCE QUALITY OF ARABICA COFFEE

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Abstract

Research on the influence of processing methods and fermentation on arabica coffee has been done. The study aims to determine the effect different processing methods on pH, cupping test and coffee caffeine content. This research was conducted through two stages of treatment. First stage is the variation of fermentation time from 4, 6, 8, 10 and 12 hours and with the addition of yeast at 12 hours. Then stage II with variation of processing process that is store in open place (bucket) and store in closed place (sack) from 24, 48 and 72 hours and continued with fermentation process about 12 hours. The results of the first stage showed that the best fermentation time was at 12 hours with the decrease of pH reach 3.93 and the cupping score of 85.50. The addition of yeast did not give effect to the flavor with the total cupping score about 84.0. The results in stage II of open-air processing gave the score 84.5 and the highest caffeine area found at 48 hours.

Keywords: Cupping score, fermentation, caffeine, coffee processing, pH.
BIOLOGICAL CONTROL OF PLANT PARASITIC NEMATODE ON BLACK PEPPER WITH ENDOPHYTIC BACTERIA

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Abstract

One of the constraints in increasing the production of black pepper in Indonesia is yellow disease caused by plant parasitic nematodes \textit{Meloidogyne incognita} and \textit{Radopholus similis}. Currently, nematode control is generally conducted by using chemical pesticides. It is very important to find out control strategies that are more environmentally in order to improve the quality of black pepper and reduce the cost of production, namely the use of biological agents and organic materials. The main objective of this research was to evaluate the effectiveness of the formulation of endophytic bacterial isolates against plant parasitic nematodes \textit{Meloidogyne} spp and its effect on the plant growth and productivity of pepper as one component in an integrated pest management (IPM) of nematodes on pepper plants. The study was focused on testing the formulation from three endophytic bacterial isolates AA2, MER, MSJ that those have been known that able to suppress plant parasitic nematode \textit{Meloidogyne} spp and were able to increase the plant growth on previous research. The results showed that the formulation of endophytic bacteria treatment was able to reduce the number of gall \textit{Meloidogyne} spp / gall index and to improve pepper plant growth, as indicated by the number of leaves and number of branches of pepper in the greenhouse. Results in field testing in Bangka until now (the research is ongoing) indicates that the application of endophytic bacteria formulation can reduce the incidence of yellowing disease of pepper and increase the amount of flower on the primary branches of pepper plants as well as the number of nematode populations in the soil. Based on the results of this research that formulation of endophytic bacteria is expected to be an alternative integrated management for controlling plant parasitic nematode of pepper.

\textbf{Keywords}: \textit{Meloidogynes} spp, yellow disease, root gall, formulation, endophytic bacteria
DECOMPOSITION OF COFFEE PULP UNDER SOLID STATE FERMENTATION BY Aspergillus VT12

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Abstract

In coffee bean processing more than 40% coffee pulp was produced as hemicellulose wastes with high C/N ratio so that difficult to decompose. An isolate Aspergillus VT12 can grew well and produced extracellular crude enzyme under solid state fermentation on coffee pulp substrate base. The crude enzyme was observed actively breakdown or degrade coffee pulp substrate and released reducing sugars. The optimum activity of crude enzyme in pH 5 at 35°C. At 18 hours incubation, the crude enzyme had hydrolysis efficiency 1.49%.

Keyword: Aspergillus VT12, coffee pulp, solid state fermentation
ANTIMICROBIAL PEPTIDE: POTENTIAL FUNCTION OF ZmES GENE FAMILY FROM MAIZE

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Abstract

In tropical region, the losses of yield caused by pests, diseases, and soil problems are exacerbated by climatic conditions. Availability of insecticide and pesticide or agens that could maintain agriculture productivity is needed. Antimicrobial Peptides is one an potential agents for control plant diseases. The objective of this studies was to evaluate strucural capacity of ZmES gene and a possibility application for agricultural perpestictive. ZmES gene were isolated from egg cell of Maize, Genomic DNA was cloned an sequenced. Structural of ZmES was analyzed based virtual data base. At least the structural of ZmES has high homology to the defensins of Rs-AFP1 from Radish. Prediction function analysis of ZmES structure will be discussed in more detail in this papers.

Keywords: antimicrobial peptide, AMPs, ZmE, Smaize, Defensins,
COMPOSITE OF ZEOLITE AND ARROWROOT STARCH BASED HYDROGEL AS MATRIX FOR CONTROLLED RELEASE AMMONIUM SULFATE FERTILIZER

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Abstract

Agricultural productivity can be improved by intensification through fertilization. Giving fertilizer directly to the plant was known ineffective and inefficient. Most of the fertilizer will be dissolved by the irrigation or rainwater so it can pollute the environment. The use of polymer as controlled release fertilizers (CRF) is very beneficial because it can reduce the amount of dissolved fertilizer such as ammonium fertilizer. The hydrogel composite can be synthesized from arrowroot starch, hydrolyzed monomer (acrylamide-co-acrylic), zeolite as mineral, and ammonium sulphate fertilizer through polymerization process. IR spectrum analysis indicates change or shift of wavenumber as the indicator of successful monomer grafting, zeolite adding, and fertilizer loading. Swelling ability test of hydrogel increase as the increase of buffer pH value as immersion medium and decrease due to addition of zeolite and fertilizer. The result of ammonium release analysis from hydrogel composites increase with the increase of buffer pH value and the amount of loaded fertilizer.

Keywords: composite, arrowroot starch, CRF, ammonium
EFFECTS OF POTASSIUM FERTILIZER AND GIBBERELLIN ON YIELD OF CAYENNE PEPPER (*Capsicum frutescens* L.)

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Abstract

Cayenne pepper (*Capsicum frutescens* L.) is one of horticulture commodities which is categorized in annual crop and has high economic value and widely developed in Indonesia and has an important role in the fulfillment of food. Production of this plant each year decreased one of them due to loss of flowers and fruit. One effort that can be done to increase the productivity of cayenne pepper is the addition of potassium fertilizer and gibberellin hormone is known to suppress the occurrence of flower and fruit loss. The purpose of this study is to obtain the dosage of potassium fertilizer and the appropriate concentration of gibberellin hormone to increase the productivity of cayenne plants. This research was conducted in plastic house from June to December 2016, located in Tugusari Village, Bangsalsari district, Jember Regency, with Complete Random Design (RAL) pattern and repeated twice. The first factor is the fertilization of Potassium K0 (0 g KCl / plant), K1 (5 g KCl / plant), K2 (10 g KCl / plant), K3 (15 g KCl / plant). The second factor is G0 (0 ppm), G1 (50 ppm), G2 (100 ppm) and G3 (150), with doses of 20 ml / plant at the beginning of the flower, ie 40 HST (day after planting) and 40 ml / The plant at the beginning of the fruit pentil that appears 62 HST (day after planting).

Keywords: cayenne pepper, potassium fertilizer, gibberellin, productivity
THE INSECTICIDAL ACTIVITY OF A AND B ASARONE ON SILICA NANOPARTICLES AGAINST THE CABBAGE HEART WORM

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Abstract

The prospect of using botanical insecticides to control the insect pests is very promising. However, there are some factors limiting their efficacy. Short release rate at the point contact, the inherent volatility and vulnerability to oxidation and ultra-violet light are causing phytochemical changes during the application. The use of nanoparticles is a novel technology with their potency to maximize the efficacy of phytochemicals. One of the promising plant contained insecticidal compound is Acorus calamus. The main compound of A. calamus, α and β asarone. The improvement of α and β asarone on silica nanoparticle with their potential to maximize their efficacy against the cabbage heart worm, several findings have been achieved. In term of findings, it showed that β asarone adsorp more than α asarone with the silica nanoparticle (SNP) surface. However, β asarone more polar than α asarone so the β readily release on SNP surface. The rate release of α and β asarone had similar pattern. The higher concentration of the asarone and the short duration of storage time had influenced on the rate release of asarone. At the concentration 0.2% of asarone on SNP with the 30 days storage time, released 60% of α asarone and 100% of β asarone. The dispersion rate which had effect on the stability of the formulation showed that both asarone had similar pattern with 20-30% of asarone had been dispersed after 13 hour. Another finding showed that during bioassay, there is no phytotoxic effect found on the leaf disks. The bioassay showed that both of α and β asarone on silica nanoparticle had significant effect as compared to the control, however among the formulations did not show any significant effect. Though, the number of death insect and malformed insect is higher on β asarone on silica nanoparticle than α asarone on silica nanoparticle

Keywords: Acorus calamus L., silica nanoparticle, cabbage heart worm, improving activity
INCREASING RESISTANT STARCH TYPE 3 ON MODIFIED CASSAVA FLOUR (MOCAF) THROUGH ONE CYCLE AUTOCLAVING-COOLING COMBINED WITH DEBRANCING ENZYME PULLULANASE

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Abstract
Currently Modified Cassava Flour (Mocaf) is widely used as food ingredients as a substitute for replacement for wheat flour either because they have good functional values such as rich in fiber and contain no gluten that is believed to be related with certain diseases such as autism. One way to enhance the functional value of Mocaf we can increase the content of resistant starch (RS) that have role as a prebiotic. Resistant Starch type 3 (RS3) formed through retrogradation of a gelatinized starch. Previous research by Asbar demonstrated increasing levels of as much as 8.73 % RS3 Mocaf treated with 3 cycles of heating and cooling process (autoclaving-cooling). Another study by Zahruniya using one cycle's method of autoclaving-cooling combined with debranching enzyme pullulanase showed an increase levels of RS3 on cassava starch by 87.64 %. The purpose of this study is to improve the levels of resistant starch Mocaf through one cycle of autoclaving-cooling combined with debranching enzyme pullulanase. The results indicate after heating at 121 °C for 1 hour and cooling at -20 °C for at least 6 hours followed by debranching using pullulanase in a temperature of 50 °C for 24 hours resulted in increased levels of RS by 36%.

Keywords: Modified Cassava Flour (Mocaf), Resistant Starch type 3, autoclaving-cooling, Pullulanase.
ANTIFUNGAL POTENCY FROM WALUR (Neonauclea gigantea (veleton) Merr.)

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Abstract
This study aims to determine the anti-fungal activity of Candida albicans from leaves, bark and wood of Walur (Neonauclea gigantea (veleton) Merr.) plant. Extraction uses three kinds of solvents (n-Hexane, ethyl acetate, and methanol). Phytochemical testing and anti-fungal activity were performed on nine extract samples obtained. The results of phytochemical tests on leaves, wood, and bark showed that all samples contain carbohydrates. Only methanol extracts of bark containing alkaloids. Flavonoids are present in 7 extracts except in bark and wood extracted n-hexane solvent. Saponins are present in methanolic extracts from leaves and wood. The results of terpenoid testing showed only the methanolic extract from the bark gave a positive result, while the steroid was found only in the ethylacetate extract of the leaves. Anti-fungal testing of n-hexane extract on wood obtained inhibition results of C. albicans fungi at a concentration of 500 μg of 12 mm, 250 μg of 9.33 mm, and 125 μg of 8.66 mm. While the n-hexane leaves extract obtained by 500 μg inhibition of 13.33 mm, 250 μg of 14.33 mm, and 125 μg of 10.33 mm. From these results it can be seen that the samples of n-Heksan extracted leaves have higher inhibition rates.

Keywords: antifungal, Candida albicans, Walur plant
SITE-DIRECTED MUTAGENESIS TO IDENTIFY THE ACTIVE SITE OF RECOMBINANT SUCROSE PHOSPHATE SYNTHASE FROM SUGARCANE

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Abstract

Sucrose phosphate synthase (SPS; EC 2.4.1.14) is playing the physiological role of regulating photosynthetic carbon flux into sucrose and believed to be the key enzyme for controlling biosynthesis of sucrose. SPS catalyzes the transfer of glycosyl group from an activated donor sugar, uridine diphosphate-glucose (UDP-G), to a sugar acceptor fructose-6-phosphate (F6P), resulting in the formation of UDP and sucrose-6-phosphate (S6P). We have cloned cDNA of SPS from sugarcane leaves and reported that sugarcane SPS (SoSPS1) is considered to be a representative of enzyme responsible for photosynthesis with the regulatory function (Sugiharto et al., 1997). Previously studies found that deletion of N-terminal increased the specific activity of recombinant SoSPS1 (Sawitri et al., 2016). SPS contains glycosyltransferase domain which is responsible for catalytic function of SPS. However, the information of functional site for catalytic reaction in glycosyltransferase domain is not clearly understood. Active site of enzyme has a crucial role for binding substrate and undergoing a chemical reaction. Therefore, it is necessary to identify the active site of UDP-G to solve the physiological and functional role of SoSPS1. In this study, we introduce to sequence similarity of the enzymes that shared similarly glycosyltransferase domain in order to select the target of mutation. Domain-based approaches identify homologous proteins by comparing protein domain architecture. The conserved sequence is predicted to be a target of enzyme active site and it may be essential for specific contribution to catalysis enzyme. Using site-directed mutagenesis through substitution of another residues at predicted active sites and analysis of enzyme kinetics would provide an important insight into the underlying catalytic mechanism of enzyme. The resulting mutants suggest the knowledge about in vitro modification to explore SPS functional sites and offer potential prospects for modifying catalysis of sucrose synthesis by the idea of redesigning SPS enzyme.

Keywords: sucrose phosphate synthase, recombinant enzyme, site-directed mutagenesis, sugarcane
THERMAL AND PASTING PROPERTIES OF CORN STARCHES WITH DIFFERENT COMPOSITION AND AMYLOSE CONTENT

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Abstract

In this work we examine commercial corn starch and laboratory corn starch (native). Native corn starch is made only by physical process without any chemical addition. Those processes influenced its nutrition composition. Commercial corn starch consist higher starch and amylose content than native corn starch. Native corn starch had protein and ash compound 10 times higher than commercial corn starch. Compound group analysis using FTIR showed that commercial corn starch had lower peak at wavenumber around 3000 cm\(^{-1}\) and 1550 – 1700 cm\(^{-1}\) than native corn starch. Thermal evaluation using DSC showed that commercial corn starch had gelatinization and pasting temperature around 75.5\(^{\circ}\)C and 80.2\(^{\circ}\)C respectively. However, native corn starch had higher thermal characteristics by 79.3\(^{\circ}\)C and 84.2\(^{\circ}\)C for gelatinization and pasting temperature. Interesting result was showed by RVA analysis, while native corn starch had peak viscosity 1420 cP, commercial corn starch had peak viscosity 3852 cP. It is assumed different thermal and pasting characteristic of those corn starches will promote its different application in food industry.

Keywords: corn starch, thermal and pasting properties, nutrition compound
AMYLOSE CONTENT AND FUNCTIONAL PROPERTIES OF SECOND GRADE TRADITIONAL CASSAVA STARCH TREATED BY OXIDATION USING HYDROGEN PEROXIDE: INFLUENCE DIFFERENT CONCENTRATION AND REACTION TIME

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Abstract

In this work, second grade of traditional cassava starch which had poor quality, was tried to improve its properties by hydrogen peroxide oxidation. The starch was oxidized with hydrogen peroxide on level 0.5 to 2% (based on starch) for 30 and 60 minutes. As controls were first grade and second grade of traditional cassava starch which were not treated by oxidation. The oxidation process was run in pH 9. As result of oxidation, amylose content of oxidized starches was higher than controls. The result showed oxidation only slight changed colour and water content of starch. Viscosity which measured at temperature 60°C and 80°C showed that first grade starch was more viscous than second grade starch and oxidized starch. Higher hydrogen peroxide concentration promoted lower viscosity of oxidized starch. Gel strength of second grade starch was improved because of oxidation. Interestingly, oxidation improved its syneresis properties which showed by lower water released during gel storage in the refrigerator. Water holding capacity of oxidized starch was higher than controls. However, oil holding capacity of second grade starch was improved by oxidation but it was lower than first grade.

Keywords: amylose content, hydrogen peroxide, oxidation, cassava starch, functional properties
Tempe fermentation made from red beans (Phaseolus vulgaris L.). The fermentation process causes physical change, biochemistry and microbiology that benefit the nutritional content. Dry red kidney beans (P. vulgaris L.) contains important fat nutrition classified as essential linoleat (ω-6) and alfa linoleat (ω-3). This research aims to identify the type and the contents of unsaturated fat either pra or post red kidney bean fermentation (Phaseolus vulgaris L.) using RAPRIMA within 24 and 48 of hours fermentation process. The data analysis used in this research is qualitative data based on the result of Gas Chromatography Mass Spectrometry (GCMS) analysis. The result shows that there are two kinds of unsaturated fatty acids (PUFAs), they are 9,12-Octadecadienoic acid (ω-6) and 9-Octadecenoic acid (ω-9). The maximum time of fermentation for the increasing unsaturated fat is at the 48-hours of fermentation process with the increasing of 72, 53% at 9,12-Octadecadienoic acid.

**Keywords**: Fermentation, Tempe, GCMS®, Phaseolus vulgaris L., ω-6, ω-9.
COMMERCIAL USE OF BIOLOGICAL AGENTS AS BIOLOGICAL CONTROL FOR PLANT PESTS AND DISEASES: STATUS AND PROSPECTS

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Abstract

The increasing demand for agricultural products that are free of pesticide residues prompted experts to study the possibility of substitution of synthetic pesticide with biological agents ones. The use of synthetic pesticides has been known to leave a residue that is harmful to the health of humans and domestic animals, lead resistance and resurgence of pests, kill natural enemies such as parasites and predators, and contaminate water, soil and air, which in turn disrupts ecosystems. In connection with this situation, it is time to look for another alternative control agent which has equivalent control effectiveness of synthetic pesticides but relatively safer to living organisms and the environment. Utilization of biological agents as pesticides is believed to be able to answer these problems because the active ingredients of pesticides composed of plant secondary compounds that are safety and readily biodegradable. Results of recent studies suggested that some biological agents in Indonesia such as Trichoderma viridae, T. harsianum, Bacillus subtilis, B. Thuringiensis, Beauvaria bassiana, formulated as pesticide and Azotobacter, Rhizobium sp., Azospirillum sp, Aspergillus sp, Actinomycetes, Streptomyces, Pseudomonas sp, Trichoderma sp., Cytophaga sp., Lactobacillus sp., Mycorcylus sp., Thermospora, Streptococcus sp., Penicillium sp, Pantoea sp, Pseudogriceolus, as organic fertilizers are able to control a variety of pests and diseases of plants. To improve the effectiveness of control activity, the plant material needs to be formulated into ready-made pesticides and fertilizer. To get optimum benefit, the use of botanical pesticides should be addressed to prevent insect attacks instead for control measures.

Keywords: biological agents, pesticides, fertilizers, pest, disease, plant
NANOENCAPSULATING OF KAFFIR LIME (Cirtus hystrix) LEAVES OIL WITH COASERVATION METHOD USING ARABIC GUM AND MALTODEXTRIN AS ENCAPSULANT

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Abstract

Kaffir lime oil is an essential oil from Cirtus hystrix leaves. This product is generally volatile when exposed to air. For covering the used, kaffir lime oil were process into nanocapsules. The technique used is coaervation method. This experiment aims to identify the ratio of arabic gum and kaffir lime oil, and to determine the optimal crosslinking time. Nanoencapsule was made by mixing arabic gum with the kaffir lime oil in various mixing ratio. The coaervation process was done by dropping encapsulant mix and kaffir lime oil with various concentration into glutaraldehyde. After the coaervation, next process was adding maltodextrin into the mix followed by homogenization process and then dry using spray drying methods. Analysis was done by observing the result of encapsulation efficiency, particle distribution, and morphology profil using Scanning Electron Microscope. The result shows that the best nanoencapsulation efficiency was between 71.85 - 80.75%. The optimum condition for the highest value of total citronellal content in on 1:3 ratio (b/v) and the optimal time of crosslinking is 13 minutes. The nanocapsules had spherical shape with dips in the surface with average size of nanopsulees of 457.87 nm.

Keywords: kaffir lime oil, coaervation, arabic gum, nanoencapsulation
ANTIOXIDANT AND PHENOLICS CONTENT OF BLACK GLUTINOUS RICE ANTHOCYANIN EXTRACT DURING FERMENTATION PROCESS USING *Pediococcus pentosaceus* N11.16

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Abstract

Anthocyanin from black glutinous rice extract was incubated with *Pediococcus pentosaceus* N11.16 in microemulsion system. The microemulsion was made using food grade surfactant such as tween 80, tween 20, and span 80. This effort was made to improve the ability of anthocyanin as stable food colorant. Anthocyanin in microemulsion systems were tested for the stabilization to enzymatic degradation. From the previous research, it was said that *Pediococcus pentosaceus* N11.16 produce β glucosidase which would degrade glycoside such as anthocyanin. The medium was added with 5, 10, 15, 20, and 25 ppm of anthocyanin microemulsion. Phenolics content was remain stable during fermentation process for all anthocyanin concentration, while the highest antioxidant activity where in 20 ppm anthocyanin equivalent to cyanidin-3-glucoside. Total acid producers bacteria were also monitored during the incubation.

**Keywords**: kaffir lime oil, coaservation, arabic gum, nanoencapsulation
HEALTH AND MEDICINE
ANTIGENICITY AND EPITOPE MAPPING OF 33 kDa ANTIGENIC PROTEIN FROM SALIVARY GLAND OF Anopheles sundaicus

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Abstract

Malaria is an infectious disease caused by Plasmodium and transmitted by the female Anopheles mosquito. About 30 species of Anopheles became the main vector of malaria include Anopheles sundaicus. Vector control programs have an important role in preventing the transmission of malaria because malaria vaccine has not been found and drug resistance problem. Vector control programs require new methods that more efficient, effective, low risk and also can be applied to the population and individual levels compared with conventional methods of entomology to evaluate the programs. One of the new methods are being developed by using the antigenic protein from the salivary glands of Anopheles as a biomarker of exposure to Anopheles mosquito bites. This study aims to determine the antigenicity and epitope mapping of antigenic protein with a molecular weight of 33 kDa from salivary gland of An.sundaicus. Antigenic proteins were determined by western blotting method and identified by mass spectrometry LC-MS / MS. Antigenicity of proteins identified were further analyzed by in silico using Kolaskar and Tongaonkar antigenicity from Immune Epitope Database and Analysis Resource (http://www.iedb.org) with a threshold value (threshold value) 1.0. Epitope mapping was done by using the Linear Epitope Prediction Bepipred with a threshold value (threshold) 0.35 of IEDB. Nine new hypothetical proteins were identified from the 33 kDa antigenic band that matched with proteins from An.gambiae, An. darlingi and An.sinensis. Protein AGAP013270-PA (An.gambiae str. PEST) has the highest antigenicity compared to other proteins. Epitope mapping analysis showed that characterized proteins have poly-epitope. These proteins have the potential to be developed as a biomarker of exposure to An.sundaicus mosquito bites.

Keywords: Anopheles, protein, antigenic, salivary gland
Myrmeleon sp. AS POTENTIAL ANTI-DIABETIC AGENT DECREASE THE DAMAGE OF LIVER AND KIDNEY HISTOLOGY OF HYPERGLYCEMIA MICE

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Abstract

The failure of the pancreas to produce insulin or an inadequate amount of insulin causing the high glucose level and disrupting glucose equilibrium in blood that causes hyperglycemia. Furthermore, hyperglycemia can lead to damage to organs and tissues such as liver and kidney. Recently, utilization of antlions as antidiabetic agent slightly increase. This study aim was to determine the effect of antlion extract on level of blood glucose and histology of kidney and liver of diabetic mice. Twenty four two months-old of male mice were induced hyperglycemia by using streptozotocyn 0.5 ml/30 g. The diabetic mice were grouped into six treatment, i.e: aquadest as negative control, glibenclamid as positive control, and four doses of antlion extract (2.5; 5; 7.5; and 10) w/w. Permanent thin section was used to observe the histology of liver and kidney. The results showed that 10 mg/kg was the most effective dose decreased the blood glucose level within two days. The lowest damage of liver and kidney histology was occurred on treatment of antlions extract 10 mg/kg and 5 mg/kg, respectively. These results indicated that antlions extract had ability for repairing organs damage caused by hyperglycemia.

Keywords: antlions, histology, hyperglycemia, kidney, liver, permanent thin section.
INTRANASAL IMMUNIZATION WITH 54 KDA HEMAGGLUTININ PILI PROTEIN OF *Streptococcus pneumoniae* INCREASE EXPRESSION OF pIgR

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Abstract

*Streptococcus pneumoniae* can cause many infections like meningitis, bacteremia, otitis media and particularly pneumonia in children. Immunization is one way to prevent the spread of pneumonia and intranasal immunization is currently developed by many research. Intranasal immunization used vaccine from bacteria pili is more effective because it could prevent the attachment of bacteria on surface epithelium of respiratory track. The immunization triggers differentiation of T cell into Th1, Th2, Th17 and T reg. Th17 produce a wide variety of cytokine including IL-17A that stimulate the expression of pIgR. The aim of this study was to determine the ability of intranasal immunization with 54 kDa pili proteins of *S. pneumoniae* in stimulate the expression of pIgR through the increased of IL-17A. To achieve these objectives purified 54 kDa pili proteins is used as an antigen to immunized Wistar rats intranasal. Mucosal immune responses identified from nasal washings inspection of Wistar rats using IL-17A, and pIgR indicators. These results indicate that mice immunized with combined antigen-adjuvant had higher levels of IL-17A, and expression of pIgR than the other groups. ANOVA test showed that there were significant differences between rats immunized with combined antigen-adjuvant compared to the other group.

Keywords: intranasal immunization, hemaglutinin pili, *S. pneumoniae*, pIgR
ESTRADIOL LEVELS AND UTERUS HISTOLOGY OF FEMALE MICE (Mus musculus) INDUCED BY SYNTHETIC PROGESTERONE

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Abstract

The purpose of this research was to determine the effect of progesterone to estradiol levels and histology of uterus, to test the effect of estrous cycle to uterus histology of females’ mice (Mus musculus) after treated by progesterone in birth control pills. This research used Completely Randomized Design (CRD). Females Mus musculus Balb-C and synthetic progesterone (cyproterone acetate) contained in ‘Diane-35’ birth control pills were used in this study. The research consisted of two treatment groups, i.e. group K had no treatment and group P treated by a solution of Diane-35 at a dose of 2.6 mg per 5 mL distilled water. Results on the effects of progesterone on endometrial thickness suggested that there were significant differences between treatment groups. Meanwhile, the effect of progesterone on estradiol levels indicated that there were no significant differences among treatment groups. This means that the thickness of the endometrium was strongly influenced by the presence of a synthetic progesterone hormone. and induced endometrium growth thicker. The levels of estradiol are not significantly different due to a negative feedback mechanism of Follicle Stimulating Hormone (estrogen effect) and Luteinizing Hormone (progesterone effect). The greatest thickness of endometrium of estrous cycle was treated by progesterone, which was 0.2500 mm².

Keywords: progesterone, endometrial thickness, estradiol levels.
ANTIBACTERIAL ACTIVITIES OF SEA MANGO (Cerbera odollam G.) LEAF EXTRACT AGAINST PATHOGENIC BACTERIA

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Abstract

Sea mango (Cerbera odollam G.) is the plant that has antibacterial activity. The aim of this research is to investigate the antibacterial activities of sea mango leaf extract against Bacillus subtilis, Escherichia coli, Salmonella thypimurrium, Staphylococcus aureus and Enterobacter coclea. The extraction process of sea mango leaf was done using ethanol 96% as the solvent by maceration method. The efficacy of these extracts was tested against those bacteria through a well-diffusion method employing 75 μL leaf-extract solution per well. According to the findings of the antibacterial assay, the sea mango leaf extract showed inhibitory activity against E. coli, S. thypymurrium, S. aureus and E. coclea. B. subtilis were resistant to all the solvent extract. The extract had an antibacterial activity with mean zones inhibition 8 mm against E. coli, 6 mm against S. aureus, 2,5 mm against S. thypymurrium and 4 mm against E. coclea. The crude extract was fractinated using Flask Chromatography to separate the fractions of sea mango leaf extract and then tested for each bacterium. The result showed that the fraction with the highest inhibitory activities to gram positive (+) was fraction number 6 and the fraction with the highest inhibitory activities to gram negative (-) was fraction number 13. The result was identified of the fraction with highest inhibitory was number 6 having 48.6% inhibitory of S. aureus.

Keyword: Sea mango (Cerbera odollam G.), well-diffusion method, fractination, antibacterial activity
ANTIMICROBIAL AND ANTICANCER ACTIVITIES OF ENDOPHYTIC FUNGI ISOLATED FROM MANGROVE PLANT Sonneratia alba Sm

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Abstract

Endophytic fungi are those that grow intra- or intercellular within the tissues of higher plants without causing a disease. This study aims to evaluated antibacterial and cytotoxic activities of endophytic fungi from leaf, bark and root of mangrove Sonneratia alba Sm, collected from Bungus, West Sumatra, Indonesia. The method that has been used was isolation of endophytic fungi on direct planting method with sabouraud dextrose agar (SDA) as growth medium. Thirteen isolates fungi strains were obtained from this mangrove. They were cultivated on unpolished rice as medium for ± 4 weeks, and extracted with ethyl acetate. The ethyl acetate extracts were analyzed for antimicrobial and cytotoxic activities by using agar diffusion method and MTT assay on T47D and Vero cells. The study revealed nine (69%) of the total extract had antimicrobial activity against pathogenic bacteria and fungal such as, Staphylococcus aureus, Escherichia coli and Candida albicans. While nine extracts (69%) were cytotoxic (Percentage of cell viability < 50) against T47D cells. This study concluded that the endophytic fungi of Sonneratia alba Sm can be developed as a new source of antibiotic and anticancer compounds.

Keywords: Endophytic fungi, mangrove, Sonneratia alba Sm, antibacterial activity, cytotoxic
PROTEIN DOMAIN ANNOTATION OF Plasmodium sp.CIRCUMSPOROZOITE (CS) USING HIDDEN MARKOV MODEL

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Abstract

Malaria is considered one of the most dangerous tropical disease. Approximately 500 million world population is directly threatened by this parasitic disease. Malaria is caused by Plasmodium sp. single-cell protozoa, especially Plasmodium vivax, Plasmodium knowlesi, Plasmodium malariae, and Plasmodium ovale. The complexity of Plasmodium sp. life cycles that depends on their host is currently one of the cardinal obstacles in the drug development of malaria. Therefore, investigating the molecular mechanism of Plasmodium sp. becoming feasible option to investigate their virulence. Circumsporozoite (CS) gene from Plasmodium sp. has been found to have the crucial role in the virulence and life cycle of the parasite. This study aimed to foresee the protein domain annotation of the CS gene product, in order to determine the conservation of protein profile among them. The Hidden Markov Model (HMM), as the widely used computational method for pattern prediction, will be employed in order to cater the fine-grained resolution of the protein domain annotation. Data from PlasmoDB website, the center of Plasmodium sp. genome database, were utilized for this research. The result showed that the conservation coverage of protein domain annotation among different species of Plasmodium sp. was high with some significant variation in each of the species. However, Thrombospondin type-1 (TSP1) repeat domain was highly conserved in Plasmodium sp. Moreover, extensive phosphorylation sites were found as well. These findings emphasize the importance of cell interactions for the survival of these species. This domain conservation data would be useful as the blueprint for drug and vaccine development of malaria.

Keywords: malaria, Plasmodium sp., protein domain annotation, Circumsporozoite, Hidden Markov Model, virulence, domain conservation
ROLE OF PUTATIVE *Toxoplasma gondii* BAX INHIBITORS IN APOPTOSIS-LIKE CELL DEATH REGULATION

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Abstract

Increasing evidence suggests the existence of apoptosis-like cell death in *Toxoplasma gondii*. However, *Toxoplasma* effector molecules that might regulate apoptotic cell death in this parasite are largely unknown. In this project, we identify the role of Bax inhibitor proteins, i.e. a family of cell death suppressors which are conserved among a variety of organisms, in *T. gondii* apoptosis-like cell death regulation. In silico analysis of the *T. gondii* genome demonstrated the presence of three putative Bax inhibitor genes, namely TgBI-1, TgBI-2 and TgBI-3. Stable transfection of the genes encoding TgBI-2 and TgBI-3 into HeLa cells was confirmed by immunofluorescence microscopy. Treatment with an ER stress-inducing agent (brefeldin A) and an apoptosis inducer (staurosporine) led to lower levels of chromatin condensation in TgBI-2-expressing HeLa cells than in HeLa WT cells as indicated by Hoechst staining. Measurement of caspase 3/7 activity exhibited an inhibitory effect of TgBI-2 in HeLa cells after treatment with either staurosporine, brefeldin A, tunicamycin or thapsigargin whose inhibition was more pronounced at 24 hours after brefeldin A and tunicamycin treatment and at 48 hours of thapsigargin treatment. Staurosporine-treated TgBI-2-transfected HeLa cells displayed lower caspase 3/7 activities both at early and later time points. Furthermore, TgBI-2- and TgBI-3-expressing HeLa cells showed lower induction of hypoploid DNA (subpeak G0/G1) after treatment with inducers as above. All together, these results indicate protective effects of TgBI proteins and suggest a role of TgBI proteins in regulation of apoptosis.

**Keywords**: apoptosis, Bax inhibitors, *Toxoplasma gondii*
THE PERFORMANCE AND NUTRIENT DIGESTIBILITY OF LOCAL RABBIT CONSUMED PROBIOTIC PROBIO-FM

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Abstract
This study was aimed to measure performance and nutrient digestibility of local rabbit consumed probiotic Probio-FM. Probio-FM was added into drinking water, contained $10^{10}$-$10^{11}$ cfu/ml lactic acid bacteria and the drinking water trial was conducted for a month. This study was using 16 male local rabbit divided into 4 treatment groups. Rabbits were kept individually in individual cage 75x60x50 cm. During the study, rabbit fed commercial feed for rabbit JAM-FEED contained 99.42% dry matter, 1.60% fat, 12.74% crude protein, and 11.25% crude fiber. The study was design into Randomized Block Design (RBD) with 4 treatments and 4 replications. The treatments were Probio-FM level in the drinking water; T0 (control, drinking water without Probio-FM), T1 (Drinking water added 5 ml/L Probio-FM), T2 (Drinking water added 10 ml/L Probio-FM), and T3 (Drinking water added 15 ml/L Probio-FM). Feed and drinking water offered ad-libitum. Results of this study showed that there was no significant (P>0.05) effect of Probio-FM on rabbit performance (feed consumption and body weight gain), protein and fibre digestibility. It is concluded that Probiotic Probio-FM might offered to the rabbit without any adverse effect to the rabbit performance and nutrient digestibility.

Keywords: Nutrient Digestibility, Probiotic Probio-FM, Performance, Rabbit
NATURAL BIOACTIVE COMPOUND CHALCONE FROM *Syzygium samarangense* AS AN ANTICANCER BASED ON IN SILICO SCREENING

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Abstract

Cancer continues to be one of the world’s most devastating categories of diseases, after cardiovascular disease. Cancer appears with losses of cellular regulation especially in growth-regulating genes, it have been implicated in the onset of cancer namely proto-oncogenes and tumorsuppressorgen genes. Chalcone is one of bioactive compound found in *Syzygium samarangense* reported can induce apoptosis and have the ability to alter the mitochondrial membrane potential of cancer cells, and inhibit cell proliferation, angiogenesis, and metastasis. This study aims to determine the bioactivity compounds chalcone for anticancer and its target based on in silico screening. The bioinformatics tool based on reverse docking used in this study were: Pubchem compound database, protein target prediction database Pharmmapper and Swiss Target Prediction, molecular docking software PyRx 0.8, ligand docking and binding site analysis with PyMOL software. Docking and binding site analysis showed that the chalcone was able to interact with Tyrosyl-DNA phosphodiesterase 1 (TDP 1) with binding affinity of -5.7 kkal/mol and as a standard is doxorubicin of -7.4 kkal/mol. Chalcone has a higher bonding power than doxorubicin against TDP 1.

Keywords: cancer, chalcone, reverse docking, *Syzygium samarangense*, TDP 1
EXPLORATORY STUDY ON SUPERCRITICAL EXTRACTION OF PROPOLIS: CENTRAL COMPOSITE DESIGN APPROACH

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Abstract

*Trigona* sp is a bee that is easy to cultivate and its hive contains more propolis than honey. During this time, only its honey is taken, while propolis is often regarded as the impurity of honey. Propolis itself shows potential as a health supplement which is rich in antibacterial compounds, antibiotics, antiviral, anti-inflammatory, antioxidants and even metabolism of carbohydrates and fats agent. A common method for generating propolis is by solvent extraction. This method has drawbacks such as requiring high temperatures and long extraction times. This can cause damage to the bioactive components in propolis. To overcome this, this research uses a supercritical extraction method to produce high quality propolis. It is necessary to re-design and optimize the extraction of propolis by using supercritical extraction method. The raw feedstocks was milled, and then fed into supercritical reactor for extraction. During the extraction, variables process (temperature, pressure and CO2 flow rate) are set to constant. Extraction time was 3 hrs. As extraction time was completed, the product was filtered for further analysis. The result was then analysed by HPLC. The influence of process variables such as temperature, pressure and CO2 flow rate was informed in this work. Based on analysis, the supercritical extracted propolis shows high quality which contains galangin, CAPE, ferulic acid, p-coumaric acid.

**Keywords:** propolis, supercritical extraction, *trigona* sp.
PARASITOLOGICAL AND MOLECULAR CHARACTERIZATIONS OF CHRONIC LYMPHATIC FILARIASIS PATIENTS IN PROVINCE OF ACEH, INDONESIA

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Abstract

Lymphatic filariasis (LF) is a chronic neglected tropical disease and continues to present challenge to current elimination programs. It is estimated that 1.3 billion people live in LF endemic areas with 120 million people infected worldwide. Indonesia shares the second largest LF patients worldwide after India. Indonesia is also the only country that has all three species cause the disease; Wuchereria bancrofti, Brugia malayi and Brugia timori. There are no report regarding parasitological and molecular characterizations of chronic LF (elephantiasis) patients in Province of Aceh although the province has the second largest LF patients in Indonesia. Therefore, 22 patients in Province of Aceh who had developed chronic lymphedema for more than 10 years were investigated. Moreover, all those samples were also characterized based on their parasitological and molecular profiles using microscopy, immunochromatographic card test (ICT) and polymerase chain reactions (PCR) methods. However, none of the patients showed positive result for microfilaraemia nor ICT. Filarial DNA in all patients after PCR analysis also could not be detected in the blood. Those results suggest that there is no worm both in larval and adult stages can be found in the patients anymore after long term of infection. Additionally, the study also gives important information regarding microfilaraemic status of elephantiasis patients as national elimination program is undergoing in the province.

Keywords: lymphatic filariasis, parasitological and molecular characterization, PCR.
ISOLATION OF AGAROSE FROM AGAR AND ITS APPLICATION AS MEDIUM IN THE DISC DIFFUSION ANTIBIOTIC SUSCEPTIBILITY TESTING OF BACTERIA

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Abstract

Agarose has been separated from commercial agar that was extracted from red algae, Gracilaria gigas. Agarose was obtained by dissolving the agar powder with 70 °C preheated propylene glycol under continuous stirring followed by increasing the temperature to 105 °C to get homogenous solution with concentration of 1% b/v agar. Agarose was separated from more soluble agarpectin by cooling process overnight at -10 °C, followed by adding isopropanol at room temperature to induce precipitation of agarose. Agarose precipitate was then filtered with flannel and dried at room temperature until the smell of isopropanol disappeared and the agarose granule was formed. The granule then was grinded to yield purified agarose powder. Isolation of agarose were conducted 3 times, purified agaroses were named agarose A, agarose B, and agarose C. Some chemical and physical properties of isolated agarose such as gelling and melting point, gel strength, and sulfate content, were measured and determined utilizing standard measurement method. It was found that the sulfate content of agarose A, B, and C were 0.60, 0.59, and 0.65 % respectively; and gel strength (1.5 %) were 1546, 1549, and 1523 g/cm² respectively. In this study, the isolated agarose has been used as substitute for agar medium in disc diffusion antibiotic sensitivity testing of bacteria. The sensitivity of Staphylococcus aureus has been tested to gentamicyn (10 µg/disc), tobramycin (10 µg/disc), and ofloxacin (5 µg/disc), furthermore the sensitivity of Pseudomonas aeruginosa have been tested to meropenem (10 µg/disc), imipenem (10 µg/disc), and ciprofloxacin (5 µg/disc). The result showed that inhibition zone diameter in nutrient agar medium was wider, more round (smaller SD-diameter), and more clear than in nutrient agar medium. Therefore it can be concluded that by replacing agar with agarose as medium in the disc diffusion antibiotic susceptibility testing of bacteria method will render the analysis to be more accurate, precise, and higher in sensitivity.

Keywords: Agarose, agar, disc diffusion antibiotic susceptibility testing of bacteria, Pseudomonas aeruginosa, Staphylococcus aureus.
SECONDARY METABOLITES FROM ENDOPHYTIC BACTERIA OF Cosmos caudatus Kunth LEAF AS ANTICANCER CANDIDATE

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Abstract

Each plant body has endophytic bacteria in it. The ability of endophytic bacteria to produce the same secondary metabolites with their host plants is a potential source for obtaining flavonoid compounds from Cosmos caudatus leaf. C. caudatus has been known as an anticancer drug plant and has been widely used in traditional medicines. The content of flavonoid compound is considered to be used as an anticancer substance. The purpose of this study was to determine the ability of endophytic bacteria from C. caudatus leaf in producing flavonoid compounds in vitro. Each isolate was cultured on liquid medium of 0.1\% soluble starch, 0.5\% peptone and 0.15\% yest extract with pH 7, which already incubated in room temperature for 5 days with agitation of 120 rpm and extracted with ethyl acetate solvent. The extract was tested its flavonoid content using Thin Layer Chromatography (TLC) method. The results showed that endophytic bacterial isolates PKM 1, PKM 2, PKM 17, and PKM 19 isolated from Cosmos caudatus leaf could produce secondary metabolites of flavonoids. Presumably, one of the compounds contained in the crude extract of endophytic bacteria was quercetin.

Keywords: anticancer, Cosmos caudatus, leaf, endophytic bacteria, flavonoids
APPLICATION OF INFRARED SPECTROSCOPY TO CLASSIFICATION OF Annona muricata L. VARIETIES

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Abstract

Annona muricata L. (AM) is one of the plants of the Annonaceae family that can be used as a herbal medicine in Indonesia. The leaf of two variety of AM plants, namely, AM-lokal, and AM-ratu, were classify using a infrared spectrophotometer. After the leaves were dried and powdered, powders were scanned in the absorbance reflectance mode of NIR from 850 to 2200nm and the absorbance reflectance mode of FTIR from 4000 – 650 cm\(^{-1}\). Several classification models based on the NIR and FTIR spectra data were developed using Linear Discriminant Analysis (LDA), Support Vector Machines Classification (SVMC), and Soft Independent Modelling of Class Analogies (SIMCA). The result shows the accuracy of LDA, SIMCA, and SVMC of NIR classification model were 100%, 100%, and 97.3% respectively. The accuracy of LDA, SIMCA, and SVMC of FTIR classification model were 76.1%, 100%, and 97.3% respectively. The SVMC classification model from NIR and FTIR spectra gave the best result with 100% accuracy, it means the model can classify all the sampel in the correct variety. The results show that NIR spectroscopy might be a suitable alternative tool to discriminate the leaves of Annona muricata L. plant varieties

Keywords: Annona muricata, classification, NIR
ANTIMALARIAL ACTIVITY OF *Litseacubeba* LEAF EXTRACT IN MALARIA-MICE MODEL

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Abstract

Malaria is still major health problem in the world including Indonesia. The drug of choice for malaria treatment is Arthemisinine combination-based Therapy (ACT), but recently there are reports on antimalarial resistance, which lead to the development of an alternative drug from many resources. *Litsea cubeba* is one of medicinal plant which commonly used as an antimalaria by some Indonesians. It contains several compounds such as flavonoid which possibly act as an antioxidant and can decrease oxidative stress in malarial infection. In this study, we analysed antimalarial and antimalarial activity of *Litsea cubeba* leaf methanolic extract in *Plasmodium berghei*-infected mice. This was a true experimental study with post test only control group design. Samples were divided into 5 groups; 3 treatment groups with consecutive doses of 50mg/kgBW, 100mg/kgBW and 200mg/kgBW, positive control group with ACT treatment and negative control group. In vivo antioxidant activity was measured by calculating MDA and SOD level, and antimalarial activity was assessed using the 4-day suppressive antimalarial assay. Treatment with *Litseacubeba* leaf methanolic extract of 50 mg/kgBW, 100 mg/kgBW and 200 mg/kgBW in malaria-mice models significantly (P < 0.05) decrease the level of MDA and increased the level of SOD. The extract decreased parasitaemia level by 3.66 + 0.90 %, 3.37 + 0.7 %, and 2.65 + 0.79 % in the day 4th and resulted 7.9 + 0.73 %, 16.36 + 0.66 %, and 34.37 + 1.48 % percentage of suppression, respectively for the dose of 50 mg/kgBW, 100 mg/kgBW and 200 mg/kgBW, compared to 2.18 + 0.79 % parasitaemia level and 50.17 ± 1.29 % percentage of suppression in positive control group. In conclusion, the methanolic *Litseacubeba* leaf extract has an antioxidant activity and can decrease parasitaemia in malaria-mice model so it is potential as an antimalarial agent.

Keywords: antimalarial activity, antioxidant activity, *Litseacubeba*, malondialdehyde (MDA), superoxide dismutase (SOD)
RESISTANCE DEVELOPMENT OF *Aedes aegypti* TO PYRETHROID-BASED INSECTICIDES IN SEVERAL AREAS IN INDONESIA

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Abstract

The mosquito control is still mainly performed by using insecticides but their effectiveness is increasingly questioned nowadays. We here conducted a study on *Ae. aegypti* resistance development towards several commonly used insecticides in the capital city of Jakarta dan Denpasar Indonesia. Thus, *Ae. aegypti* eggs were collected with ovitraps and hatched in the insectary of the Gadjah Mada University. The F0 generations were used for WHO resistance tests and knockdown resistance (kdr) assays. Presented results showed clearly that there is resistance development of *Ae. aegypti* populations to the here tested pyrethroid insecticides (i.e. permethrin). Observed mortalities were less than 90% with highest resistance against 0.75% permethrin concentrations. Furthermore, a significant association of V1016G gene mutations with resistance phenotypes to 0.75% permethrin was observed. Nevertheless, F1534C mutation did not show a significant correlation with resistance development. In conclusion, our results show that populations of *Ae. aegypti* within the city of Jakarta have developed resistance against several routinely used insecticides of local control programs. Thus, the regular verification/assessment of resistance status development will hopefully help to assist local public health authorities in their mosquito control programs by recommending and managing the rotation of different routinely used insecticides with different effector mechanisms in order to delay *Ae. aegypti* resistance development.

Keywords: vector, resistance, *Aedes aegypti*
NEGLECTED ZOONOTIC-PARASITES ARE CIRCULATED IN RAT POPULATION IN CODE RIVERSIDE, YOGYAKARTA

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Abstract

Rats are well-known as vector more than 60 zoonotic diseases. They acts as very effective transmitter for diseases due its anthropophilic character and very adaptable with human-living. In addition, rats are top rodent in South East Asia causing pre-harvest damage of rice farming reaching 5% to 17%. The management and controls of rats challenge countries worldwide as they have lived close to human being in thousands years. Population density of rats in tropical countries especially oceanic islands is higher than continental land. Increased human demography, urban growth and contraction for living-space enhance contact between rat and human dramatically. Reports and update of rat parasite in Indonesia are little. This investigation documents parasite focused on liver with spot on expanded urban area and settlement construction adjacent to Code River, Yogyakarta, Indonesia. Rats necropsied show 42.31% are infected by *Capilaria hepatica* and 43.59% by *Cysticercus fasciolaris*. This study indicates clearly that species with potentially health risk are circulated in high rates in Code riverside Yogyakarta, Indonesia.

Keywords: rats, parasite, zoonotic
THE SUPPRESSION OF ROTENONE-TREATED HUMAN BREAST CANCER STEM CELL SURVIVAL USING SURVIVIN INHIBITOR YM155 RELATED TO OXIDATIVE STRESS MODULATION

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Abstract

Despite the recent progress in molecular-targeted therapies, breast cancer remains the first-leading cause of cancer-death among women over the world. Nowadays, breast cancer stem cells (BCSCs) is believed to be responsible for therapy resistance. Very recently, we have demonstrated that human BCSCs (CD24⁻/CD44⁺) could survive better than their counterpart non-BCSCs (CD24⁻/CD44⁻) after rotenone treatment, due to lower ROS levels production, high expression of antioxidant MnSOD and anti-apoptosis survivin. The aim of this study was to verify the role of survivin on the survival of human BCSCs under oxidative stress modulation by suppressing its expression using a survivin inhibitor YM155. Human BCSCs (ALDH⁺ cells) were firstly treated with YM155 for 24 hours prior to rotenone treatment for another 6 hours. We determined the intracellular superoxide level using dihydroethidium assay, manganese superoxide dismutase (MnSOD) expression using qRT-PCR, as well as cell viability using trypan blue exclusion and ethidiumbromed/acridine apoptosis assay. This study found that the suppression of survivin expression using YM155 could reduce the survival of rotenone-treated BCSCs, which may be associated with the oxidative stress modulation in rotenone-treated BCSCs, as shown by the increased ROS levels and decreased MnSOD expression. In conclusion, we confirm that survivin is responsible for maintaining the BCSCs survival under oxidative stress modulation. Furthermore, the present study reported for the first time that YM155 could modulate the oxidative stress in BCSCs by reducing the MnSOD expression and increasing the ROS levels. Thus, we propose that YM155 treatment may overcome the BCSC resistance to oxidative stress-based anti-cancer.

Keywords: BCSCs, survivin, YM155, rotenone, MnSOD, ROS, oxidative stress
CYTOTOXIC EFFECT OF ETHANOLIC EXTRACT MARINE SPONGES *Aaptos suberitoides* On HeLa CANCER CELLS WITH IN VITRO TEST

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Abstract

Ethanolic extract of marine sponges *Aaptos suberitoides* was tested to inhibit the growth of HeLa’s cancer cell. HeLa is a type of woman cancer type that is common in Indonesia’s. Cytotoxic of ethanol extract from *A. suberitoides* were conducted with three assays, which were MTT, proliferation and apoptosis tests. Results indicated that sponges have capability to inhibit HeLa’s cancer test with MTT cytotoxic activity value of \( LC_{50} \) 133,968 µg/mL, IC50 value of proliferation test 153.00 µg/ml, and apoptosis cell index that valued of 153.007 µg/ml. In addition, *A. suberitoides* extract induces apoptotic like body formation of the cells.

**Keywords:** Ethanolic extract *A. suberitoides*, cytotoxicity HeLa cell line.
COMMUNITY HEALTH AS EVIDENCED BY A COMMUNITY WELLBEING INDEX (CWBI): THE CASE IN BOHOL, PHILIPPINES

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Abstract
The 2013 Bohol earthquake was the most devastating earthquake in 23 years of Philippine history. A total of 671,103 families (3,221,248 persons) were affected in 6 provinces within Central and Western Visayas. Damage on infrastructure was estimated to be at USD52.06 million and 222 were declared dead because of the tremor. One could expect the level of community heath to be dwindling. Looking at the community wellbeing index (CWBi) can be of help to comprehend how institutions deal with the effects of disasters. The present study aimed to: 1) assess and monitor the indicators of the community wellbeing (CWB) in the exposed areas and 2) determine the community capitals for prioritization.

Different sectors joined in the focus group discussions (FGDs) conducted in Bohol such as the local government units, education sector, business sector, people’s organizations, and socio-civic sectors. All participants were survivors of previous disasters. They either lost properties, jobs, businesses or loved ones. A face to face interview aided by a standardized questionnaire at least to 73 household heads in every community identified in the random sampling technique was conducted. The number of households was determined by GPower analysis. Data were analyzed and community wellbeing index (CWBi) was determined using the formula:

\[ CWBi = (B \cdot w_{d1}) + (F \cdot w_{d2}) + (Po \cdot w_{d3}) + (SC \cdot w_{d4}) + (N \cdot w_{d5}) \]

where B is built capital; F, the financial capital; Po, political capital; SC, sociocultural capital and N, the natural capital; Wd1 to Wd5 are the respective weights of the 5 dimensions.

The CWBi of Bohol had value of 0.576 with a moderate level of community wellbeing. Of the 5 dimensions of CWBi, sociocultural capital had the highest dimension value of 0.277, with sense of community having the highest indicator value of 0.214. While the political capital lagged behind but the natural capital got the lowest dimension value of 0.014. Political capital reflected the preparedness and capacity of local political leaders to be always proactive. Indeed, a need to understand the link of ecosystem services to human welfare and environmental stability to somehow withstand the impacts of disaster, whether earthquake or other types of natural disasters must always be present. The never-ending impacts of natural disasters faced by community members can be addressed immediately if policy makers will be guided by the index. The national government should build infrastructure away from the fault lines and a massive redirection of the National Greening Program should be immediately done to increase values of the national capital thereby improving community health.

Keywords: community health, community wellbeing index (CWBi), policy makers, sense of community
DETERMINATION OF SPF NUMBER AND ANTIOXIDANT ACTIVITY OF SEAWEED EXTRACT FROM GUNUNG KIDUL, YOGYAKARTA

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Abstract

The objective of this research was to determine the ultraviolet (UV) protection absorption properties of seaweed from Gunung Kidul, Indonesia. This research was conducted with determination of SPF number. The in vitro SPF number is determined according to the spectrophotometric method and calculated by applying Mansur mathematical equation. The results showed that seaweed have potency as UV protector.

Keyword: seaweed, UV absorption, sun protection factor, antioxidant
THE EFFECT OF NATRIUM METABISULPHIT (Na₂S₂O₅) EXPOSED ON BALB’C MICE LIVER HISTOLOGY

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Abstract

Sodium metabisulphite (Na₂S₂O₅) is an additive that is often used in food processing. This compound serves as a food preservative because it can prevent browning reaction (browning) and can work as an antioxidant. Excessive and continuous use Na₂S₂O₅ of can have adverse health effects. Several studies have shown that sulfites and their derivatives can cause damage to some organs such as the liver, brain, lungs, lymph and stomach in rats. The aim of this research is to know the effect of sodium metabisulfite (Na₂S₂O₅) and the effect of dosage of sodium metabisulfite (Na₂S₂O₅) on the damage of liver histology structure in Balb-C mice (Mus musculus L.). This study used 0.21 mg/gbw, 0.42 mg/gbw and 0.63 mg/gbw of sodium metabisulphite that administered intraperitonally during 30 days. On the 31st day the liver organ were taken and made preparations slides. The conclusion of this research is giving sodium metabisulfite (Na₂S₂O₅) can cause damage of hepatocyte structure in the form of vacuolization of cells, pycnosis, and necrosis in central venous area and periportal area.

Keywords: Natrium Metabisulphit, Balb’C Mice, Liver
THE PREDICTION OF CURCUMIN CONTENT IN THE TURMERIC RHIZOME WITH RAMAN HANDHELD SPECTROSCOPY

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Abstract

The quality control of herbal medicine should be started from the determination of the active substance at harvest time. The Raman spectrometry has been used for this propose. The aim of this study is to determine the quantification of curcumin in turmeric rhizome (Curcuma longa Linn.) using Raman spectroscopy combined with multivariate analysis of PLS-R that are expected to provide reference method for quality control in turmeric rhizome, especially for raw materials of Herbal drugs. Parameters that can be used for analysis of curcumin levels on turmeric rhizome obtained using intensity of data Raman and the data obtained from the standard method will be processed with multivariate analysis methods PLS-R. The validation value of quantification result using Raman-PLSR is seen from R² value of 0.999, RMSEC value of 0.119 and p-value of 0.00. The study showed the developed method could be implemented on to determine the prediction quantification of raw material herbal medicine.

Keywords: Curcumin, PLS-R, Turmeric, Raman Spectroscopy
THE EFFECT OF GOAT MILK ON BIOMARKERS OF BONERESORPTION IN SEDENTARY WOMEN

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Abstract

Physical inactivity (sedentary) lifestyle has a role in the etiology and pathology of osteoporosis. Osteoporosis is caused by abnormalities of bone turnover that is the process of bone resorption is higher than bone formation. Markers of bone resorption can be determined by analyzing the levels of Carboxyterminal Cross-Linked Telopeptide Collagen (CTx). Bone remodeling markers are influenced by diurnal variation and calcium intake. Goat milk contains high calcium and it is expected to play a role in preventing and controlling osteoporosis through decreased bone resorption marker, CTx. The purpose of this study was to analyze the effect of goat milk consumption to changes in levels of serum CTx and calcium in sedentary women, therefore goat milk can be used to prevent and control osteoporosis. The research design was controlled randomized trial. Research subjects: 18 sedentary women were randomized into 2 equal groups (control and trial), aged 18-19 years, healthy, and did not consume high calcium foods or drugs. The treatment group was treated with goat's milk as much as 1x250 ml/day, at the morning (08.00-09.00 a.m), given for 110 days. The data was analyzed by the statistical t-test with the significance level of 5%. The results of this study showed that there was a nonsignificant decrease (p>0.05) of CTx levels and also a non-significant increase (p>0.05) of calcium levels after treated in the trial group. The results of this study concluded that goat milk has little effect in inhibiting the process of bone resorption in sedentary women.

Keywords: bone resorption, Carboxyterminal Cross-Linked Telopeptide of type I Collagen, calcium, sedentary women, goat milk
ANTI-INFLAMMATORY EFFECT OF ARABICA COFFEE EXTRACT (Coffea arabica L.)

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Abstract

Coffee is a beverage that contains some bioactive compounds, such as caffeine, chlorogenic acid, and trigonelline, that provide health benefits. Phenolic and flavonoid compounds in coffee were expected to have anti-inflammatory effects. Nowadays, arabica coffee is a type of coffee that is popular and has increased consumption every year. This study aims to examine the anti-inflammatory effects of arabica coffee extract (Coffea arabica L.) by in-vitro model. The anti-inflammatory effect on arabica coffee was tested on lipopolysaccharide (LPS)-stimulated murine RAW 264.7 macrophages. To clarify the specific effect of arabica coffee extract, we also evaluated its cytotoxic activity by viability assay using WST-8 assay. Anti-inflammatory activity in arabica coffee extracts was demonstrated by increased IL-6 production as well as decreased protein concentrations in each sample concentration reduction. The results of cytotoxic activity test of arabica coffee extract showed that cell viability in sample with hot distilled water solvent and distilled water solvent (both dilution rate: 16 times), had the highest cell viability value of 126.82±6.16% and 108.02±20.36%.

Keywords: arabica coffee, anti-inflammatory activity
Abstract

Background: Intermittent hypobaric hypoxia is suggested to possess a protective effect toward hypoxic condition in many organs including nerve tissue. The aim of this study is to analyze the expression of cytoglobin (Cygb), neuroglobin (Ngb) and the specific activity of acetylcholinesterase (AChE), an enzyme which terminate the neurotransmitter acetylcholine (ACh), in brain tissue as adaptive responses to intermittent hypobaric hypoxia. Twenty five adult Sprague-Dawley male rats are divided into 5 groups: 1. The control group (normoxia); 2. The group that exposed to acute hypobaric hypoxia (AHH, control to intermittent hypobaric hypoxia (IHH) treatment); 3. The group which is exposed to hypobaric hypoxia (HH) on day-1 and re-exposed on day-8 (intermittent hypobaric hypoxia 1x, IHH1x); 4. The group which is exposed to HH on day-1, re-exposed to HH on day-8 and day-15 (intermittent hypobaric hypoxia 2x, IHH2x); 5. The group which is exposed to HH on day-1, re-exposed to HH on day-8, day-15 and day-22 (intermittent hypobaric hypoxia 3x, IHH3x). Rats from all groups are euthanized after treatment, brain tissue are extracted, homogenized then measured and analyzed for Cygb and Ngb protein expression and also AChE specific activity. Cytoglobin and Ngb were decreased in acute induction and increased significantly along with the increasing frequency of the IHH induction. There were significant differences in Cygb expression between IHH2x and IHH3x groups compared to normoxia group and between IHH1x, IHH2x and IHH3x compared to AHH group. There were significant differences in Ngb expression between IHH2x and IHH3x groups compared to normoxia group and between IHH2x and IHH3x groups compared to AHH group. The specific activity of AChE was increased significantly since the first induction of hypobaric hypoxia (AHH) but then decreased in IHH3x. There were significant differences in the specific activity of AChE between IHH2x and IHH3x groups compared to normoxia and between IHH2x and IHH3x groups compared to IHH1x groups. From these findings, we conclude that IHH, especially IHH3x, seems to induce protective adaptive response in the rat brain tissue through the changes of Cygb and Ngb expression and the changes of AChE specific activity.

Keywords: cytoglobin, neuroglobin, acetylcholinesterase, brain, intermittent hypobaric hypoxia
EFFECTS OF UMBILICAL CORD-AND ADIPOSE-DERIVED STEM CELL SECRETOMES ON ALDH1A3 EXPRESSION AND AUTOCRINE TGF-B1 SIGNALING IN HUMAN BREAST CANCER STEM CELLS

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Abstract

Nowadays, umbilical cord- and adipose-derived stem cells (UCSCs and ASCs) are the most common sources of mesenchymal stem cells (MSCs). As part of tumor microenvironment, MSCs communicate with cancer cells via their secretomes. Increased activity of aldehyde dehydrogenase-1 (ALDH1) has been widely used as a common stemness marker in normal and cancer stem cells. Our study aimed to elaborate the effect of UCSC and ASC secretomes on the expression of ALDH1A3, TGF-β1 and TGF-β receptor type I (TβRI) in human breast cancer stem cells (BCSCs). UCSCs and ASCs were cultured in serum-free αMEM under standard conditions for 24 hours. The conditioned medium (CM) containing secretomes of UCSCs and ASCs were collected and added 50% (v/v) to the cultured of human BCSCs (ALDH+ cells) for 72 hours. The mRNA expressions of ALDH1A3, TGF-β1 and TβRI were determined using qRT-PCR. We found that CM-UCSCs significantly increased the ALDH1A3 expression of BCSCs in parallel with the increase of TGF-β1 and TβRI expressions. Conversely, CM-ASCs had no effect on the ALDH1A3 expression, but significantly decreased TGF-β1 and TβRI expressions of BCSCs. These results contradict our previous data on ALDH1A1 and the pluripotency markers Oct4 and Sox2 expressions. Therefore, we conclude that the effects of UCSC and ASC secretomes on ALDH1A3 expression in human BCSCs may be related to the autocrine TGF-β1 signaling which suppress stemness of BCSCs. Further studies are required to evaluate factors involved in the differential effects of UCSC and ASC secretomes that regulate autocrine TGF-β1 signaling and stemness of human BCSCs.

Keywords: UCSCs, ASCs, BCSCs, ALDH1A3, TGF-β1, TβRI
MICROBIAL MODIFICATION OF GADUNG (*Dioscorea hispida* Dennst) TUBER FLOUR THROUGH FACULTATIVE SUBMERGED FERMENTATION USING LACTOBACILLUS PLANTARUM

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Abstract

Gadung (*Dioscorea hispida* Dennst) has been recognized as one of the most underutilized tubers in the world due to its antinutrients content, such as dioscorin and cyanogens. Its significant resistant starch content, but without gluten has suggested the utilization of gadung tuber in reducing the risk of obesity, diabetes and the incidence of celiac diseases. With these benefits in mind, an effort on gadung tuber processing into functional food materials was undertaken. The objectives of this research were to study the effect of flour consistency (5-25% w/v), microbes loading (2.5-15% w/v) and fermentation time (0-144 hours) on the swelling power, solubility, carbonyl and carboxyl group’s content and amylose content during microbial modification of gadung tuber flour. The flour modification was conducted via facultative sub-merged fermentation using *Lactobacillus plantarum* in a series of Erlenmeyer flasks fitted on a thermo-controllable shaker. Samples were withdrawn from the fermentation flasks at 24 hours interval for swelling power, solubility, carbonyl and carboxyl group’s content and amylose content analysis. In general, the swelling power and solubility of modified flour was lower than the native flour. Carboxyl group content increased with fermentation time, while no clear trend was found for carbonyl group. The amylose content of the modified flour was higher than that of the native, which most probably due to the depolymerization of amylpectin branches to form new amylose molecules with various molecular weights. The best fermentation conditions were flour consistency of 10% (w/v), microbes loading of 5% (w/v) and fermentation for 144 hours.

**Keywords**: gadung flour, fermentation, consistency, microbes loading, time, swelling power, solubility, amylose content
PHASE DIAGRAM AND THERMODYNAMIC PROPERTIES OF KETOPROFEN-MALONIC ACID BINARY MIXTURES

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Abstract

The study is an investigation of binary mixtures of ketoprofen with malonic acid. The solid-liquid phase diagram of ketoprofen-malonic acid binary mixtures was determined by differential scanning calorimetry and composition of the eutectic mixture was determined using a Tammann plot. The phase diagram of ketoprofen-malonic acid binary mixtures showed a incongruent melting system. The measurement of binary mixtures of ketoprofen-malonic acid with DSC also obtained the value of melting temperature, heat of fusion and entropy of fusion of ketoprofen-malonic acid system.

Keywords: phase diagram, thermodynamic properties, ketoprofen, malonic acid, binary mixture
ANALYSIS OF PLURIPOTENCY MARKER EXPRESSION IN HUMAN GLIOBLASTOMA MULTIFORME CELLS TREATED WITH CONDITIONED MEDIUM OF UMBILICAL CORD-DERIVED MESENCHYMAL STEM CELLS

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Abstract

Glioblastoma multiforme (GBM) is the primary brain tumor with the highest malignancy degree and therapy resistance. It might be due to the presence of cancer stem cells population with high pluripotency and self renewal ability. Recently, it has been reported that tumor stroma cells, including mesenchymal stem cells (MSCs), secrete factors that affect cancer cell growth. Until now, the role of MSC secretomes on cancer stem cells and its pluripotency remain unclear. Therefore, the aim of this study was to analyze the effect of conditioned medium (CM) containing MSC secretomes on the expression of pluripotency markers of GBM cells. Umbilical cord-derived MSCs (UCSCs) were grown on serum-free αMEM for 24 hours to prepare the USCS-CM. Human GBM T98G cells were treated with USCS-CM for 24 hours. Following this treatment, the expression of pluripotency markers SOX2, OCT4 and NANOG genes were analyzed using quantitative RT-PCR. The result showed that SOX2 and OCT mRNA expression were 4.7-fold (p=0.02) and 1.3-fold (p=0.03) respectively higher in the CM treated cells compared to the control. However, there was no change in NANOG mRNA expression. It might be due to there are others factors which regulate NANOG mRNA expression. In conclusion, UCSC-CM could affect the expression of SOX2 and OCT4 in human glioblastoma multiforme T98G cells. Further research is needed to elaborate the mechanism of different expression of pluripotency marker that was induced by UCSC secretome.

Keywords: conditioned medium, mesenchymal stem cells, glioblastoma multiforme, pluripotency expression
THE EFFECTS OF GALLIC ACID AND ITS SYNTHETIC DERIVATIVES FORM ON TNF-A CYTOKINES AND VIABILITY OF ENDOMETRIOSIS CELLS IN VITRO

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Abstract

Edometriosis is a gynecologic disease in women that can cause infertility and chronic pelvic pain, and has a relatively high recurrence rate. Since gallic acid and its derivatives have been shown to have an anti-inflammatory effect in several cancer cell, this study intended to investigate whether these substance can be used as candidates for the therapy of endometriosis. Study the effects of gallic acid and its synthetic derivatives form (heptil and octylgallate) on the production of TNF-α proinflammatory cytokines and endometriosis cell viability derived from primary endometriosis tissuecultures in vitro. The endometriosis cell was isolated enzymatically from the patient's primary tissue, cultured and given gallic acid, heptyl gallate and octyl gallate at doses (25.6 μg / mL, 51.2 μg / mL and 102.4 μg / mL) for 48 h and continued induced with LPS for 24 hours in vitro. Inflammatory markers were assessed by measurement of TNF-α cytokine products by ELISA and cell viability by MTS assay. Gallic acid, heptyl gallate and octyl gallate significantly inhibited viability of endometriosis cells (p = 0.000) with the highest inhibition at doses of 102.4 μg / mL compared to the control. TNF-α production decreases in heptyl gallate doses of 102.4 μg / mL compared to gallic acid and octyl gallate, although not statistically significant. The present study suggest that gallic acid, heptyl gallate and octyl gallate have an inhibition effect towards viability of endometriosis cells, and potentially suppress the production of TNF-α cytokines.

Keywords: endometriosis, gallic acid, heptyl gallate, octyl gallate, TNF-α, cell viability
THE ROLE OF RESISTANT STARCH TYPE 3 FROM CASSAVA STARCH IN INCREASING PLASMA GLP-1 LEVELS OF DIABETIC MOUSE

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Abstract

Diabetes mellitus (DM) occur when human body is unable to produce enough insulin and/or unable to use insulin effectively, resulting in an increase of blood sugar levels (hyperglycemia). Indonesia has ranks fourth after United States, China and India in the prevalence of DM. Controlling blood sugar and insulin levels can be done through the stimulation effect of Glucagon-like peptide-1 (GLP-1). The goal of this study was to determine the effects of resistant starch type 3 (RS3) from cassava starch in increasing plasma GLP-1 levels. This research use male mouse (Rattus novergicus) as a diabetic model by providing a high-fat diet (HFD) for one month than combine with intraoperitonel injection of low dose streptozotocin (STZ). The mouse then grouped into 4 groups randomly (1) normal or negative control, (2) cassava starch diet, (3) RS3 diet, (4) positive control. Blood sugar levels were measured before and after STZ injection to determine the diabetic conditions (blood sugar  greater than 200 mg/dL). After 4 weeks of dietary administration blood sugar and plasma GLP-1 levels were examined using ELISSA. Statistical analysis showed decreased in blood sugar levels and increased in plasma GLP-1 levels after one mounth of RS3 diet. This research shows that RS3 from cassava starch has a potential role as a nutritional therapy on diabetes mellitus condition.

Keywords: Resistant starch type 3, cassava starch, GLP-1, Blood Sugar, Diabetes Mellitus
STABILITY OF RECOMBINANT HUMAN INTERFERON ALPHA-2B IN Pichia pastoris

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Abstract

The stability of recombinant human interferon alpha-2b (rhIFNα-2b) remains a great challenge for pharmaceutical sciences. In previous research we constructed open reading frame encoding rhIFNα-2b and produced the protein in Pichiapastoris (P. pastoris). This research was aimed to study the stability of rhIFNα-2b in three parameters: temperature, pH and shelf life. The rhIFNα-2b was overproduced by using buffered methanol complex medium (BMMY) at 30 °C for 48 h with 2% of methanol as inducer. Filtration of protein was used by minimate™ tangential flow filtration system with molecular weight cut off (MWCO) 5 kDa. Purification of rhIFNα-2b was performed by immobilized affinity chromatography column using AKTA purifier system. Colorimetric bicinchoninic acid assay informed that the yield of purified rhIFNα-2b was 10.92 mg/L (OD₆₀₀ = 2.3). Sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) and Western Blot analyses confirmed that the protein was rhIFNα-2b with 24 kDa in size. Matrix assisted laser desorption ionization-time of flight/time of flight (MALDI-TOF/TOF) mass spectrometry identified the protein as hIFNα-2b with 22% of amino acid coverage. Non reducing SDS-PAGE and Image J software analyses showed that temperature increment, acidic and basic pH as well as shelf life length caused protein aggregation and degradation. The 3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide (MTT) assay informed that aggregation and degradation reduced the antiproliferative activity of rhIFNα-2b on human breast cancer MCF-7 cell line. To conclude, all parameters give an impact on rhIFNα-2b stability with the most influencing parameter was temperature at 25°C. These data can be used to develop rhIFN-α2b formulations as therapeutic protein.

Keywords: Aggregation, degradation, Pichiapastoris, rhIFNα-2b, stability.
THE EFFECTIVENESS OF *Syzygium samarangense* LEAVES ON HEALING PROCESS OF BURNS BASED ON COLLAGEN

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**Abstract**

Background: The World Health Organization (WHO) estimates the number of death in 2014 caused by burns is 265,000. Burns can caused skin damage as well as other complication problems such as dehydration, infection, and other multiple organ failures. *Syzygium samarangense* leaves contain flavonoids and saponins that can increase the activation of macrophages and TGF-B which is important to accelerate the process of collagen formation and wound healing process. Objective: Knowing the effect of *Syzygium samarangense* leaf extract on the healing process of burn based on collagen. Method: This in vivostudy use true experimental design. We made burns by placing a coin that already heated in oven at 70°C for 10 seconds. Rattus Wistar as experimental animals divided into 6 groups (n = 4) with details of Group A (normal), B (positive), C (negative). Groups D, E, and F were the groups that givenointment extract topically in doses of 15%, 30%, and 45% each day’s. Termination is done on day 14. Test statistics by using Kruskal Wallis. Results and discussion: From this research, *Syzygium samarangense* leaf extract can reduce the wound area (p <0,05) and increase the amount of collagen (p <0,05). Conclusion: *Syzygium samarangense* leaf extract can accelerate the healing process of burns.

**Keywords**: Burns, *Syzygium samarangense* Leaves, Saponin, Flavonoid, Collagen
THE EFFECT OF ENCAPSULATION MATERIAL ON THE QUALITY OF PROBIOTIC CONTAINING Lactobacillus fermentum

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Abstract

This research was conducted to ascertain the effect of encapsulate material on the quality of probiotic containing Lactobacillus fermentum. The probiotic was isolated from the intestine of Japanese quail (Coturnix japonica). A fully randomized factorial design was used to assign four kind of encapsulate material, that was maltodextrin-starch corn (MC), maltodextrin–skim milk (MS), gum arab-starch corn (GC), gum arab-skim milk (GS). The first factor was non-encapsulated probiotic and the second factor was encapsulated. The inclusion levels of encapsulate material was (25, 30 and 35%). Data were analyzed by analyzes of variance by two-way Nested of Completely Randomized Design. The results showed that the best of encapsulate material is maltodextrin-corn Starch 35% (MC 35). L. fermentum that encapsulated with MC 35 was produce highest of lactic acid (1.13 %), lowest of pH (4.067), lowest total sugar (0.518 %) and highest amount of probiotic cell (10.66 log cfu/ml).

Keywords: encapsulation, Lactobacillus fermentum, probiotic
MAMMARY GLAND HISTOLOGY OF SWISS WEBSTER OVARIECTOMIZED MICE (Mus musculus L) AFTER SOY TEMPEH FLOUR EXTRACT EXPOSURE

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Abstract

Estrogen plays an important role in the growth of the mammary gland which stimulates the growth of the stroma and the duct system and stimulate the accumulation of fat in the mammary gland that can provide mass on the mammary gland. Estrogen level decreasing caused mammary gland atrophy and duct dilation that lead to inflammation. Tempeh contains phytoestrogen compounds that have a structure 17β estradiol-like. This study was conducted to determine the effect of tempeh soybean flour extract on mammary gland histology of Swiss Webster ovariectomized mice (Mus musculus). Tempeh soybean flour extract dosages were given to the mice: 0.21 g/ml, 0.42 g/ml and 0.63 g/ml by gavage as long as 10, 20, and 30 days. Mice were dissected on 11th, 21st and 31st day. The results showed that the extract of soybean tempeh flour for 10, 20, and 30 days can decreased the average diameter of the lumen and increased the thickness of intralobularis duct epithelium. The lowest lumen diameter average (23.40 μm) and also the highest epithelium thickness average (8.96 μ) were found at the highest dosage (0.63 g/ml/day) during of 30 days treatment

Keywords: Mammary gland, Ovariectomy, Soy tempeh flour extract
EVALUATING THE GEOGRAPHICAL DISTRIBUTION OF COI HAPLOTYPES OF Nannophya pygmaea (ODONATA: Libellulidae)

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Abstract

Nannophya pygmaea (Scarlet Dwarf, Northern Pygmyfly, or Tiny Dragonfly) is the smallest species of dragonfly in the world, and can be found in Asia, the Indian peninsula to Australia. Although categorized as Least Concern ver 3.1 by the IUCN, this species has become rarely found due to habitat loss due to shifting land use. In National Park Bogani Nani Wartabone (NP-BNWB), this species is found only in agricultural land as it is the preferred habitat. This species is very rare and endangered in Korea. The aim of this study is to evaluate the distribution of COI (cytochrome Oxidase I) haplotype of N. pygmaea in Asia. The data used are the barcode DNA regions of COI of N. Pygmaea found in TN-BNWB, and paired with the distributed haplotype COI data in Asia obtained from the BOLD system. The phylogenetic tree is constructed using the Neighbour-joining (NJ) method and the genetic distance is calculated using Kimura 2-parameter, all of which are integrated in the BOLD system. The Kimura 2-parameter genetic distance value was also obtained from calculation using MEGA7 for sequences obtained from NCBI. Phylogenetic tree shows that there are two large clusters or operational taxonomic units (OTU) (I and II), and four small clusters (Ia, Ib, IIa, and Iib) of N. pygmaea. This result is supported by analysis using ABGD (Automatic Barcode Gap Definition), that there are four groups of species candidates. The combined result of a phylogenetic tree study obtained from BOLD and NCBI show that Cluster Ia is represented by taxa from Korea and Japan; Ib cluster is from China, Taiwan, and Laos; Cluster IIa is from Indonesia (Central Kalimantan), Singapore, Malaysia, Brunei, Cambodia, and Vietnam); and Iib cluster is from the Philippines (Davao) and Indonesia (North Sulawesi). The enormous genetic distance of intraspecies shown by this species (up to 14%) suggests that the possibility of taxa separated by very distant genetic distances are in fact different species or OTUs.

Keywords: Automatic Barcode Gap Definition, cytochrome oxidase subunit I, phylogenetic, genetic distance, Nannophya pygmaea, operational taxonomic unit
THE DIVERSITY OF PTERIDOPHYTES HAVE MEDICINAL POTENCY BASED ON ALTITUDE IN SOUTHERN SLOPES AREAS OF MOUNT SLAMET BATURRADEN

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Abstract
Volcanic eruptions of Mount Slamet on 10 periods ago resulted in plant succession into plant variations in each height strata on its southern slope, one is ferns. Beside to ecological functions, ferns also have important benefits for humans, one of them as a medicinal herb. This research was conducted in the heterogeneous forest of slopes area of Mount Slamet Baturraden botanical gardens in Central Java, with the variation of area based on altitude, i.e. (540 – 1500 m), (270 – 540 m), and (from 0 – 270 m), calculated from the border between damar and heterogeneous forest. The method used is a quadratic method with purposive random sampling, by put 2 x 2 m\textsuperscript{2} of the plot in every variation of the height area, each 50 plots. At an altitude I, found \textit{Selaginella ciliaris} (medicine amenorrhea), \textit{Christelia dentate} (antibacterial), \textit{Diplazium eculentum} (Birth-aid in parturition), \textit{Adiantum philippense} (irregular menstruation medicine), and \textit{Cyathea crenulata} (contains antioxidants), with the important value of each species, are 3.430787, 1.644494, 1.504045, 0.822247, and 0.681798. At an altitude II, found \textit{Selaginella bryopteris} (for post-patulm care), \textit{Blechum orientale} (barren and ulcers medicine), \textit{Pityrogramma calomelanos} (for rheumatic pain and spine care), \textit{Pteridium aquilinum} (contains antioxidants) and \textit{Dryopteris cochleata} (premenstrual syndrome medicine), with the important value of each species are 2.46959, 1.99460, 1.39697, 0.47188, and 0.23594. At an altitude III only found \textit{Dioranopteris linearis} (increase fertility in women) with essential value is 2.50. Based on the study data, it can be inferred, there are 11 species potential medicine from 24 species pteridophytes found.

\textbf{Keywords}: Pteridophytes, Plant medicine, Baturraden
PHYLOGENETIC ANALYSIS OF FUNGAL ENDOPHYTE FROM QUINA PLANT (*Cinchona calisaya* Wedd) BASE ON ITS rDNA SEQUENCE

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Abstract

Endophytic fungi are microorganisms that can live inside plant tissues without harming the host. The endophytic *Colletotrichum* spp. were isolated from quina plants (*Cinchona calisaya* Wedd). The identification of endophytic fungi required combination of morphological characters and molecular methods. The purpose of this research was to identify seven isolates of endophytic fungi *Colletotrichum* spp. from *C. calisaya* based on phylogenetic tree. The method was used phylogenetic analysis of maximum parsimony (MP) by PAUP 4.0b10 with bootstrap analysis 1000 random sequence additions. The analyze of the phylogenetic tree based on phylogenetic tree ITS rDNA, ACT and the combination both of ITS−ACT. The result showed that *Colletotrichum* M5 was identified as *C. karstii* strain CBS 127552, *C. karstii* strain CBS 129822, and *C. Karstii* strain CBS 128550 with bootstrap value 89%. *Colletotrichum* endophytic M2, M3, M4, M7, and M8 identified as *Colletotrichum* sp. M2, *Colletotrichum* sp. M3, *Colletotrichum* sp. M4, *Colletotrichum* sp. M7, *Colletotrichum* sp. M8. *Colletotrichum* sp. M30 formed sisterclade *Gromerellacingulata* f sp. *Camelliae* strain ICMP 10643, *Gromerellacingulata* f sp. *Camelliae* strain ICMP 10646, *C. camelliae* strain LC1363 with bootstrap value 64%. The identification of *Colletotrichum* spp. in this research were needed another gene i.e. *glyceraldehyde-3 phosphate* (GDPH), *Calmodulin* (CAL), *Glutamine Synthetase* (GS), *β-tubulin* (TUB2), and *Elongation Factor1-α* (EF1-α) to be identification until species level.

Keyword: *Cinchona calisaya*, *Colletotrichum*, phylogenetic tree
MOLECULAR CHARACTERIZATION OF FOUR GIANT GOURAMISTRAINS FROM JAVA AND SUMATERA

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Abstract

Giant gourami (*Osphronemus goramy*) are widely distributed across Indonesia, such Java, Sumatera, and Kalimatan which lead to the emerge of various gourami strains due to morphological differences. So far, no scientific data about the relationship between morphological and genetic differences among strains. This research aims to obtain information on molecular characteristics of four giant gourami strain from Java and Sumatera based on partial sequences of cytochrome c oxidase 1 gene. This information is vital to strengthen of their taxonomic status. Caudal fin clips were sampled from each strain. Nucleotide sequencing was performed using bigdye terminator technique. Pairwise Fst comparison was carried out with the help arlequin software, whereas sequences divergence analysis was performed in DnaSP software. Homology of the sequences were checked with previous published data available in genbank using basic local alignment search tool (BLAST). BLAST process result in 99-100% similarity to the previous published sequences. This means that all strains are belong to single species, i.e. Osphronemus goramy. This placement was supported by low level of genetic divergences among strains. Although they have low level genetic divergences, this value is suitable to separate each strains clearly as indicates by pairwise Fst comparison analysis and amova which showed differences among strains. However, phylogenetic tree shows that all stains formed a monopyletic group with bootstratp value of 100. Phylogenetic analysis supports the placement of all strains into a single species that is *Osphronemus goramy*. Those morphological differences are also reflected in their genetic character, except for Tambago and Oranye strains.

Keywords: fixation index, gourami (*Osphronemus goramy*), molecular divergence, Java, Sumatera
UNEXPECTED SPECIES SHIFTING OF THE ANOPHELES DIVERSITY IN BANGSRING VILAGE, WATUDODOL DISTRICT BANYUWANGI, INDONESIA

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Abstract
Malaria is still a human health burden in Indonesia. This disease is caused by malaria parasite which is transmitted to human host by Anopheles mosquitoes as main vector. Knowledge on bionomic of the vectors, which includes the study of its diversity, plays a crucial role in developing strategy for an effective and successful vector control program to combat the transmission of malaria. Malaria’s case has been reported to occur annually in Bangsring village, Wongsorejo district of Banyuwangi city, East Java since 2002. The objective of this research was to explore the bionomic characteristic of Anopheles (An) as vector for malaria in this area. The data collection i.e. determination of Anopheles diversity, Anopheles behaviour, and environmental influences, was conducted for 6 months annually from 2014 – 2017. All the collected data were descriptively presented as well as statistically analysed for certain data such as weather influence on vector behaviour. The questionnaires were taken to elaborate human behavior. The results showed that there were species shifting of Anopheles vector in this area. The proportion of An. sundaicus and An. subpictus which were previously reported until 2015 as the main Anopheles species in this area, was significantly decrease in 2016 & 2017. An. indefinitus & An. vagus was becoming the majority of Anopheles species. The number of Anopheles sp. mosquitoes which were resting surround cattle cage was much higher than inside the house in the last 2 years of experiment. This was relevant with its species shifting since the predominant species of An. indefinitus has zoophilic preference behaviour. There was no significant change in environmental condition (temperature, rainfall, humidity) throughout the observation period. However, the decrease of malaria cases during the last 2 years is very likely due this species shifting, since An. indefinitus has not previously been identified as primarily vector for malaria, compared to An. sundaicus, An. aconitus and An. maculatus which are well known as important primary malaria vector on Java Island, Indonesia. The active participation of the people in this area in vector control program has been concluded as the main reason for decreasing primary malaria vector. Still, the cause for species shifting and the dominancy of An. indefinitus are remain unclear.

Keywords: Malaria, Anopheles, vector, bionomic
ISOLATION AND CHARACTERIZATION OF BENEFICIAL BACTERIA FROM THE GUT OF TILAPIA (*Oreochromis niloticus*) FOR PROBIOTIC PROPERTIES AGAINST FISH PATHOGENS

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Abstract

The aim of this study was to evaluate the ability of beneficial bacteria isolated from the gut of tilapia (*Oreochromis niloticus*) for probiotic properties against *Aeromonas hydrophila* and *Vibrio alginolyticus* under *in-vitro* conditions. The method used in this study consisted of microscopic- and biochemically characterization and identification of bacterial isolates, antagonistic and antibacterial activity assays by agar diffusion method. One of conventional safety evaluation approaches to assess the safety of a new probiotic strain is toxicological testing, which in our study using brine shrimp lethality test (BSLT). This study have isolated fourteen isolates and from antagonistic testing, six isolates were selected for antibacterial activity against the two fish pathogens. The six isolates exhibited moderate activities (10.30-13.30 mm) against *Aeromonas hydrophila*, and this was slightly higher than the activities against *Vibrio alginolyticus* which ranging from low to moderate (9.00-12.70 mm). The highest inhibitory activity was demonstrated by isolate PR 23 against both *Aeromonas hydrophila* (13.30 mm) and *Vibrio alginolyticus* (12.70 mm). The cytotoxicity test with BSLT (brine shrimp lethality test) showed that the three bacterial isolates (PR 21, PR 23 and PR 36) were not toxic to *Artemia* nauplius. Microscopic- and biochemically characterization and identification suggested that the three probiotic candidates belong to the genus *Lactobacillus* (isolates PR 21 and PR 23) and *Eubacterium* (isolate PR 36). All three isolates were able to survive in low pH (pH-2 and -4). Based on the positive results of this study, all three probiotic isolates have prospects for challenge experiments in fish to explore their probiotic effects under *in-vivo* conditions.

Keywords: Probiotics, Tilapia (*Oreochromis niloticus*), Antibacterial and antagonistic tests, Cytotoxicity, Fish pathogens
Actinomycetes are Gram positive and filamentous bacteria, sporulation and plant tissues colonization. Actinomycetes have a widespread habitat in the soil, so that indigenously important in plant root system. Cellulolytic and xylanolytic activity of actinomycetes are also used to degrade plant biomass with high lignocellulotic. Actinomycetes are known for its ability to produce antibiotic and anti phytophagant that can be used to reduce the use of fungicide. The potential of indigenous actinomycetes could be used as biofertilizer and biocontrol agent. This research consists of isolation and screening actinomycetes from rhizosphere of cacao and edamame soybean in Jember resident. These isolates screened to detect their cellulolytic and xylanolytic activity, solubilization phosphate and antimicrobial potential. The results showed there were 40 actinomycetes isolate which is isolate EC 3.7 has cellulolytic, xylanolytic and solubilization phosphate activity. Actinomycetes isolate EC 3.7 is the most potential as a microbe of biofertilizer. Isolate EC 3.7 can also used as a biocontrol agent because it can inhibit the growth of Fusarium oxysporum and Penicillium sp. Isolate EC 3.7 also produce antibacteria, it can inhibit the growth of Escherichia coli. Based on the characterisation of spore, isolate EC 3.7 is suspected to be part of Streptomyces.

Keyword: actinomycetes, indigenous, biofertilizer
DIVERSITY OF JUVENILE AND SMALL FISH IN MANGROVES WITH DIFFERENT ROOT TYPES IN LABUHAN COASTAL AREA, SEPULU – BANGKALAN

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Abstract

The complexities of mangrove root types are well known to give effect on communities of fish including larval, juvenile and adult stages. This study aimed to access the difference on species composition and diversity of juvenile and small fish from mangrove area with different root types, especially in mangrove area in coastal area of Sepulu, Bangkalan which projected as a mangrove protection area. The samples were collected from November 2016 to June 2017 using modified centipede net and scoop net. Sampling locations including area with the pneumatophores (S), stilt roots (R), combination of both types (C) and area without mangrove (unvegetated area or T). At the end of study, at least 32 species from 16 families of juvenile and small fish were identified. Families of fish with highest number of species are Gobiidae with 13 species, followed by Ambassidae, Mugilidae, Eleotridae and Siganidae with 2 species each. Fish species with highest abundance in all sampling sites and periods are Oryzias javanicus (F. Adrianichthyidae, 22.039%), Ambassis kopsii (F. Ambassidae, 17.878%), Lizavaigiensis (F. Mugilidae, 9.613%), Am. buruensis (F. Ambassidae, 9.261%), Terapon jarbua (F. Terapontidae, 7.562%), L. subviridis (F. Mugilidae, 7.385%) and Pseudogobius javanicus (F. Gobiidae, 7.385%), respectively. Result of two-way Anova (p=0.05) suggest that area with stilt roots (R) which dominated by mangrove Rhizophora have relatively higher abundance and species richness of juvenile and adult fish. Meanwhile, average of Shannon-Weaner diversity index (H’) value in R area is 2.031 or highest among the other sampling sites.

Keywords: diversity, juvenile fish, small fish, mangrove root, Labuhan coastal area
FIRST EXTENSIVE SURVEY OF HETEROBRANCH SEA SLUGS (Mollusca, Gastropoda, Heterobranchia) FROM BUNAKEN NATIONAL PARK, WITH EMPHASIS AROUND BUNAKEN ISLAND

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Abstract

Bunaken National Park (BNP) is one of the most famous marine National Parks in Indonesia with an extraordinary biodiversity in marine life forms. BNP is very popular for diving tourists, since it is close to the capital city of North Sulawesi (Manado) with connection to an International Airport. This close connection to a large city and easy access, including economic demands for housing tourists implies a large threat to coral reefs and other marine habitats nearby. Therefore a monitoring of marine biodiversity and assessment of threats and changes are imminent to protect and to give guidelines for future use of resources. Here we monitored for the first time with a thorough search of 5 people and within a time frame of 2 weeks with about 8 hours manpower under water the diversity of marine heterobranchs. We list the species with photo documentation, and enlarge the list by including former encounters documented by pictures. In total, at least 96 species are now recorded from Bunaken National Park.

Keywords: Heterobranchia, Biodiversity, Monitoring.
MICROFLORA OF LELE DUMBO (Clarias gariepinus) AND TOTAL PLATE COUNT (TPC) INTESTINE AND IMPORTANT PROBIOTIC LACTIC ACID BACTERIA (LAB) AND HOW GROWTH STUDIES IN IN THE CATFISH FEED MANUFACTURER IN VITRO

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Abstract
The bacteria flora of Catfish Dumbo Clarias gariepinus was investigated using standard microbiological procedures. The total heterotrophic bacteria count of intestine of Clarias gariepinus ranged from 1.2 - 1.8 x 10⁴ cfu/g. The bacteria flora included Streptococcus sp., Escherichia coli, Salmonella sp., Staphylococcus sp., Vibrio sp., Pseudomonas sp., Serratia sp., Klebsiella sp., Shigella sp., Enterococcus sp. and Proteus sp. Enterococcus sp. and Intestine and Important Probiotic Lactic Acid Bacteria (LAB). LAB is a group of Gram positive bacteria capable of converting carbohydrates into lactic acid, besides LAB is one group of bacteria that have a role as probiotic bacteria, which means a good bacteria that live in the digestive system. Catfish dumbo (Clarias gariepinus) is one of the cultivated animals that allegedly have a good content of LAB on its digestive system. But at a certain age Catfish dumbo experiencing the digestibility of the feed is less effective ie at the age of starter. The less effective is marked by the high feed conversion ratio (FCR), ie what is the ratio of feed or in other words is how much feed (kg) is given to produce 1 kg of fish meat. This research was conducted by descriptive method through the exploration of catfish dumbo digestive system obtained from pond cultivation with the final result of LAB isolate that known growth in catfish diet of starter age. The ability test was grown by growing the isolates on the catfish feed of the starter age manufacturer.

Keywords: Microflora of Lele Dumbo, Total Plate Count Important Probiotic Lactic Acid Bacteria LAB, Catfish Dumbo, feed conversion ratio (FCR)
TRANSCRIPTOMIC ANALYSIS OF DEFENCE-RELATED GENES IN Musa spp.

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Abstract

Soil borne fungi pathogen, Fusarium oxysporum sp. Cubense (Foc) and Ralstoniasolanacearum are disease agents caused wilt diseases in banana which has been well known causes seriously destruction of banana plantation in the world. Currently, eradication of infected banana trees is the best method to reduce spreading of Foc and R. solanacearumin banana plantation. Early detection of microbial infection is an alternative method that offers possibility to prevent fusarium wilt dispersion. Transcriptomic analysis of defence-related genes (WRKYs family genes and PRs genes) in Musa spp was performed in order to investigate expression level of those genes after infected with Foc and R. solanacearum. 45 days old banana seedling were infected with Foc and R. solanacearum and analyzed level expression of WRKYs genes (WRKY4, WRKY15, WRKY18, WRKY23, WRKY71, WRKY74)and 3 PRs genes (PR1, PR2, PR4) using quantitative real time PCR and semi-quantitative real time PCR methods. ACTIN gene was used as reference gene. Data were collected from 6 time scale (0, 1, 2, 3, 7, 14dpi) and were compared with control plants. Phenotypically, treated plants showed damage in the pseudostem and leaves after 7 dpi. Growth retardation was observed in the leaves and shoot meristem apical of the treated plants in comparison to control plants. Expression level data showed that 5 of 9 tested genes (WRKY4, WRKY15, WRKY23, PR1) showed up regulated at 2nd dpi. WRKY74 and PR4 initially (0 day) have high expression level in comparison to expression level of the same genes in the control plants, but then the level of expression gradually was decrease until 14th day after Foc infection. Three days after infection 4 genes (WRKY4, WRKY23, PR1, PR2) showed highest increasing level of expression (12, 7, 33 and 7 fold respectively) relative to initial day (0 day). Base on the transcriptomic data of 9 tested genes in this study, 7 genes (WRKY4, WRKY15, WRKY23, WRKY74, PR1, PR2, PR4) have potential to be further analyzed as candidate of responsive genes for early detection of microbial pathogen infection, especially Foc and R. solanacearum in banana.

Keywords: Transcriptomic analysis, Defence-related genes, Fusarium oxysporum, R. solanacearum, Banana.
THE POTENTIAL OF AMARANTH AS NATURAL ANTIOXIDANTS

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Abstract

The prevalence of cancer in developing countries is expected to be formidable, as it is ranked as the sixth major cause of deaths in Indonesia; after infectious diseases, cardiovascular diseases, traffic accidents, nutritional deficiencies, and congenital diseases. It is estimated that there will be at least 170-190 new cases of cancer annually for each 100,000 people. In 2012, the death toll of cancer was 194,500 people. Breast- and cervix uteri-cancer were the major death causes among women, meanwhile, lung and colorectum cancer were the major causes among men. According to various sources, a high consumption of dietary antioxidants containing in vegetable and fruits might help in preventing cancer. The most prominent representatives of dietary antioxidants are ascorbate (vitamin C), tocopherols (vitamin E), carotenoids, and flavonoids. Amaranth (Amaranthus sp.) are multi-purpose plants, whose grains and leaves are considered as potential antioxidant source. It was domesticated approx. 4,000 years ago in the Middle America, though, it is widely distributed almost in all types of eco-geographical regions. This study reported the antioxidant properties of Indonesian and worldwide amaranths (N= 30 accessions) containing in the leaves by measuring their Radical Scavenging Activity (RSA) presented by IC50 value, which shows the percentage of inhibited free radical amount at 50%. Results showed that the range of IC50 was in the range of 1.30-13.83 mg ml-1, while, the total phenolic phenol was varied [0.28-1.59 mg Gallic Acid Equivalent (GAE) kg-1 amaranth leaves]. This study served as the baseline for amaranth’s further utilization in pharmaceutical and food industries.

Keywords: Gallic acid equivalent, LCMS, nutraceuticals, underutilized crops
APPLYING Bacillus subtilis TO STABILIZED TROPICAL ORGANIC CLAY

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Abstract

Indonesian government is eager to achieve an economic growth rate of 7 percent in 2025. In order to achieve this economic growth, Indonesia has to boost its infrastructure development. Many of the infrastructure facilities, such as roads, tunnels, bridges and dams, have to be built on the soft soils. Therefore, in order to support these facilities, the strength of the soft-soils have to be improved. Soil improvement methods, which are environmental friendly, has been developed. One of this method is biogrouting, which is soil improvement method by applying microorganism bacteria. This work studied biogrouting of high plasticity tropical organic soil using Bacillus subtilis bacteria. In order to study the effectiveness of biogrouting using Bacillus subtilis, unconsolidated undrained triaxial and direct shear tests were conducted on the pure and stabilized soils. The triaxial test gave 0.2143 kg/cm² for the cohesion and 0.2317 kg/cm² for the shear stress of the undisturbed soil. The value of improved soils increased 5.8 times and 2.7 times more than cohesion and shear stress values, respectively, after 28 days of incubation period.

Keywords: Biogrouting, Bacillus subtilis, organic clay soil, high plasticity, soil shear strength.
CHARACTERIZATION OF POLYSACCHARIDE EXTRACT FROM MYCELIUM AND FRUITING BODY OF LING ZHI (Ganoderma sp.) WITH FACE (Fluorophore Asissted Carbohydrate Electrophoresis)

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Abstract

Ling Zhi mushroom (Ganoderma sp.) has been known to have a lot of health benefits. It is because the active components in it, like triterpenoids, steroid, phenols, glycoproteins, polysaccharides, and others. Polysaccharide is one of the Ling Zhi’s components playing a major role in improving human health. This study aimed to compare the total polysaccharide and its profile contained in mycelium and fruiting body of Ling Zhi mushroom. The analytical methods used were total sugar (TS) and FACE with AMAC label. Results of this study indicated that water extract yield of fruiting body was not significantly different from that of mycelium (2.53% vs 2.88% dry weight). Percentage of total polysaccharide in mycelium was found higher than the one in fruiting body (71.94% vs 39.1% dry weight). The polysaccharide profile of fruiting body was similar to that of mycelium of Ling Zhi mushroom (Ganoderma sp.) as shown by FACE (Fluorophore Asissted Carbohydrate Electrophoresis) result.

Keywords: Ling Zhi, polysaccharide, fruiting body, mycelium, FACE
DIVERSITY OF ENDOPHYTIC Trichoderma ISOLATED FROM VARIOUS ECOSYSTEMS IN RIAU, INDONESIA

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Abstract

Sustainable management of any agriculture or forest ecosystem should consider holistic approaches including ecological, social, and economical aspects for the benefits of all stakeholders. In forestry this implies sustaining the supply of forest products while preserving natural forests. Such scenario should secure not only economic importance of forests, but also their environmental and social roles. Fungi represent a very good selection of biodiversity components in any given habitat including forest ecosystems. They contribute significantly to the sustainability of forest production and play fundamentally important and diverse roles in ecosystems, being involved in many of the key processes required for ecosystem functioning. For instance, they enhance the amount and efficiency of nutrient acquisition by the vegetation, modify soil physical structure and water regimes, and regulate the dynamics of soil carbon sequestration and greenhouse gas emission. They also influence plant health through different types of interaction with the plants. Understanding the critical roles of fungal species in the sustainable forest productivity, research priority has been put on interactions between plants and fungi with particular emphasis of plant pathogens and antagonists. This presentation discusses diversity of endophytic Trichoderma isolated from different ecosystems in the Province of Riau, Indonesia. More than 200 endophytic Trichoderma isolates were collected. Following the isolation processes, their contribution to seedling growth and efficacy against root rot pathogens are also screened.

Keywords: biocontrol agents, biodiversity, pathogen, root rot diseases, screening.
Abstract

The searching novel bioactive compounds from nature are still an important field. Endophytic fungi derived from plants proved to be a possible alternative for production of important plant secondary metabolites. Present studies focus on searching an antimalarial compound based on inhibition of Plasmodium falciparum respiratory complex enzyme, malate-quinone oxidoreductase (MQO). Forty-two endophytic fungi were recovered from leaves of Aglaia elliptica using four different culture media (PDA, MEA, Czapek-Dok and modified PDA). The characterization of those endophytic fungi were done based on their morphological traits. Each isolate was fermented in a small scale and extracted for intracellular and extracellular metabolites. Twenty-five extracts were found to be active as inhibit MQO enzyme. Of the twenty-five extracts, six intracellular and one extracellular extracts were found to exhibit strong inhibition of the MQO enzyme.

Keywords: endophytic fungi, Aglaia elliptica, inhibitor MQO, antimalaria
IDENTIFICATION OF CELLULOYTIC BACTERIA BA 041109 FROM BANDEALIT COASTAL AREA BASED ON DNA SEQUENCES ENCODING 16S RRNA

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Abstract

Our previous study showed that a bacterial isolate designated as BA 041109 from Bandealit coastal area, South Jember Indonesia has been characterize to have cellulytic & lipase activities, which are important properties for the bioremediation of water contaminants. Further identification of this bacteria, morphological and biochemical properties as well as molecular based method is very important to study its phylogenetic relationship with other aquatic bacterial assemblages and also to further elaborate the real functional biological properties of this bacteria in the aquatic environment. The purpose of this research was to identify isolate BA 041109 based on morphological, biochemical, as well as molecular characteristics. Single cell and colony morphological characterization were used as initial step to identify the bacteria. Biochemical observations have been conducted by starch hydrolysis analysis, catalase properties, motility, nitrate reduction, indole H₂S, citrate Simon activities and fermentation analysis to several carbohydrate. Molecular characterization was done based on DNA sequence encoding 16S rRNA. Morphologically, BA 041109 has coccus-bacil shape cell, Gram negative and as a colony with round shape having white color. DNA sequence encoding 16srrRNA analysis showed that BA 041109 has high similarity with Acinetobacter ursingii strain 3792Type. This result has been supported by its similarity in biochemical properties observed in this research.

Keywords: Aquatic bacteria, cellulytic bacteria, identification, bioremediation, 16S rRNA
EFFECT OF HEATING ON THE PHYSICO-CHEMICAL STABILITY OF SAANEN GOAT MILK

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Abstract
Goat milk is known to be generally less heat stable than cow milk. Saanen (SA) were subjected to three standard heating procedures in batch mode. Heating procedures included high temperature-short time (HTST) pasteurisation (90 °C), extended short life (ESL) (120 °C) and ultra high temperature (UHT) (140 °C) treatments for 0, 60 and 120 s. Cow skim milk was used as a reference. Preheating treatment (90 °C, 120 / 240 s) and addition of sodium phosphate (0.00625 – 0.05 %) were carried out to determine effect on heat stability. Heating of milks under pilot plant condition was carried out using direct steam injection under UHT conditions (140 °C, 0 s) with and without preheating treatment. The heated milks were analysed with regard to the degree of whey protein denaturation (HPLC), casein micelles size (dynamic light scattering) and calcium content in serum (EDTA titration). Concerning stability, SA skim milk was less heat stable than. The preheating treatment of 90 °C, 120 / 240 s did not increase the heat stability SA. Sodium phosphate of 0.05 % addition gave better result for SA milk with regard to casein micelle size.

Keywords: Saanen, Goat milk, Heating, Pasteurisation, ESL, UHT
CHECKLIST OF COMMERCIALY IMPORTANT GROUPER (SERRANIDAE) IN ACEH, INDONESIA

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Abstract

The Groupers, locally known as “kerapu” in Aceh and Indonesia, is one of the commercially-important fish in Aceh. Generally, the recording of the groupers in fish landings were recorded as kerapu instead of species names. The species list is one of important information to strategize a better fisheries management plan. However, in Aceh, an accurate inventory of this high-value commercial fish has not been carried out previously. This study was to inventory the groupers species that landed in Aceh fish landings. The fish samples were collected from major fish landing sites across Aceh waters. In this study, 23 species of the Serranidae family were identified. The result of the study has an implication on the endorsement of sustainable fisheries management regulation at the provincial level to protect the species from overfishing.

Keywords: Groupers, Aceh waters, fish landing
THE INFLUENCE OF MALE QUALITY ON FEMALE REPRODUCTIVE INVESTMENT IN RED JUNGLE FOWL (Gallus gallus)

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Abstract

Mothers are predicted to differentially invest in offspring from partners of different quality in order to optimize her fitness. The comb characteristics of male red jungle fowl (Gallus gallus) may serve as a signal of attractiveness and hence quality. Here, we report on the relationship between mate attractiveness and maternal investment in eggs and subsequent offspring development in red jungle fowl. We randomly mated females with a male with an above average (good quality) or a below average comb (poor quality) and let them produce a clutch and raise the chicks. After this first clutch females were then paired up with a male of opposite quality and left to produce a second brood. We found that females paired with good quality males produced eggs sooner after pairing than females mated with poor quality males, but we did not find differences in offspring characteristics. We can conclude that these effects were mediated by the comb as honest information about male genetic or phenotypic quality.
CHARACTERISTIC AND CAPABILITY OF P-
SOLUBILIZERS RHIZOBACTERIA ON SALINE SOIL
ECOSYSTEM

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Abstract

Saline ecosystem as marginal agricultural soils has a great potential for extensification and intensification rice cultivation. Phosphate solubilizing bacteria (PSB) as biofertilizers play important role for improving the nutrients status and phytohormone production to support rice growth under saline condition. The research to investigate the characteristic and capability of PSB of saline soil ecosystem has been done since January 2016. The PSB potential isolates were taken from saline different area from Cilamaya-Karawang West Java. The PSB were isolate using dilution methods and grown in plated agar contain pikovskaya’s media. Subsequently, the bacteria surrounded by holozone (clear zones) were isolated and subject to test the phosphate solubility, phosphatase activity and bioassay. Based on the temporary results were screened and obtained six isolates that has a great potential to be developed and used as phosphate biofertilizers to increase the rice productivity on saline soil ecosystem.

Keyword: P-solubilizer bacteria, saline soil, biofertilizer, phosphatase
ADULTICIDE EFFICACY OF *Artemisia vulgaris* Against *Aedes aegypti*

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Abstract

*Aedes aegypti* is the vector of various arthropod-born diseases such as dengue fever, chikungunya and currently, zika. This study aimed to evaluate *Artemisia vulgaris* as an alternate adulticides for controlling *Aedes aegypti*. It has been reported that 71,668 DF human cases have so far occurred in Indonesia in 2015 covering 34 provinces which means that DF has spread now into all national territories. Eradication of *Aedes* still largely depends on insecticides, which is the most cost-effective strategy, and often inefficient due to resistance development in exposed *Aedes* populations. This study was designed by use of Centers for Disease Control and Prevention (CDC) bioassay standard. Eggs were collected from endemic areas of dengue fever within Sleman, Yogyakarta. The larvae and adult stages were reared in the insectary of Department Parasitology, Veterinary Medicine, Universitas Gadjah Mada. CDC bottles were coated with the ethanolic solution of extract with concentration of 10, 50, 100, 500, 1000, 5000, 10000, 50000, and 100000 μg per bottle. F₀ mosquitoes were used for all experiments. Death and surviving mosquitoes were evaluated based on CDC standard assay. The test was performed with 10-25 adult mosquitoes every bottle and each concentration was repeated in triplicates. The LC₅₀ and LC₉₀ were determined by using probit analysis (Graphpad Prism 7.0.). The results showed that LC₅₀ and LC₉₀ were 5790 μg and 52110μg respectively after 120 minutes exposure by the extract. These results indicated clearly that *Artemisia vulgaris* may act as candidate of bioinsecticides for controlling *Aedes aegypti*.

Keywords: *Aedes aegypti*, *Artemisia vulgaris*, adulticide, bioinsecticide
INDEGENOUS TREE SPECIES ON THE NORTH SLOPE OF MOUNT LAWU, NGAWI, EAST JAVA

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Abstract

Forest on the north slope of Mount Lawu has a unique landscape, source of water, flora and fauna. In other hand, illegal logging and forest fire become a serious threats for conservation of indegenous species. This study was conducted to determine the vegetation types in natural forests on north slope of Mount Lawu between July and August 2015. Data werecollected by nested sampling plots with 20 m x 20 m(tree), 10 m x 10 m (poles), 5 m x 5 m (sapling) and 2 m x 2 m (seedling). Sampling intensity of 2,5% or 13 plots were placed by purposive sampling. Data of vegetation type was then compared with interview data with 155 villagers of Girikerto Village aged 60 and above using a questionnaire guide. The variables measured were species composition, Importance Value Index (INP), index diversity, and vegetation usage by Girikerto villagers. The results showed that the vegetation in the north slope of Mount Lawu consists of 19 species in 15 families. We recorded some indegenous tree species such as bulu (Ficus sp.), cobor (Litsea angulata), jingkat (Macaranga javanica), condong lawe (Engelhardia spicata), cempaka putih (Michelia alba), and sarangan (Castanopsis argentea). Index diversity of seedlings and trees classified as medium, while the sapling and pole are high.
ISOLATION OF ALKALOTHERMOPHILIC XYLANASE GENE FROM *Bacillus halodurans* CM1 AND ITS CLONING IN PGEM T-EASY

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Abstract

A gene encoding an alkalothermophilic xylanase gene was isolated from *Bacillus halodurans* CM1 with its original promoter. The gene isolation was performed by PCR using degenerate primers. The isolated gene was cloned in pGEM-TEasy, which was then used to transform *E. coli* TOP10. The cloned gene was verified by restriction digest using EcoRI and expression analysis by observation of clear zone on agar media containing xylan and assay of xylanase activity.

Keywords: alkalothermophilic xylanase, cloning, expression, *Bacillus halodurans* CM1
Annona muricata Linn. LEAF EXTRACT AS α-AMYLASE AND α-GLUKOSIDASE INHIBITOR

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Abstract

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by both postprandial and fasting hyperglycemia with disturbances in carbohydrate, fat and protein metabolism. There has been an enormous interest in the development of alternative medicine for type 2 diabetes. Annona muricata or sirsak has been used to cure cancer and according to American Association of Clinical Endocrinologist there was a significant increasing for patient cancer with obesity and diabetes. The goal of the present study was to provide in vitro evidence and chemical structure for potential inhibition of α-amylase and α-glucosidase activity. Ethanolic fraction of Annona muricata leaves gave the highest inhibitory activity against α-amylase (IC₅₀ value of 73.54 ppm) and α-glucosidase (IC₅₀ value of 63.73 ppm) furthermore inhibition of compounds isolates Fr.EtOH.4.2.3 gave IC₅₀ 0.12 ppm and IC₅₀ 0.17 ppm inhibition of α-amylase and α-glucosidase respectively. Analysis data and identification of active compounds is done by LC-MS and FT-IR, identification active compound of α-amylase and α-glucosidase inhibitors is mixture of Muricatin C, cis-Reticulatacin-10-one and 3-Methylquercetin 7-[galactosyl-(1->4)-glucoside].

Keywords: Diabetes, Annona muricata Linn., α-amilase, α-glukosidase, inhibitor
ANTIBACTERIAL OF Averrhoa carambola L. AGAINST Methicillin Resistant Staphylococcus aureus (MRSA)

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Abstract

Star fruit (Averrhoa carambola L.) has been used as treatment for curing illness traditionally. Purpose of this study is to investigate the effect of methanol extracts of A. carambola leaf and its bark on the growth of Methicillin Resistant Staphylococcus aureus (MRSA). The extraction was done by maceration method while antibacterial test by Kirby-Bauer method. Antibacterial activity test used three concentrations namely 25, 50, 75%. For negative and positive control, methanol and linezolid was used respectively. The result showed the extraction of barks at concentration of 75% gave the widest inhibition zone to MRSA.

Keywords: Averrhoa carambola L., MRSA bacteria, maceration, Kirby-Bauer method.
STUDY OF ENTOMOPHATOGENIC FUNGUS TO CONTROL VECTOR INSECT OF CITRUS TRISTEZA VIRUS (CTV) ON CITRUS

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Abstract

Citrus Tristeza Virus (CTV) disease is a silent killer, which threatens to decrease productivity, quality and even death of citrus plants and the erosion of genetic resources. Spreading in the field very quickly by the intermediate insect vector pest, aphid (Toxoptera citricida, T. Aurantii and A. Gosypii). The microbes studied for potential biopesticide candidates are: Beauveria bassiana and Hirsutella citriformis, and Metarhizium anisopliae (Metch) Sorokin previously reported to control Diaphorina citri pests resulting effectiveness of > 25% and was able to suppress yield loss up to 10%. The objectives of the study examined the effectiveness of entomopathogen in controlling the pest of CTV vector, Toxoptera citricida, in the laboratory and screen house, to find out the physiological, biochemical and molecular physiology of entomopathogen. The results showed that the best entomopathogen suspension concentration was B. bassiana 106 followed by H. citriformis 106 and M. anisopliae 106. Entomopathogen B. bassiana and H. citriformis effectively controlled the CTV vector pest in the laboratory. In the semi-field experiments at the screen house, the most effective result was H. citriformis 106 and the combination of H. citriformis 106 + B. bassiana 106, killing up to 50% and 100% on day 7. H. citriformis had the most physiological character, was able to develop optimally at a temperature of 20-40 degrees C and humidity between 60-80%. The biochemical character of the entomopathogenic fungus B. bassiana contained cellulase enzyme and phosphate solvent and IAA hormone, at most compared to the others. H. citriformis had not been found to contain enzymes and hormones. The molecular biochemical characterization of entomopathogenic fungi using FS1 and NS2 primers more clearly distinguished isolates and entomopathogenic species.

Keyword: Citrus, CTV, B. bassiana, M. Anisopliae, H. citriformis
MUNG BEAN SPROUTS FLOUR (Vigna radiate L.) AND CORN SPROUTS FLOUR (Zea mayz) AS MODIFICATION OF FORMULA WHO 75 FOR MALNUTRITION CHILD WITH LACTOSE INTOLERANCE

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Abstract

Modification of Formula WHO 75 with mung bean sprouts flour and corn sprouts flour is one of alternative for children with lactose intolerance. This study aimed to analyze the effects of mung bean sprouts flour and corn sprouts flour as modification of Formula WHO 75 for malnutrition child with lactose intolerance. This study used randomized block design. The treatment was applied with the ratio of mung bean sprouts flour and corn sprouts flour were F1 (55%: 45%); F2 (50%: 50%); F3 (45%: 55%); F4 (40%: 60%); F5 (35%: 65%); and F6 (30%: 70%). The best treatment of this research was F6 (mung bean sprouts flour : corn sprouts flour is 30%: 70%). The results showed significant differences (p <0.05) on osmolarity, lactose content, viscosity, bioavailability protein, colour and the appearance between Formula WHO 75 standart and formula with modified. No significant differences (p> 0.05) on energy content, protein, taste and flavour between Formula WHO 75 standard and formula with modified. The mung bean sprouts flour and corn sprouts flour as modification of the Formula WHO 75 can be used for the treatment of malnutrition child at stabilization phase with lactose intolerance.

Keywords: WHO 75, corn sprouts flour, mung bean sprouts flour, malnutrition
BIODIVERSITY LOSS IN LAKE TOBA ECOSYSTEM

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Abstract
Lake Toba, like other lakes in the world, provided services to people live in surrounding area. It provided plants from which people utilised food, herbs, wood, as well as types of fish from the lake. In addition to this provisioning service, the lake also provided regulating service, cultural service. Some studies revealed that the ecosystem has been changed especially in past decades due to population growth and development purposes. Human activities caused change of ecosystem. Widespread deforestation, shifting of land use pattern, and intensive agricultural practices in catchment area of Lake Toba contributed both directly and indirectly to the plant diversity. Not many available references documented the variety of indigenous flora and fauna in the area, however through interview with local inhabitant in the area, it was found that many of known local species were become difficult to find. This paper spelt out some of rare if not endangered plant species such as pine, mobe, antarasa, andalehat, and sijungkot. As to fish, ihan Batak is already listed as endangered species. Some of them have direct or indirect supports to the food security and sustainable environment.

Keywords: Lake Toba, ecosystem, biodiversity
THE USE OF MARINE FUNGI IN CARRAGEENAN EXTRACTION

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Abstract

Carrageenans are a complex family of water soluble galactans extracted from red algae in particular Kappaphycus, Gigartina, Eucheuma, Chondrus and Hypnea. Carrageenans have several applications such as gelling and thickening agents in food processing. The yield of carrageenan relies on the extraction method. The yield can reach 50% of the total dry weight of seaweed. Kappa carrageen (κ-carrageen) is extracted from red algae Kappaphycusalvarezii or traded under the name Eucheumacottonii. Carrageenan extraction process commonly use alkali treatment with high temperature. Another method that is currently being developed is the enzymatic extraction. This method is considered more environmentally friendly because it does not produce chemical waste as well as energy efficient because it does not require heating. This study aimed to observe the best extraction method in producing high quality and yield of carrageenan from red alga K. alvarezii using marine fungal endophytes. The marine fungus EN was the selected agent with the cultivation period was 6 days. Characteristics of the carrageenan such as viscosity, whiteness and impurities were determined to select the best extraction method.

Keywords: cellulase, endophytes, enzymatic extraction
THE EFFECT OF REFUGIA BLOCK ON THE ARTHROPOD DIVERSITY IN PADDY FIELDS IN MALANG, EAST JAVA

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Abstract

A study on the effect of refugia blocks on Arthropod diversity has been done in the organic red rice field in Malang, from March to June 2017. The observations were made 11 times on each of the 6 plots in the paddy field with refugia and without refugia as control starting 37 days after planting (DAP) to 103 DAP. The visual encounter surveys method was conducted for 15 minutes on each plot. The results showed that the abundance, taxa richness and diversity of Arthropods in the field with refugia was higher than those in the control, but statistical analysis showed this result was not significant. The mean of individuals in the treatment area was 190 ± 96, while in the control was 148 ± 72. The mean of taxa in the treatment area was 24.27 ± 6.7, while the control was 22.65 ± 6.8. The mean of diversity in the treatment area was 2.53 ± 0.3, while the control was 2.50 ± 0.4. Peak of the Arthropod abundance occurred at 71 DAP of 408 individuals in the treatment area and 307 individuals in the control, this may be related to the beginning of the generative period.

Keywords: abundance, arthropod, diversity, organic red rice, refugia, taxa richness
FAR-FIELD METHOD FOR THE EVALUATION OF TROPICAL TUBER PROPERTIES

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Abstract

Detection of the frequency response of tropical tubers has been evaluated using the Far-Field method. The tropical tubers used as targets in this research are Porang (Amorphophallus muelleri Blume) tuber, Iles-iles (Amorphophallus variabilis) tuber, and sweetpotatoes-Cileumbu. A horn reflector, appropriate to the minimum range in far field area, is designed as the guide of the electromagnetic wave. The experiments were performed by varying the distance between the horn mouth and the target material (tropical tubers). The optimum distance of 6 up to 10 cm resulted in relatively high reflected power received by the antenna. Different thicknesses of the sliced tubers influenced the reflected power. Finite Difference Time Domain model simulation was conducted for Porang tuber to examine the power and the distance for different tuber thicknesses. The results of the measurements show that Porang, Iles-iles and sweet potatoes-Cileumbu can be detected at range frequency of 1.745 – 1.88 GHz, 2.185 – 2.21 GHz, and 2.055 – 2.17 GHz, respectively. These results will give benefit for modeling the sensor system for detecting the tubers underground and in the line-production.

Keywords: Far field method, FDTD model simulation, Porang tuber, range of frequency
FLOWER CHARACTERISTICS ASSOCIATED WITH INSECT ABUNDANCE IN *Santalum album* Linn. TREE

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Abstract

Studies on how the phenologies of flowers affect the community of insects have increased. However, the understandings of underlying mechanism involved remain largely unexplored. Here, we show how the host-plant influence the diversity of visitor insects and the possible interactions through it is flowering characters on *Santalum album* Linn. Observation was conducted during the flower peak season in 2015. As an approach of flower phenology, the analysis conducted by using the number of flower and flowering phase as a factors. The insect community observations include the number of insect, abundance and their roles on ecosystem in general. Additionally, the effects of environment on the insects’ abundance will analyze by using ANOVA statistical. The results showed that totally the insect communities in *S. album* consist of 40 species and 280 individu. As a second thropic levels: Hymenoptera; Lepidoptera; Coleoptera; and Orthoptera, while the third trophic level: Coleoptera; and Odonata. The most abundance insects were Formicidae, Muscidae, and Syrphidae with 22.5%, 12.5%, and 12.14% respectively. The flowering phase as a single factor was not significantly influenced on the abundance of insects, however interaction with the number of flower, this, significantly effects the insects abundance. Flower abundance was significantly influenced Family Formicidae, Vespidae, Eumenidae, Syrphidae, Muscidae, Hesperiidae, Nymphalidae.

**Keywords:** insect community, trophic levels, flowering, *S. album*
Abstract

Observation and calculation of Ophiuroidea that lived in the tidal region at BatuLawang Beach and Pancur Beach, Alas Purwo National Park (TNAP), which has solid rocky seabed, gets constrained. When the sea water recedes, Ophiuroidea in the region goes into the small holes (hiding hole) in the rocks of the seabed, so it is not visible from the surface. As a result the observation and calculation of Ophiuroidea become inaccurate. As the tide begins to sink, Ophiuroidea that originally hiding, stretches out its arms out of the hole sweeping the foam on the surface of the tide. The emergence of Ophiuroidea arm starts from the moment the sea water starts to tide. The research question is when the right time to observe and count Ophiuroidea in the region. The purpose of this study was to find an Ophiuroidea observation and calculation method that gave accurate results. The research method is using 6 plots each 1 x 1 m. Observation and calculation of Ophiuroidea is done when the water starts to tide until the water reaches a depth of 12 cm, performed for 5 repetitions in 5 days. To test the consistency of number of Ophiuroidea calculation results using mean difference analysis. The results shows that Ophiuroidea when water recedes enter into hiding hole and can’t be observed. Observations when the tide gets the number of Ophiuroidea vary among the plots. The average number of Ophiuroidea each plot in 5 counts (replicates) did not differ significantly. The appearance of the Ophiuroidea arm when the tide is related to the activity of surface food feeding (SFF) until the water depth reaches 12 cm from the seabed, then stop the SFF and back into the hiding hole. When the tidal waters reach a height exceeding 20 cm from the base, the observations become constrained by water levels and tidal waves. The conclusions of this study are the method of observation and calculation of Ophiuroidea when the water starts to tide up to a depth of 20 cm yields a consistent amount in each plot and does not differ significantly in each repetition.
SALIVARY GLAND’S PROTEIN PROFILES OF DOMINANT VECTORS FOR MALARIA IN BANGSRING VILLAGE, WATUDODOL DISTRICT, BANYUWANGI - INDONESIA

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Abstract

Bangsring village and some area in Watudodol district, has been known to be a breeding area for Anopheles mosquitoes. Many malaria cases around this district, until late 2000, have been associated with the bionomic investigation of Anopheles population in this area. However, there is an un-expecting species shifting of Anopheles in this area in the last 5 years, which also followed by fact of decreasing number of malaria cases. Salivary gland proteins of Anopheles play a crucial role in transmitting malaria pathogens from vector to human host because of its vasodilatory & immunomodulatory activities. Until about 2015, Anopheles sundaicus has been identified as the dominant vector, however over the last 2 years the dominant species were Anopheles vagus and Anopheles indefinitus. The objective of this research was to determine the protein profiles of the salivary glands from Anopheles sundaicus, compared to Anopheles vagus and Anopheles indefinitus. The methods used in this research was monthly landing collection over period of 6 months, isolation of salivary gland and proteins extraction (SGPE), and analysis of protein profiles by SDS-PAGE. The results showed that mainly some predicted proteins clusters, which are important for blood feeding, were observed in those 3 vectors. However, cluster salivary serpin putative anticoagulant and laminin were only found in Anopheles sundaicus and Anopheles vagus which are main vector for malaria, but not in Anopheles indefinitus which is known as a secondary vector. Considering those 2 protein cluster important role in blood feeding, this may be associated with the significant decreasing number of malaria cases in the last 2 years, since Anopheles indefinitus has been main Anopheles species identified in that area.

Keywords: Protein, Salivary Gland, Anopheles
CHARACTERISTICS OF SALTED CATFISH (*Pangasius hypophthalmus*) WITH SALT CONCENTRATION VARIATIONS AND TIME OF FERMENTATION

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Abstract

Fish protein has a privilege that besides more digestible also contains amino acids with a pattern similar to the pattern of amino acids in the human body. One of the many types of fish consumed by people who are catfish (*Pangasius hypophthalmus*). Catfish easily damaged so should the effort to preserve the fish, using NaCl. The process of decay in fish can be caused mainly by the activity of enzymes found in the body of the fish itself, the activity of microorganisms, or the oxidation process in the fat body by oxygen from the air, in addition to the fungus also causes damage to the fish. The study evaluated the effect of salt concentration and time of fermentation on the characteristics of salted fish. The research method with a completely randomized design with 2 factors, the concentration of salt (20%, 30% and 40%) and time of fermentation (24, 36 and 48 hours). Analysis is conducted moisture, ash, protein content, total plate count, total mold and organoleptic test. Research shows that the best treatment in this study is in treatment salt content of 30% and fermentation time 24 hours. Characteristics of these treatments is 14.16% moisture content, ash content of 2.87%, 5.73% protein content and organoleptic test results saltiness 3.0, 1.60 crispness, color, 2.50 and 2.90 the overall favorite. Total plate count 4.2 x 10³ cfu/gram and total mold 9.6 x 10⁴ cfu/gram.

Keywords: Salted fish, catfish, fermentation, total plate count, total mold
DIVERSITY OF MALARIA’S VECTOR *Anopheles* spp. IN CAMPUREJO VILLAGE, BOJA DISTRICT, KENDAL REGENCY, CENTRAL JAVA PROVINCE

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Abstract

Malaria is an infectious disease caused by the Protozoa genus *Plasmodium* which is transmitted by female *Anopheles* (*An*) mosquitoes. Based on information from local public health center, 125 cases had been emerged in medical clinic PuskesmasBoja I and II period 2010-2017. Understanding the bionomical properties of Anopheles vectors including its diversity is an important step for vector control program to overcome malaria endemicity. The objective of this study was to determine the diversity of malaria vector *Anopheles* spp. in those area. The collection of *Anopheles* spp. mosquito’s has been conducted by human bites landing collection at 06.00 p.m. until 06.00 a.m. inside and outside the house. The collection had been done from May until October 2016. We identified the diversity of Anopheles spp. mosquitoes based on their morphological characteristic. The diversity of malaria’s vector in Campurejo village are *An. vagus*, *An. Indefinitus*, *An. subpictus*, *An. aconitus*, *An. kochi*, and *An. barbirostris*. *An. vagus* was the main population observed during the experimental period. This is unexpected since previous study showed that *An. Aconitus* was the dominant one. The highest density of Anopheles on May at 6 persons/hour and the lowest on September at 4 persons/hour.

**Keywords**: *Anopheles* spp., Campurejo village, diversity of malaria’s vector
MOLECULAR PHYLOGENETIC ANALYSIS OF
*Drosophilamelanogaster* Meigen BASED ON ITS2 DNA MARKER

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Abstract

The internal transcribed spacer 2 (ITS2) is a small non-coding region located inside the nuclear ribosomal DNA cluster. ITS2 sequence variability is widely used in taxonomy and molecular phylogeny. Based on this molecular marker, this study wanted to identify and construct phylogenetic analysis of *Drosopila melanogaster* Meigen from our laboratory. The phylogenetic tree was constructed after analysis on DNA sequence encoding its ITS2 by using Unweight Pair Group (UPGMA) method. The result showed that our *D. melanogaster* wild type and all mutant strain have high similarity to *Drosophila melanogaster* 28 S ribosomal RNA gene partial sequence (Gene bank Acc GU 597379.1) (identity score up to 100%). Phylogenetic tree showed that *Drosophila melanogaster* wild type and black mutant closely related to *Drosophila melanogaster* 28 S ribosomal RNA gene partial sequence (Gene bank Acc GU 597379.1), they were also belong to one cluster. Next to this cluster are *sepia* and *clot* mutant in one clade, while the vestigial and plum mutant were stayed in one cluster belong to the different clade.

Keywords: Molecular phylogentic analysis, *Drosophila melanogaster*, ITS2 DNA marker
COMPARISON OF HYDRO DISTILLATION PROCESS BY STEAM EXPLOSION PRE-TREATMENT WITH THE TRADITIONAL HYDRO DISTILLATION METHOD IN EXTRACTION OF KAFFIR LIME OIL

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Abstract

Steam explosion is proposed pretreatment method to accelerate the hydro distillation (SEHD) of kaffir lime leaves. The aim of this research was compared of SEHD and a conventional Hydro Distillation (HD) and evaluated in terms of extraction yield, extraction time, chemical composition, and quality of the essential oil. Extraction of kaffir lime oil with SEHD is superior with regard to extraction time (35 min. vs 150 min.) and extraction yield (1.386% vs 1.156%). The chemical composition and quality of the extracted essential oil by using two methods are quite similar to each other, indicating that the utilization of steam explosion pretreatment would not cause an adverse influence on them. Therefore SEHD is a fast and energy-saving method for essential oils extraction of kaffir lime leaves.

Keywords: kaffir leaves, essential oil composition, steam explosion, hydro distillation
OPTIMIZATION OF RAPD-PCR CONDITION FOR GENOTYPIC IDENTIFICATION OF LACTIC ACID BACTERIA ISOLATED FROM BEKASAM

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Abstract

A Randomly Amplification Polymorphic DNA-Polymerase Chain Reaction (RAPD-PCR) method was optimized in this research by determining the optimal PCR buffer, MgCl2 buffer and M13 end concentration. For the optimal condition, RAPD (Randomly amplified polymorphic DNA) PCR reaction should be performed in 50 µl containing 100 ng genomic DNA, 1 x Taq DNA polymerase buffer (consisting of KCL (200 mM) and NH4(SO4)2 (25 mM) and without MgCl2), 125 µM of each dNTPs, 0.5 µM M13 primer, 2.5 or 3.0 mM MgCl2 and 2.5 U Tag DNA polymerase. This condition was then applied to identify lactic acid bacteria isolated from bakesam, an Indonesian indigenous fermented fish product.

Keywords: chili, wilt disease, Fusarium oxysporum, chili variety
EPIPHYTIC FERNS AS BIO INDICATORS FOR FOREST COVER RECOVERY IN MERU BETIRI NATIONAL PARK

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Abstract

Tropical rainforests are the major habitat for the world’s biodiversity and contributes for ecosystem services such as climate regulation and carbon storage and sequestration. Meru Betiri National Park is one of largest area of forest cover (52.992 Ha) in East Java Province. This National Park suffered from massive deforestation in 1998 and started to regenerate by following years. This aims of this research was to investigate the regeneration of forest cover, by observing epiphytic Ferns, which are sensitive plants to microclimate dynamic as indicator of dense canopy cover. Epiphytic Ferns inventory conducted by sampling through 4000 meter inspection lane at Resort Alas Baban, Meru Betiri National Park, with maximum height 600 amsl. Epiphytic Ferns only grows on very dense area in one spot at the end of research plot near to the boarder to next forest Resort “Malangsari”. Total 7 Species belongs to 3 Families, i.e. Aspleniaceae, Pteridaceae, and Poypodiaceae were collected. This result support low regeneration of disturbed forest in this area due to high exploration by the local people.

Keywords: Meru Betiri National Park, Epiphytic Ferns
THE ECOVAL OF TREE BIOMASS AT TROPICAL EVERGREEN AGLAIA-STREBLUS FOREST OF MERU BETIRI NATIONAL PARK, EAST JAVA, INDONESIA

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Abstract

This research study was done to determine the ecoval(ecological value) of tree biomass at tropical evergreen Aglaia-Streblus forest of The Meru Betiri National Park (TMBNP), East Java, Indonesia. The ecoval is used to get information how much valuable is our natural resources so the government or management in charge can use this information to conserve the existence of forest structures and functions and to generate plan, actions and policy for this sustainable forest ecosystem. Plot method of 100x10 m² was used to sample tree species. Non-destructive method was used to collect tree wood chips for wood species gravity (ᵦ) estimation. The allometric method was used to calculate tree biomass. Using 0.5 conversion factor, the biomass was converted into carbon content. The volume, carbon content, and existence factor of each tree species parameters were used for ecoval appraisal. Appraising ecoval of tree species was based on the value of tree structure and carbon stocks as base values of ecological valuation. There were about 27 families, 46 genera, and 57 tree species found in TMBNP. The total volume of tree structure was about 9,086 m³/ha that accounted high value of biomass of 3,524 Mg/ha in total or 62 Mg/ha in average. Among the 57 tree species, A. argentea had the highest value of biomass (1,169,89 kg/ha) because this species had big volume (836 m³). Based on the calculation of both ecological structure and function values, the ecoval tree species was 588,921–1,059,031 USD tCO₂ per hectare. It was about 7,545,848,575 – 13,569,368,672 IDR for tree biomass ecoval per hectare in the MBNP. This high indicated that there were tremendous ecoval of forest structure and biomass in the MBNP.

Keywords: ecoval, tree biomass, carbon content, appraisal, existence factor
ENVIRONMENTAL SCIENCE
SELECTION OF EFFECTIVE SGRNAS FOR CLEAVAGE OF PALMITOYL-ACP THIOESTERASE (PATE) EXON-1 GENE IN OIL PALM USING CRISPR/CAS9 SYSTEM IN VITRO

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Abstract

Palm oil contains palmitic acid in a comparable level to oleic acid, which raises a public consideration regarding its health effect. In this study, the design and selection of effective single guide RNA (sgRNA) required exon-1 region of palmitoyl-ACP thioesterase (PATE) gene silencing using CRISPR/Cas9 system was conducted. The result showed that only two out of six designed sgRNAs were able to cleave the template DNA, whereas only one of the two gave a total cleavage. We also tested the sgRNA to Cas9 concentrations for in vitro cleavage and revealed four to one molar ratio was optimum. Furthermore, incubation effect was also tested in which six hours incubation on 37°C was optimum. Therefore, it can be concluded that one of the designed sgRNAs was effective as a guide for Cas9 to cleave exon-1 of oil palm PATE gene.

Keywords: CRISPR/Cas9, gene cleavage, palmitic acid, PATE.
CLIMATE CHANGE IMPACT TOWARD FISHERIES CATCH DIVERSITY IN EAST JAVA

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Abstract

Climatic conditions in recent years have been uncertain, the difference between the dry season and the rainy season can’t be determined by the month, even the high rainfall and wind speed conditions make it difficult for fishermen to catch fish in the sea. On the other hand, the increasing demand for food, especially the nutritional requirements of animal protein also increases along with the increasing population density and the food industry. A number of studies have been conducted to determine the impact of climate change on it, but there wasn’t integrated data documentation, especially in East Java. The research was conducted by taking the fish catch data by fisherman in East Java from 2013-2016 in Diskanla, then climate change can be taken from BMKG. In addition, documentation of fish species was also conducted directly at TPI in several districts in, such as Tuban, Probolinggo, Trenggalek and Malang. Interviews with fishermen, fish traders and TPI officers were also conducted to determine the perception and knowledge of the community about climate change and its effect on fish catch. The results showed that climate change didn’t significantly influence the diversity of fish catch. Since other factors that allegedly more influential fishing methods that can damage the marine ecosystem. Although significantly unaffected, the data show fish catches in 2013-2015 tend to be stable and decrease in 2016 which in line with the results of interviews stating that the catch of fish has decreased in 2015 because of the rain throughout the year (El Nino).

Keywords: climate change, diversity, east java, fisheries
CHARACTERIZATION OF BIOFILM POLYMERS TO DEVELOP BIOFILM AS AN ADSORBENT FOR WATER TREATMENT

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Abstract
Biofilm as a predominant habitat of microbes in aquatic ecosystems is one of the most promising alternative adsorbents in the water contamination treatment including that subjected to pollutant ions. The main site in the biofilm that has the ability to adsorb the pollutant ions is biofilm polymer. Hence, the possibility of the utilization of biofilm as an adsorbent for various pollutant ions will increase if the characteristics of biofilm polymer are understood. In the present study, the characterization of biofilm polymer collected from the surface of the stone in a Lake Biwa Japan was conducted. This study also investigated the adsorption of various ions to the biofilm. The results indicate that ionizable functional groups such as carboxylic group and amino group exist within biofilm polymer resulting in both the negative and positive charges on the biofilm polymer. The ion adsorption to the biofilm seems to be a physicochemical process where the electrostatic interaction between the ions and the charged sites in biofilm polymers is a main driving force where the divalent cations were adsorbed much more than monovalent cations. The result of this study is expected to contribute to the development of biofilm for the water treatment technology for solving aquatic ecosystem pollution.

Keywords: biofilm, biofilm polymers, adsorbent, adsorption, water treatment
SOIL PHOSPHATE AND POTASSIUM DISSOLVING ACTIVITIES BY SOIL BACTERIAS

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Abstract

Increasing phosphate (P) and potassium (K) availability in soil could be driven by microbial activities which specifically able to dissolve P and K which are actually hard to dissolve. Oxisol is an aged and weathered soil that has low soil fertility; while Alfisol is a soil that has higher nutrient content than Oxisol. The objectives of this research were to study the dissolving activity toward soil P and K by P- and K- solubilizing bacterias in Oxisol and Alfisol. Marking procedure was performed for P- and K- solubilizing bacterias to determine their activities in soil. Marking process was conducted by utilizing resistance toward rifampicin antibiotic concentration of 50 µg.ml⁻¹. The results of this study revealed that the increasing availability of P occurred in both soils (sterilized and non-sterilized). In Oxisol, P availability increased by 1.50 times, while in Alfisol reached the as high as 2.88 times of the initial concentration. Likewise, for K availability in Oxisol increased by 5.53 times, and for Alfisol increased by 6.26 times. The activities of P solubilizing bacteria beside able to increase soil P availability was also able to augment soil K content. Similarly, the K solubilizing bacteria also capable to increase P availabilities in both soils.

Keywords: Oxisol, Alfisol, Phosphate – Potassium solubilizing bacteria
USE OF SIMPLE BIOMARKERS TO DETECT METAL TOXICITY UNDER DIFFERENT pH IN LABORATORY STUDY

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Abstract

Research on a simple mussel biomarker, *Perna viridis*, was conducted to detect the toxicity of Lead under different pH in laboratory study. This research was performed by exposing green mussels with a serial dilution of lead (Pb) concentration which was 0.008; 0.08; 0.8 mg/l and control combined with variations of pH which was 6.2; 7.7 and 8.2. The exposure period was 96 hours. To determine the differences in treatment and interaction among the treatments factorial ANOVA was used. The results demonstrated that the simple biomarker, condition index (CI), could statistically detect the effect of pH on Pb toxicity at concentration 0.8 mg/l for 96 h exposure under pH 8.2. Evidence supported by other biomarker i.e. hemocyte classification based on color and the typical hematological staining and Ca concentration analysis in green mussel’s shell. The potential using of this simple biomarker for categorizing pollutant status in marine ecosystem is discussed.

Keywords: Simple biomarker, Condition Index, *Perna viridis*, Ocean acidification, Lead.
THE USE OF SIGMOIDAL DOSE RESPONSE IN ASSESSING ECOTOXICOLOGICAL RISK OF AGROCHEMICALS ON MICROBIAL ACTIVITY IN SOILS

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Abstract

The use of generalized logistic dose response model has been used to demonstrate the inhibitory effect of nitrification on soil microbial activity. This model is currently used in ecotoxicology to provide for risk assessment of agrochemicals on the environment. Ecotoxicological risks of three nitrification inhibitors include NIs, 3,4dimethylpyrazolephosphate (DMPP), 4-Chloromethylpyrazolephosphate (ClMPP) and dicyandiamide (DCD) on non-target soil microbial processes were determined using three standard methods in three different type of soils. The following parameters were used for general microbial activity such as dehydrogenase activity (DHA) and dimethyl sulfoxide reductase activity (DRA). The potential denitrification capacity (PDC) is a specific microbial process in soils. The determination of DHA was carried out spectrophotometrically, whereas DRA and PDC were determined using gas chromatography. To evaluate the inhibition, dose response curves were presented as no observable effect level (NOEL) and as well as effective dose at ED₁₀ and ED₅₀ (10% and 50% inhibition) were calculated. The inhibition in presence of increasing NI concentrations was calculated as NOEL at effective dose ED₁₀ and ED₅₀. Dose response curves showed the inhibition effectiveness, which, was a most distinct in sandy soils. The NOEL for microbial non-target processes were about 30-70 times higher than base concentration in all investigated soils. The PDC revealed to be the most sensitive parameter. Sensitivity to the three NIs decreased in the order of PDC>DRA>DHA. ClMPP exhibited the strongest influence on the non-target microbial processes in soils.

Keywords: dose response, ecotoxicology, agrochemicals, microbial activity
MOLECULAR IDENTIFICATION AND DETECTION OF
ALKB GENES OF BACTERIA POTENTIAL AS
BIODEGRADABLE AGENT OF POLYETHYLENE PLASTIC
WASTE

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Abstract

Plastic is a product of polymerization of synthetic or semi-synthetic that is widely used due to its
nature which is easily shaped and relatively inexpensive. One type of plastic that is widely used is
polyethylene (PE) including plastic bags. The use and dependence of plastic bags is increasing
year by year. The solutions needed right now are not burial or burning the waste which may affect
the environment or other organisms. In recent year, it was found that plastic can be degraded by
microorganisms. The research aimed to identify potential microorganisms able to degrade
polyethylene plastic and determine its alkB gene which codes for alkane hydroxylase enzyme
involving in plastic bag degradation. Molecular identification based on 16S rRNA was used to
identify the isolate. Amplifying the alkB gene was done using alk-BFB and alk-BRB primers.
Results showed that based on BLAST sequence the isolate was Bacillus cereus. Amplification of
alkB gene resulted in 454 bp product which corresponded with the alkB gene.

Keywords: polyethylene plastic, alkB gene, biodegradable agent, B. Cereus
SIMULATION INCREASING WATER AVAILABILITY TO LEAF FALL OF YOUNG FAST GROWING TEAK

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Abstract
Teak is known as a deciduous plant that will shed its leaves in the dry season. This study aims to prove whether with the addition of water around the roots, the leaf fall can be inhibited so that the growth of teak can be faster. The research was conducted by watering the fast growing teak named Golden Teak since planting until nine months after planting or after passing one dry season period. The results showed that young fast growing teak fall a pair of leaves regularly every two weeks. Leaf fall in the dry season, which is in September, reaching double, for plants whose source of water relies only on rain. While leaf fall in the watered plants took place normally. In the rainy season, around December, leaf fall was reduced only half of the normal, which is about two leaves per month. Biomass obtained from this watered plant is twice than the not watered one. However, watering does not affect the percentage partition of leaf, roots, and stem.

Keywords: leaf fall, fast growing teak, watering, biomass, partition
HIGH THROUGHPUT SCREENING METHOD FOR BIODEGRADATION TEST OF VARIOUS AZO DYES

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Abstract

Dyes in textile waste become an important issue because it is difficult to degrade. The laccase enzyme derived from the white fungus Marasmiellus palmivorus proved effective in degrading several types of textile dyes. Enzyme is obtained by extracting grown mushrooms in SSF (Solid State Fermentation) media. The crude extract of laccase is purified by hydrophobic interaction chromatography and ion-exchange chromatography. The pure laccase is tested on a textile dye by the High Throughput Screening (HTS) method. The dye samples used were 14 dyes of azo, anthraquinon and disperse type. Sodium sulfate is added to a textile dye, pH 12.5 and heated in a temperature of 80°C to mimic the effluent. Rapid test was performed at room temperature using microplate titer with sample ratio and 1:1 enzyme for 24 hours with dye concentration of 150ppm. The samples observed were a mixture of dye and pure enzymes with specific activity of 2.49 U/mg. Screening of dye decolorization by M. palmivorus culture on PDA medium was also performed. Mycelial cultures were grown on PDA media that had been supplemented with dyes and incubated at room temperature for 2 weeks. The HTS method shows Procion Blue H-GN and Levafix Blue E-Ra Gran positively polarized by laccase. While the test using mycelial culture showed the results of 7 dyeecolorized dyes ie Telon Blue AFN, Telon Red AFG, Silver N Isolation, Telon Blue BRL, Levafix Blue PN-3R, Procion Blue H-GN and Levafix Blau E-Ra Gran. The number of dyes that have been successfully dissolved by the culture of the fungus may be due to the absorption of the dye by the mycelial mycelia. The concentration of Levafix Blue E-Ra Gran dye reduced to 86 ppm after 24 hours. The conclusion of this study is that the HTS method successfully demonstrated the decolorization properties of various textile dyes quickly and proven by changing the dye concentration after the test.

Keywords: High Throughput Screening, Decolorization, Textile Dye, Lacase, Marasmiellus palmivorus
THE DEVELOPMENT OF INVENTORY, MONITORING, AND INFORMATION NETWORKS SYSTEM OF FAUNAL DIVERSITY IN SOUTH SUMATRA

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Abstract

Despite high attention and commitment of Indonesia in biodiversity conservation and its habitat, however, loss of biodiversity and habitat deforestation is also still high. Deforestation rate in Indonesia between period of 2000-2012 reach up 6.02 million ha, and approximately onethird of which is in Sumatra Island. As the fulfillment of CBD and Aichi targets, and in line with the mandate of the Law on the Conservation of Natural Resources and Ecosystems and IBSAP (Indonesian Biodiversity Strategy & Action Plan 2015-2020), we try to support the requires data as well as information on the current state of biodiversity. The aims are to develop an inventory system of biodiversity needed to establish baseline data on biodiversity including its conservation status in South Sumatra, develop a biodiversity monitoring system with qualitative parameters that can be used in the determination and monitoring of degradation rates of biodiversity, and the establishment of data management system and information network of fauna biodiversity in South Sumatera so that it can be utilized in monitoring and reporting of biodiversity at regional, national and international level at the international level. We conduct a comprehensive review of methods and techniques of inventory and monitoring of fauna biodiversity, especially those that have been done in the area of South Sumatra Province. We also analysis of data needs and information network of fauna biodiversity in South Sumatra. The results is shows in the web-application database, called the South Sumatran Biodiversity Information Networks, or SSBIN, and could preview at http://ssbin.unsri.ac.id/.

Keywords: south sumatra, biodiversity, information, networks, SSBIN.
ECOLOGICAL FOOTPRINT AND THE WEALTH OF PEOPLE FROM SOCIOECOLOGICAL’S POINT OF VIEW (CASE IN PALEMBANG, INDONESIA)

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Abstract

The depletion of earth’s natural resources, environmental deterioration, and the demand of the increasing human population are certainly the biggest problems that humans are facing nowadays. Humans are using 1.6 planets for all the resources used and absorbing waste which means it take one year and six months for the earth to regenerate the resources consumed in a year. But the good news is that humans are gifted with the potential for self-awareness and intelligent choice, and knowing our circumstances in an invitation to change. Thus, to achieve sustainability, a special tool can be used. This tool is designed to calculate the ecological footprint of an individual or a certain place. However, this study focused on the ecological footprint of the people from Palembang, Indonesia. An ecological footprint test was conducted and the scores were analyzed to find out if educational attainment is significant on how people behave towards the nature. Furthermore, the results have shown that the use of natural resources is not in line with educational level of the respondents. This explained that educational attainment did not affect the ecological footprint of an individual.

Keywords: natural resources, environmental deterioration, human population, ecological footprint, sustainability.
MECHANICAL PROPERTIES OF STARCH BASED BIOCOMPOSITES REINFORCED WITH WATER HYACINTH FIBERS

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Abstract

This paper reports effect of Water Hyacinth Fibers (WHF) content on tensile properties of tapioca starch based biocomposites. WHF content in the biocomposites was varied in 1, 3, 5, 10% respectively. Casting methods were used for making the film samples. The results showed that mechanical properties of the biocomposites increased for further WHF in the matrix. Maximum result of ultimate tensile strength and tensile modulus were achieved at 10% fibers content. However, fractured strain decreased in increases further fibers content.

Keywords: water hyacinth fibers, tapioca starch based biocomposites, mechanical properties.
PRECIPITATION TECHNIQUE OF XANTHAN GUM FROM FERMENTATION BROTH BY ADDITION OF WATER-MISCIBLE-SOLVENT

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Abstract

Xanthan gum is a natural polysaccharide and an important industrial biopolymer which obtained from aerobic fermentation by X.campestris. At the end of the fermentation process, the broth contains xanthan, bacterial cells, and many other substances. To obtain the xanthan gum products, its cells are usually removed from the mixture, either by filtration or centrifugation. Further purification may include precipitation using water-miscible-solvents and addition of certain salts. The quantity needed depends on the nature of the reagent. In this study, xanthan gum product was purified by precipitation with isopropilalcohol (IPA) with volume-varying ratio (v/v). The results showed that best precipitation of the xanthan reached at 13.68 g/L when 2 vol of IPA were added per volume of the broth. Furthermore, xanthan precipitation was also done using mixtures of IPA with 1 g/LNaCl. In this case, the amount of xanthan precipitate increased to 23.5 g/L. Hence, addition of salts in sufficient concentration also causes precipitation due to ion binding of the cations of the added salt to the ionized groups on the xanthan gum moieties.

Keywords: biopolymer, xanthan gum, fermentation, precipitation, water-miscible-solvent, isopropilalcohol (IPA), NaCl
RECENT ISSUES RELATED TO THE SAFETY OF MARINE AND FISHERY PRODUCTS FOR LOCAL AND GLOBAL MARKETS

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Abstract

Export volume and value of Indonesian seafood product is significantly growing and projected to double in 2019 from 2015 (1.6 M Ton or ~US$ 5.9 Bil), with main markets of USA, Japan, Europe and China. On the contrary the trend of detentions and rejections of seafood products in the global market increase due to various reasons, including seafood product from Indonesia. This study overviews the reasons of the detention and rejection of global seafood, connects to the potency of the reason related to Indonesian seafood and recommends the possible mitigation actions. Seafood product is known as the highest notified/rejected commodity in the EU markets (728 cases in 2016), followed by fruit and vegetable (699), nuts (672) and poultry (329). The main reasons of the seafood detention are contamination of heavy metals, pathogenic microbes, histamine, pesticides and antibiotics. Heavy metal is so far the main reason of Indonesian seafood detention/rejection in the EU market. For the USA market, the trend of detention of Indonesian seafood changes from filthy in the last few years to pathogenic microbes, followed by histamine and antibiotic residues. From 130 detention cases in 2016, for example, more than 100 were due to Salmonella contamination. For local market, seafood safety issues in Indonesia are related to illegal additives and preservatives, bio toxins and poor handling and processing. These mentioned facts indicate the requirement of the better quality and safety assurance implementation at all production chain, including sanitation and hygiene, cold chain system and traceability from pre-harvest to post-harvest activities.

Keywords: food safety, seafood, detention, RASFF, refusal, contamination
THE CORRELATION BETWEEN RESISTANCES OF BACTERIA AGAINST HEAVY METALS AND ITS TOLERANCES TOWARD ANTIBIOTICS

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Abstract
A variety of contaminants has been exposed into the river worldwide. Heavy metal is one of contaminant groupsin the environment, especially in the river system, which has to be taken into account intensively. Numerousenvironmental studies have concern about the impact of heavy metals polluted environment to the growth ofmicroorganisms, such as bacteria. Bacteria which were exposed to the highly polluted environment somehow will have the ability to develop their own defense mechanism to survive in such environmental conditions.Moreover, it has been reported in some publications which estimate the correlation between the resistances of bacteria against heavy metals and its susceptibility decreasing toward antibiotics. In this literature study, several scientific reports have been reviewed regarding those estimations. It is proposed that the heavy metals contaminated stream ecosystem will lead to a co-selection towards antibiotic resistant bacteria. Consequently, the contaminated environment not only will give a bad impact to the ecosystem in direct ways but also endanger life indirectly. People will face a big health problem if many strains of bacteria which exposed to the heavy metals polluted environment have high resistances against antibiotics.

Keywords: heavy metal pollution, bacteria resistance, antibiotics resistance, co-selection
USE OF BIOTIC INDEX OF BENTHIC MACROINVERTEBRATES FOR DETECTING POLLUTION LEVELS IN SEVERAL RIVERS IN EAST BORNEO

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Abstract

This study aims to determine the level of pollution in several rivers in East Borneo based on the value of the biotic index of benthic macroinvertebrate. Benthic macroinvertebrate sampling is conducted in Perjiwa river, Bengkirai river and Nabah river. Benthic macroinvertebrates was sampled at three points on each river of approximately ± 100 individuals using surber net and hand net. The benthic macroinvertebrate identification data were used to calculate some biotic indexes, included Family Biotic Index (FBI), Hilsenhof Biotic Index (HBI), Belgian Biotic Index (BBI), and Average Score Per Taxon (ASPT). Based on the biotic index value, it can be concluded that Perjiwa river has very poor water quality (contaminated by organic material in moderate until heavily). Bengkirai River has better water quality (contaminated by organic material in fairly poor), while the river of Nabah has the best water quality and included in the category fairly until very good.

Keywords: Biotic Index, Benthic Macroinvertebrates, Pollution Levels, East Borneo
MODELING GAMLSS WITH PENALIZED SPLINE SMOOTHING USING INTERACTIVE WEB

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Abstract

Generalized Linear Models for Location, Scale and Shape (GAMLSS) is a model that can be applied to modelling data in a semi parametric with four parameters: location (μ), scale (σ), and the shape composed of skewness (υ), and kurtosis (τ). Besides being able to model the four parameters, the distribution of which is included in GAMLSS, an exponential family and supplemental distribution to another. R Package that is used to analyze GAMLSS is called gamlss. On the other side, the r-shiny also serve to create a web tutorial because the ability of r-shiny is able to integrate HTML and R program which allows use of web based data analysis. One of smoothing method can be used to analyze a non-parametric data on GAMLSS is penalized spline. Penalized spline smoothing has two advantages, namely of parametric estimation on spline regression and flexible adjustment of the level of subtlety of the curve resulting from roughness penalty on spline smoothing (λ≥0). The purpose of this research create interactive web using r-shiny so that a user can easily analyze data or modeling data by using GAMLSS. The results of this study in the form of an interactive web can be accessed at the address http://statslab-rshiny.fmipa.unej.ac.id/JORS/GAMLSS/ and this study also successfully modeled disease data case by using GAMLSS.

Keywords: GAMLSS, penalized spline, r-shiny
1D Magnetotelluric Modelling at Tiris Geothermal Area Using Recursive Forward Modelling

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Abstract
The 1D Magnetotelluric forward modelling has been carried out at the Tiris Geothermal area to obtain apparent resistivity and impedance phase responses as function of frequency due to the effect of resistivity and different layer depth. The resistivity and layer depth model are obtained from tentative model that result from previous research, using forward modelling with recursive technique. Based on apparent resistivity and impedance phase curve, the value of apparent resistivity varies by frequency and resistivity of each layer. In general, the apparent resistivity value approaches resistivity of the bottom layer determined by skin depth. The impedance phase varies around 45 degrees, affected by the frequency and resistivity of each layer. Finally, the magnetotelluric method can be used for more detailed exploration at Tiris geothermal area.

Keywords: 1D Magnetotelluric, forward modelling, recursive, apparent resistivity and impedance phase
A MODEL OF RELATIONSHIP BETWEEN ABIOTIC FACTORS AND RIPARIAN VEGETATION RELATED TO THE BENTHIC MACROINVERTEBRATE AS WATER QUALITY INDICATORS IN THE LOTIC ECOSYSTEM

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Abstract

As an open ecosystem, the lotic ecosystem always gets material and energy input from the surrounding ecosystem. These environment factors were predicted to have an affect on the water quality of lotic ecosystem. These environment factors with the water quality can affect the structure of benthic macroinvertebrate communities. The objective of this research was to obtain a model of the relationship between abiotic factors and riparian vegetation related to the benthic macroinvertebrate as water quality indicators in the lotic ecosystem. The research was conducted in Jember, Pasuruan, and Malang districts. Data collections were started from upstream (Watu Gembuk, Hyang, Dam, and Gambino water spring; Tancak waterfall) to downstream (tertiary irrigation channel). Data from 37 parameter became indicators of seven latent variables (geography, land use, riparian, water body, and water quality, benthic macroinvertebrates). Geography variable consists of altitude. Land use variables consist of naturalness index and environmental services index. Riparian vegetation variable consists of the quality of riparian. The water body variables consists of substratum type and channel width. Water quality variables consist of water discharge, water colour, water temperature, electrical conductivity (EC), total dissolve solid (TDS), alkalinity, dissolve oxygen (DO), and water quality index NSF. Benthic macroinvertebrates variables consist of taxa richness, density, Margalef index, BMWP index, ASPT index, FBI index, HBI index, EPT index, % Diptera inde, and % Gastropods index. Data were analyzed by smartPLS (Partial Least Square). The result revealed that the structural model formed was relevant and can explained the data of 98.87% ($R^2 = 98.87\%$). Latent variables that directly affect other variables were land use and water body. Land use has direct affect on riparian, water body and water quality. Water body has direct affect on benthic macroinvertebrates.

Keywords: benthic macroinvertebrates, water quality, latent variables, indicator
ELECTROCHEMICAL SEPARATION OF CADMIUM METAL FROM BLOOD SHELL (*Anadara granosa*)

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Abstract

Separation of cadmium metals from the environment and its component is necessary to be carried out for the purpose of healthy environment. This research has investigated a separation method based on electrochemical reaction for separating the cadmium from blood shell. This research was aimed to optimize some factors affecting the separation, namely the redox potential, electrolyte concentration, and to calculate the efficiency of electrolysis. Cyclic voltammetric method was used to obtain the optimum potential and the electrolyte concentration, by using a potentiostatin instrument. Evaluation of the electrolysis process was evaluated based on the resulted voltammograms in certain range of the potential applied. The optimum parameters obtained was then used for carrying out a set of electrolysis process of blood shell sample. According to the obtained voltammograms, it was found that the optimum potential was at -0.44 V, and the optimum concentration of NaNO₃ as electrolyte was 0.3 M. Application of these optimum parameters for electrochemically separating cadmium from the sample has indicated that the separation efficiency was 45.9% using 1 electrode and 56.4% using 2 electrode. There were some limitations of the method for totally reducing the cadmium, it was suspected by the change in electrode surface during the electrolysis.

Keyword: cadmium, cyclic voltammetric, electrochemically, potential
Renewable Energy
CONSTRUCTION OF AMPEROMETRIC BIOSENSOR FOR DETECTION OF AGING BIODIESEL

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Abstract

Indonesia Government has implied the use of up to 15% biodiesel mixture into its diesel fuel for public consumption as executed by PT Pertamina (Persero). Unlike fossil-based diesel, plant-based biodiesel can degrade by time due to heat, chemicals etc to compose acids which able to corrode fuel tank, engine, etc. Current method for detection of aging biodiesel is chemical titration done in lab nearby large “Depo”/fuel storage facility. With the potential increase of biodiesel usage – from 15% to 20% mixture; and more distribution from Java and Sumatera Island only to other big islands – there is a need for easy to use, yet accurate tool of detection just like a glucose sensor. Focusing on formic acid and acetic acid as indicators of biodiesel aging, enzymatic measurements using several enzymes from different sources have been successfully coupled for electrochemical measurements. Improvements of other additives have made possible the measurement using portable handy meter previously designed for glucose meter. To ensure mass productions, recombinant enzymes productions have also been achieved. Finally, the prototype meters have been used successfully at 10 “Depo” of PT Pertamina (Persero) in Java Island.

Keywords: biosensor, biodiesel, enzymatic measurement, amperometric sensor
CHEMICAL HYDROLYSIS OPTIMIZATION OF CASSAVA (Manihot esculenta) var. GAJAH FOR BIOETHANOL PRODUCTION

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Abstract

Cassava var. Gajah belongs to giant cassava that developed and now cultivated in many regions in East Kalimantan. Here we reported it’s potency as raw material for bioethanol production. Two separate hydrolysis using HCl and H₂SO₄ were conducted on 20 g of grated fresh cassava in 100 mL of each acid solution at 101±4°C for 30 min. Single factor experiment arranged in Completely Randomized Design with five treatment levels (0, 0.1, 0.4, 0.7, and 1.0 M), each replicate by three times, were applied in those experiment. The data was analyzed by anova, continued by Least Significant Difference at α of 5% for treatment levels showing a significance difference. Parameter observed are weight of unhydrolyzed substance (fibers), clarity of hydrolysate (absorbance), reducing sugars, and total sugars. The concentrations of HCl and H₂SO₄ until 1.0 M effected on the cassava hydrolysis for all parameters observed. Hydrolysis using H₂SO₄ resulted higher reducing sugars as well as total sugars than HCl. By regression analysis the optimum concentration of H₂SO₄ for cassava hydrolysis is 0.58 M (R² = 0.83), which produced reducing sugars and total sugars of 53.54 and 56.36 %, respectively. In contrast, optimum concentration of HCl (0.61 M, R² = 0.93) resulted a lower reducing sugars and total sugars of 48.61 and 51.17 %, respectively.

Keywords: cassava, bioethanol, chemical hydrolysis, gajah, reducing sugar, HCl, H₂SO₄
BIOGAS PRODUCTION FROM TOFU WASTE TREATMENT USING BATCH REACTOR

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Abstract

The small-scale tofu industry at Jember Regency produces wastewater that causes environmental pollution, especially river pollution. High contents of organic matter from tofu waste have potential to be utilized as a source of bioenergy through anaerobic treatment. The purpose of this research is to know the potential of biogas production from the utilization of solid waste and tofu wastewater with batch type reactor. Solid waste, wastewater and mixed of solid and wastewater are both factors of observation. The data were analysis using Duncan test and COD parameter efficiency. The results showed that input variation from tofu waste shows the difference of biogas production. Based on the calculation of gas pressure conversion to gas volume, the volume of biogas is obtained as follows: 4,688.70 liters from the wastewater, 3,027.85 liters from solid waste and 6,062.12 liters from the mixed of solid and wastewater. The highest potential to produce methane gas is mixed inputs based on duncan test. The efficiency of organic matter (COD) decreasing content on mixed input is COD 45.55%.

Keywords: tofu waste, biogas, batch reactor, bioenergy, wastewater, solid waste.
TENSILE AND FLEXURAL PROPERTIES OF GREEN COMPOSITES (GC) BASED ON BAGASSE FIBERS WITH BACTERIAL CELLULOSE (BC) BINDER

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Bacterial cellulose (BC) is one of environment-friendly materials which is commonly synthesized by the acetic acid bacteria (*Acetobacter xylinum*) which has some unique properties, including high crystallinity, ultrafine fiber network, high water holding capacity, and high tensile strength. With these properties, the BC material was being used for a wide range of commercial applications including pharmaceutical industry, biotechnological devices, acoustic and filter membranes, textile and food product. In the present study, preparation and characterization of green composite (GC) materials, consisting of bagasse fiber with BC binder, are investigated. The bagasse fiber with BC binder GCs were prepared using hot compression molding. The tensile and flexural properties, and fracture surfaces for each green composite specimen were investigated. The microstructure and the fracture surfaces of the GC were characterized using scanning electron microscopy (SEM). In the meanwhile, the tensile and flexural properties of the GCs materials were evaluated using Universal Testing Machine-Shimadzu AG-X 5kN. The result indicates that the tensile and flexural properties of the bagasse fibers and BC green composites were influenced on fraction mass of bagasse fibers.

*Keywords:* Bacterial cellulose, bagasse fibers, green composite, tensile and flexural properties.
THE ABUNDANCE AND DISTRIBUTION PATTERN OF GIANT CLAM (TRIDACNIDAE) IN THE KLAH ISLAND SABANG, ACEH

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Abstract

Island Klah is an island located in the Bay of Sabang, the island is surrounded by coral reefs shallow habitats for economical biota especially giant clams (Tridacnidae). The objective of the present study was to evaluate the abundance and distribution pattern of Giant clam (Tridacnidae) in the water of the island Klah of Sabang city. The research was carried out on December 2016 to January 2017. Survey was done by purposive sampling method. Giant clams data retrieval using belt transects method. A ten meter length of transect line were established in depth of 1 to 2 m. The observations were done in 2.5 m to the left and 2.5 m the right. The research result discovered two types of giant clams namely Tridacna crocea, and Tridacna maxima. The species composition giant clam was tridacna crocea (69%) and Tridacna maxima (31%). The abundance of Tridacna crocea ranged 0.3 - 0.56 ind/ m², and Tridacna maximaranged 0.02 - 0.3 ind/ m². The distribution pattern of Tridacna crocea has clumped distribution and Tridacna maximahas uniform distribution. The length diversity of Tridacna croceawareranged from 1 cm to 13.5 cm. Based on the measurement of the shell length, Tridacna croceacategorized in the size which is not ready to reproduce. Moreover, Tridacna maximacategorized into the adult sizewhich is ready to reproduce with the smallest size was 3 cm and largest size was 18.5 cm.

Keywords: Giant clam, Tridacnidae, Abundance, Klah Islands, Sabang
USING DNA BARCODES TO CONNECT ADULTS AND EARLY LIFE STAGES OF MARINE FISHES FROM THE BANDA SEA, INDONESIA

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Abstract

The sustainability of the exploitation of the Indonesian fishes depends heavily on many of fish’s basic information include both larvae distribution and dispersal. However, the identification of fish larvae and juvenile to species is very difficult. Here we use DNA Barcoding technique to identify fish’s larvae to species in the Banda Sea by comparing the queries with sequences from adult stage as reference library to contribute on biodiversity information on that particular area. Also we highlight the composition of the fish’s larvae as well as the spatial heterogeneity in theirs the distribution. In order to reach a point of reliable, we tried to establish a barcode reference sequence library for 56 species with robust identification of adult specimen from morphology technique. The dataset was used as diagnostic tool to screen queries DNA sequences from fish larva specimens collected in Banda Sea, Indonesia. For the adult specimens, after some of PCR experiment, we have successfully amplified 27 individuals, only 8 sequences available. There are a total 326 eggs and larvae have been collected from 19 stations, of the 28 successfully amplified PCR samples, 11 sequences were available for DNA analysis. We prove the ability of COI barcodes to identify species level resolution from query sequences. Results informed the benefit of public domain reference libraries of trustworthy DNA barcodes, to classify species from distinct geographical origins and determine of how the data retrieved give important information for proposing plans for conserving and managing of fisheries in the sea waters.

Keywords: Banda Sea, DNA barcode, early life history
HPV-16 VARIANT FROM BANDUNG ISOLATE

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Abstract

The sustainability of the exploitation of the Indonesian fishes depends heavily on many of fish’s basic information include both larvae distribution and dispersal. However, the identification of fish larvae and juvenile to species is very difficult. Here we use DNA Barcoding technique to identify fish’s larvae to species in the Banda Sea by comparing the queries with sequences from adult stage as reference library to contribute on biodiversity information on that particular area. Also we highlight the composition of the fish’s larvae as well as the spatial heterogeneity in their distribution. In order to reach a point of reliable, we tried to establish a barcode reference sequence library for 56 species with robust identification of adult specimen from morphology technique. The dataset was used as diagnostic tool to screen queries DNA sequences from fish larva specimens collected in Banda Sea, Indonesia. For the adult specimens, after some of PCR experiment, we have successfully amplified 27 individuals, only 8 sequences available. There are a total 326 eggs and larvae have been collected from 19 stations, of the 28 successfully amplified PCR samples, 11 sequences were available for DNA analysis. We prove the ability of COI barcodes to identify species level resolution from query sequences. Results informed the benefit of public domain reference libraries of trustworthy DNA barcodes, to classify species from distinct geographical origins and determine of how the data retrieved give important information for proposing plans for conserving and managing of fisheries in the sea waters.

Keywords: Banda Sea, DNA barcode, early life history
MORTALITY RATE OF ASCARIDIA GALLI ADULT WORMS EXPOSED TO VEITCHIA MERRILLII BETEL NUTS EXTRACT

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Abstract

The aim of this study was to in vitro investigate the mortality rate of Ascaridua galli adult worms until 24 h contact with ethanolic extract of betel nuts V. merrillii. The worms were submerged in 15 mg/ml, 25 mg/ml, 50 mg/ml, 75 mg/ml, and 100 mg/ml ethanolic extract of betel nuts V. merrillii. Albendazole and levamizole was used as reference drugs and NaCl as control group. The results showed that the highest mortality rate was shown by 100 and 75 mg/ml followed by 50 mg/ml, 25 mg/ml, and 15 mg/ml ethanolic extract of betel nuts V. merrillii. The recordings demonstrate a dose-dependent in the mortality rate of the A. galli from 15 mg/ml to 100 mg/ml concentration of the extract.

Keywords: mortality rate, Ascaridia galli, Veitchia merrillii, anthelmintics
EFFECT OF PRE-TREATMENT EXTRACTION BY DIFFERENT ACID AT SOME CONCENTRATIONS ON YIELD AND CHEMICAL CHARACTERISTICS OF GIANT FEATHERBACK FISH (Chitalalopis) GELATIN

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Abstract

Flesh of giant featherback fish is the main composition of amplang, a kind of typical cracker from Samarindacity, East Kalimantan, while its skin and bone are not optimally used yet. They are so far used as animal fed. Like bone material in general, giant featherback fish bone is expected as potential gelatin source. However, raw material and extraction method are affected on yield and characteristic of gelatin produced. Pre-treatment extraction of gelatin from giant featherback bones by soaking in acid solutions at different concentrations has been conducted. The soaked bones collected and neutralized by diluted NaOH, then washed by water. The ossein then boiled in water (1:4) at 80°C. After 6 h, the filtrate cooled at 4°C until gel is formed, then dried at 70°C overnight as gelatin powder. Single factor experiment (soaking giant featherback fish bone in HCl, H₂SO₄, and CH₃COOH solutions, each at 4, 7, 10%, for 48 h at room temperature) arranged in completely randomized design with three replications was applied in this study. Data were analyzed by Anovafollowed by Tukey test. Parameters observed were yield, as well as water, ash, and protein content. The results showed that the pre-treatment extraction method gave significant difference (p<0.01) for all parameters. Gelatin pre-treatment extraction of giant featherback fish bone by soaking in HCl 4% at room temperature for 48 h showed the highest gelatin yield (17.26%) with water, ash, and protein content of 8.54, 1.88, and 85.99% respectively.

Keywords: gelatin, giant featherback, amplang, pre-treatment extraction, HCl, H₂SO₄, CH₃COOH
Abstract

The aim of this study was to analyze the phylogenetic of Comamonas sp. nov. isolated from preputial samples of aceh cattle based on 16S rRNA gene sequencing. Preputial specimens were processed according to standard protocols. A novel Gram-negative was isolated from preputial samples of aceh cattle. Taxonomic position was investigated on the basis 16S rRNA gene sequencing. The results showed that most bands close relationship to Comamonas sp. nov. with sequence C. kerstersii strain LMG 3475 (94% similarity), C. jiangduensis strain YW1 (93%), C. terrigena strain NBRC 12685 (92%), C. terrigena strain DSM 7099 (92%), C. terrigena strain LMG 1253 (92%), C. aquatica strain LMG 2370 (92%), and C. terrigena strain IMI 359870 (92%) from Comamonadaceae group available on GenBank. On the basis of phylogenetic data that the isolate represent a novel species in the genus Comamonas. Out of 75 preputial samples analyzed 5 isolates of Comamonas sp. nov. were confirm on the basis of 16S rRNA gene sequencing, giving a prevalence rate of 6.67%. Under the conditions of the current study, Comamonas sp. nov. were prevalent in aceh cattle population although in small numbers.

Keywords: phylogenetic, Comamonas, prepuce, aceh cattle
DETECTION OF REACTION WOOD ON *Swietenia mahogany*

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Abstract

This research focuses on the macroscopic and microscopic structure of reaction wood of Mahogany. Reaction wood as defined by IAWA is a wood with distinctive anatomical and physical characteristics, formed typically in parts of leaning or crooked stems and in branches, that tends to restore the original position of the branch or stem when it has been disturbed, also known as tensionwood (in deciduous trees) and compression wood (in conifers)”. The samples were taken from the tree stand at Mulawarman university campus area and for determining the specific reaction zone, ‘Herzberg’s reagent and double staining method were used. Anatomical structure observation using IAWA standard, those of included vessels, rays, parenchyma and fiber of mahogany). The result showed that using Herzberg’s reagent the macroscopic and microscopic structure of reaction wood were distinctively clear. Macropscopically the reaction wood was identified by eccentricity appearance of the ring wood and dark brown color with coarse texture in the cross section and interlocked grain in the radial section and also wolly structure in tangential section while microscopic structure used double staining method showed that anatomical cells of reaction wood in the three dimension side are not clear distinctive.

**Keywords:** Reaction wood, *Swietenia mahogany*, Herzberg’s reagent, Double staining method
ANTIOXIDANT ACTIVITY AND UV-B PROTECTION OF ANTHOCYANIN FROM DRAGON (Hylocereus costaricencis L.) FRUIT EXTRACT AND LIP BALM FORMULA

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Abstract

Antioxidant, uv-B protection and red colour of Anthocyanin is needed to formulate a cosmeceutical lip balm. In this study we extracted anthocyanin from Hylocereus costaricencis, and formulated into lip balm. The antioxidant and the UV-B protection of anthocyanine in extract and lip balm formula are then studied. The measurement of antioxidant activity was carried out using DPPH (1,1-diphenyl-2-picrylhydrazil) free radical scavenger method by using microplate reader. UV-B protection was measured by calculate the SPF of the sample using spectrophotometer uv-vis. From the result we showed that antioxidant activity of fruit with IC50 of the extract and lip balm formula were 108.08 ± 6.28 μg/ml, and 71.68 ± 2.67 (p<0.05), respectively. Whereas the UV-B protection of the extract and the formula were 0.226 ± 0.004 and 11.109 ± 0.034 at 200 ppm (p<0.05), respectively. Oedema transmission percentage of extract was 2.045 ± 0.035 and formula was 1.063 ± 0.02, whereas % pigmentation transmission of extract was 2.169 ± 0.01 and formula was 1.199 ± 0.07. Anthocyanine from dragon fruit (Hylocereus costaricencis L) should be formulated into lip balm in combination with honey, to produce the better antioxidant and sun screen activity of anthocyanine.

Keywords: anthocyanine, (Hylocereus costaricencis L), antioxidant, IC50, UV-B protection
UTILIZATION OF BANANA PEELS AS SOLID STATE FERMENTATION TO PRODUCE CITRIC ACID BY *Aspergillus niger*

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Abstract

Banana peels are currently posing disposal problem in the tropics area. Citric acid is a commodity chemical produced and consumed throughout The World. *Aspergillus niger* is one of microorganism that can produce this citric acid by surface fermentation using peels of ayam banana (*Musa acuminata*), raja banana (*Musa paradisiaca* cv. Raja, genom AAB) and nipah banana (*Musa balbisiana*) as solid state fermentation media. The purposes of this research were to determined citric acid production percentages and different value of pH and total biomass from each of solid state fermentation media. The result for optimum production of citric acid was found in raja banana's peel fermentation media. Biomass values of ayam, raja and nipah banana's peel fermentation media were 2.442, 2.649 and 2.407. pH values of each fermentation media were 2.50, 1.50 and 2.00. Citric acid percentages of each fermentation media were 58,80%, 69,84% and 46,80%. The length of time for fermentation (10 days) supported optimum production of citric acid in raja banana's peel than ayam and nipah banana's peel media.

Keywords: Citric acid , Banana peels, *Aspergillus niger*
ASSOCIATION MAPPING OF SIMPLE SEQUENCE REPEATS (SSR) MARKERS FOR LOW HEIGHT STEM INCREMENT IN OIL PALM

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Abstract
Developing a dwarf oil palm population will give a high impact to the oil palm industry. It can reduce the cost for fruit harvesting of tall palms, yet ease the harvesting and maintaining process. Therefore, many breeding trials have been carried out to obtain superior genetic varieties particularly in generating dwarf palms with high oil yield. In this study, the simple sequence repeat (SSR) was applied to obtain marker that associated with dwarf genes in two populations, i.e. compact and normal palms. From 45 SSR markers assessed in this study, 23 markers were associated with low height increment. In regards to minor allele frequency and related function of the marker, two markers have MAF of 5% and seven markers have related function to low height increment. But, only one marker fulfilled both of the parameters, which was marker related to proline-rich-protein 4-like gene. Proline rich protein is an important component of cell wall proteins that play pivotal roles in cell wall signal transduction cascades, and plant development. Stem height increment might be regulated by polygenic genes since the associated markers were distributed in some chromosomes. Nevertheless, these associated markers need to be further tested in other populations to observe marker consistency.

Keywords: association study, dwarf palm, polygenic, SSR
ANTITUBERCULAR ACTIVITY OF ETHYL ACETATE EXTRACT OF KENIKIR (*Cosmos caudatus* H.B.K) AND SENDOK (*Plantago major* L.) LEAVES WITH IN-VITRO METHOD

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Abstract

This study has been carried out the antimycobacterial activity of two ethyl acetate extracts from leaves of kenikir (*Cosmos caudatus* H.B.K) and of sendok (*Plantago major* L.). Both extracts were obtained by maceration and flavonoid, terpenoid of each extract were with thin layer chromatography (TLC) screened. Antimycobacterial activity of ethyl acetate leave extracts were determined by proportion methods using Middlebrook 7H9 and Lowenstein Jensen (L-J) medium. Our study exhibited that both extracts showed inhibited activity against *Mycobacterium tuberculosis* H37Rv strain at concentration 1 mg/mL.

Keywords: tuberculosis, ethyl acetate extract, kenikir (*Cosmos caudatus* H.B.K), sendok (*Plantago major* L.), leaves, *M. tuberculosis*
TOXICOLOGICAL IMPACT AND HISTOPATHOLOGICAL RESPONSE OF TILAPIA AFTER LEAD (II)-NITRATE (Pb (NO₃)₂) CONTAMINATION

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Abstract

Present study was conducted to assess the histopathological alterations in gills, heart, dorsal muscles and liver of tilapia (Oreochromis niloticus) which were kept in aqueous solution of lead nitrate of two concentrations of 0.2 mg/l, 1.0 mg/l for 2 days under laboratory conditions. Histopathological changes in gills, heart, dorsal muscles and liver were recorded by light microscope. The observed changes in treated groups were disintegration of secondary lamellae, atrophy, curling and shortening of secondary lamellae, swelling/inflammation, desquamation, epithelial lifting, curling bend of secondary lamellae and necrosis in gills. Atrophy and splitting of muscle fibers are recognized as common changes recorded in heart of experimental fish. Atrophy in dorsal muscles and splitting of dorsal muscle fibers, necrotic damage and degradation of muscle fibers were interesting observation in dorsal muscle tissue of experimental fish. Examination of liver sections after exposure showed sinusoidal dilatation and leukocyte infiltration in central veins and in peripheral areas occurred after exposure. The damages in histology of gills, heart, dorsal muscles and liver depend on exposure concentrations to lead (II)-nitrate (Pb (NO₃)₂). As the exposure concentrations increased, the more adverse damage occurred in the organs. Therefore, present investigation gives brief account of the toxic effects of heavy metals on fish. Present review illustrates that these histopathological alterations would contribute important role in assessing harmful effects of lead nitrate. As such, fish are used as bio-indicators, providing useful purpose in monitoring heavy metals contamination. Hence, implementation of regulations regarding the conservation of aquatic environments must be taken into consideration.

Keywords: lead nitrate, histopathological alterations, toxicological impact, heavy metal, contamination, fish organs
CHARACTERIZATION OF LACTIC ACID BACTERIA ISOLATED FROM LOCAL BUFFALO *(Bubalus bubalis)* MEAT

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Abstract

The local Buffalo *(Bubalus bubalis)* has a high economic value by providing meat and labor for Aceh farmers. The development of local buffalo is needed for the preservation of local buffalo. Lactic acid bacteria (LAB) can be found in Buffalo *(Bubalus bubalis)* meat. The screening LAB from meat Buffalo *(Bubalus bubalis)* can improve safety and stability of the products, extending shelf life by inhibiting undesirable changes brought about by spoilage microorganism or abiotic reactions. The objective of this study was to isolate and characterize lactic acid bacteria (LAB) from local Buffalo *(Bubalus bubalis)*. All isolates were grown in de Man, Rogosa, and Sharpe (MRS) broth. Isolate LAB was analyzed for morphological characteristic, Gram staining, and catalase activity. The result show that there are three lactic acid bacteria isolate found from local buffalo. Three lactic acid bacteria isolate show diferently morphological characteristic. It was found that all the isolated strains were Gram positive. All the strains also showed catalase activity. The result will develop to search for potential new starter and bacteriocins to improve the meat industry as biopreservation.

Keywords: Lactic Citric Bacteria, *Bubalus bubalis*, Biopreservation
STUDY OF NUTRITION CONTENT ON VEGETATIVE COMPONENTS OF YOUNG SIAM CITRUS \textit{(Citrus nobilis)}

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Abstract

The efficiency and effectiveness of citrus fertilizer in Indonesia is low. Therefore, knowledge of the nutrient content of the plant can be used to improve the fertilization program on citrus. Three-year Siam citrus trees \textit{(Citrus nobilis)} on \textit{Japanschecitroen} rootstock, grown on anceptisol in the experimental field of Tlekung, Balitjestro were harvested for investigate the macro and micronutrients on vegetative components. The results showed that the total dry weight distribution on the vegetative component were: leaf = 23\%, stem plus branch with twig = 44\%, and root = 23\%. The weight of macro nutrients on plant biomass was 1,907.65 g/tree (31.13\%), while the microelements was only 18.13 g/tree (2.96 ppm). Calcium and N were the most dominant nutrient vegetative components. The overall content of Ca in plant biomass was (71.06\%) especially in leaves, followed by N (21.3\%), Mg (2.79\%), K (2.12\%), P (1.54\%), and S (1.19\%). The concentration of microelements on vegetative components were Fe > Mn > Zn > B > Cu > Mo. This suggests that to build vegetative components of citrus required greater Ca than other macro elements. Thus the fertilizer formula should not only emphasize the elements of N, P, and K but also other elements, especially Ca.

Keywords: nutrients, vegetative component, \textit{Citrus nobilis}.
RELATIVE IMPORTANCE OF LOCAL APPLE ATTRIBUTES THAT AFFECTS CONSUMER’S CHOICE IN MALANG, INDONESIA

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Abstract

General consumption level of fruits in Indonesia is currently below the standard recommendation by the Food and Agriculture Organization (FAO). On the other hand, as the emergence of middle class and the awareness raising of consuming healthy food in Indonesia, the trend of diet and consumption pattern is gradually changing. People are getting aware of consuming fruit, such as apple. The provision of high quality fruit and appropriate fruit retailer easily access to consumers are important. These supports must comply with consumer’s needs and wants, because consumer’s attitude and preferences in selecting food is complex. Therefore, it is essential to comprehend consumers’ valuation towards attributes of the locally grown apple based on their preferences. The objective of the study is to identify attributes that are considered relatively important by consumers when purchasing local apples in Malang, Indonesia. The study employed an intercept survey involving 200 consumer respondents. The sample was randomly selected at four different retailer types, namely, traditional wet market, road side stall, supermarket and modern fruit shop. A structured questionnaire was designed to collect the primary data regarding quality attributes of local apples considered important by the consumers while buying local apple. The study focused on 14 attributes of local apple, comprising of twelve intrinsic attributes and two extrinsic attributes. Data were analyzed by using descriptive statistics. The results revealed that color, fineness, crispness, chewiness, sweetness, sourness and price had the highest mean values (above or equal to four), indicating that these attributes were considered relatively important for the consumers in decision making for buying local apple.

Keywords: apple fruit, attribute, consumer, consumption, Malang.

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STORAGE LIFE TIME OF CITRUS Cv “SIAM” FROM BANYUWANGI - EAST JAVA

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Abstract

Banyuwangi is one of the citrus center in East Java, Indonesia with an estimated 27.7 million metric tons produced with growth in 12.804 hectares. The quality of the citrus will be decrease when the retention of storage is too long because of the physiological changes post harvest. The objective of the research is to determine the relevancy of shelf life and quality of the citrus. The research was conducted at Laboratory of Mechanization and post harvest in BPTP East Java and the citrus was obtained in Banyuwangi. This experiments use randomized block design as the method, which the factors are temperature of storage (room temperature 27°C and cold temperature 15°C) and storage time (0, 5, 10, 15, 20 days) with five replication. The physical parameters in this research are fruit weight, fruit texture, color of pulp and fruit skin and the chemical parameters include sugar and acid contents. The chemical analysis showed that storage temperature had significants effect on sugar contents, but didn’t have significant effect of acid contents. The storage life time have correlation with sugar and acid contents. Citrus that are storage in refrigerator produce a higher sugar content (14.20°brix), but the acid contents are same. The longer that citrus is stored the highest the sugar content. The highest acid content in citrus storage for 10 days (0.30%). The physical analysis showed that storage temperature affect the weight of citrus, but does not affect to the texture and color citrus skin. The result showed that citrus which stored in refrigerator is higher that the others. Storage 20 days at room temperature and storage life time have no effect on citrus pulp and citrus pull color. The brightness of the surface (L) that is storage 20 days in room temperature has a same value with citrus that is storage in refrigerator.

Keywords: Citrus sp, storage, physical analysis, chemical analysis
POTENTIAL AND UTILIZATION OF MEDICINAL PLANTS IN CENTRAL KALIMANTAN

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Abstract

Efforts to recognize the diversity of biological resources through the characterization and management of germplasm is needed to encompass the diversity of genetic traits of plants. In addition, information about the potential and characteristics of biological resources can be utilized for productivity and quality improvement strategies types of crops and agricultural development as the basic data by planners or policy makers. Germplasm is a national asset that needs to be preserved because it is useful as a source of food, medicine, clothing and housing. This can be done through the activities of exploration, characterization and conservation of germplasm. Central Kalimantan has an area of 15.38 million ha comprising 61,140 ha of coastal regions, 1,533,492 ha of public waters and 13,785,431 ha of the land area. This spacious land area consists of various types of land so the consequence is the diversity of genetic resources of medicinal plants and some commodities used by local communities in Central Kalimantan. This study aimed to obtain and collect medicinal plants that are (existing) in Central Kalimantan; agroecological and habitat characterization of medicinal plants, looking for opportunities for the development of cultivation systems and competitive agribusiness; acquire characteristics that determine the properties of morpho-agronomic importance, special properties, advantages, disadvantages and plant diversity; and conserve the biodiversity. The study was conducted through a desk study and field surveys. The results show there is a potential inventory of medicinal plants and habitat characterization, collection, characterization and conservation of plant plasma nuftah especially medicinal plants and their use by the local community.

Keywords: exploration, collection, conservation, medicinal plants, specifically, Central Kalimantan
BIOSORPTION OF Cr(VI) USING RICE STRAW WASTE

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Abstract

Water pollution is one of the main environmental problems. One of the pollutants that become serious problem in aquatic ecosystems is heavy metal such as Cr(VI) that can be harmful to living organisms including human. Thus, the technology to solve Cr(VI) pollution is needed. One of the low cost and environmentally safe technologies to solve the problem is biosorption. The present study investigated the biosorption of Cr(VI) using rice straw waste. This substance is selected because easily available and relatively inexpensive. The result of this study showed that the rice straw waste had promising ability to adsorb Cr(VI). The optimum time of biosorption was 120 minute. The biosorption characteristics were fitted well to the Langmuir adsorption model. The result of this study suggested that the biosorption of Cr(VI) to rice straw waste occurred through physicochemical interactions in this case ion exchange mechanism and electrostatic interaction. According to the result of this study, the rice straw waste is prospective biosorbent to solve aquatic ecosystem pollutions especially heavy metal pollution such as Cr(VI) contamination.

Keywords: biosorption, heavy metal, Cr(VI), rice straw waste, water pollution.
NEUROGLOBIN AND CYTOGLOBIN EXPRESSION IN LIQUOR CEREBRO SPINALIS OF HAEMORRHAGIC STROKE PATIENTS

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Abstract

A rupture in brain blood vessel may disrupt the oxygen and nutrient supply to the brain, thus, the energy production in brain will be decreased. Consequently, brain damage and brain death may occur quickly, where proteins of brain cells would be emitted. The aim of this study was to compare neuroglobin (Ngb) and cytoglobin (Cygb) between plasma, liquor cerebro spinalis (LCS) and brain tissue. The present study was a pilot study which was used plasma, LCS, and brain tissue from hematoma evacuation in seven patients with supratentorial haemorrhagic stroke recruited. The Ngb and Cygb levels were measured using human Ngb and Cygb ELISA kit USCN. In average, brain Ngb level was 0.058 ng/mg brain protein, while Ngb levels of plasma and LCS were 29.31% and 22.41% of brain Ngb average levels, respectively. The average level of brain Cygb was 6.543 ng/mg brain protein, and 25.26% of brain Cygb average levels, whereas it was too low for detection (undetectable) in plasma. In conclusion, the Ngb and Cygb levels in LCS were reflecting the Ngb and Cygb level of brain and were possible to be measured and analysed.

Keywords: Ngb, Cygb, haemorrhagic stroke, LCS
OXIDATIVE STRESS, ALBUMIN AND GLOBULIN SERUM PROFILE OF CHILDREN LIVE IN SLUM AREA

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Abstract

Slum area is very harmfully circumstance to live. The problem is the pollutant contamination in soil, water and air exposed peoples who lives there. They will suffered some diseases or damages. The most contaminant was microbes. We observed markers of oxidative stress: malondialdehyde and glutathione level, albumin and globulin profile of children lived in slum area that exposed with contaminant circumstance compared to healthy area. We use thiobarbituric acid to measured oxidative stress damage in cellular membrane. Measurement of glutathione using Ellmann method. Electrophoresis of Titan ® III Cellulose Acetate Plate (Helena) was used to observed the protein serum profile. Result show some abnormal appearances: significantly higher (3 times) concentration of MDA and lower concentration of GSH in children of slum area. Total serum protein was 9.42(7.1-10.7) g/dL in slum area children, 8.47(5.25-10.6) g/dL in healthy area, with significant different p = 0.001. Fraction of albumin was 3.13 g/dl in slum area children serum, besides in healthy area children albumin was 2.8 g/dl and has significant different p = 0.001. Serum globulin fraction of slum and healthy area were 6.29 and 5.67 g/dL, respectively. It considered that in slum area, children body focus on improving serum globulin part of defends mechanism.

Key words: slum area, children, albumin, globulin, malondialdehyde, glutathione
IDENTIFICATION OF OSMOPHILIC YEASTS ISOLATED FROM MOLASES SUGARCANE AS BIOETHANOL STARTER

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Abstract

Osmophilic yeasts is second generation to increase the bioethanol production. The yeasts were isolated from material contain high sugar like honey, juice or by-product material such as molasses. Bioethanol was usually produced from sugarcane molasses at brix degree 14%. The aim of these research were identification phenotypic and genotypic characteristics of indigenous yeast. Phenotypic characteristics were based on colony typical, morphological and fermentation profile. Genotypic characteristics of yeasts based on sequence of ITS region. The yeasts were isolated from original molasses (>80% brix) on malt extract agar (MEA). There were two isolates of osmophilic yeasts. Isolate A was regular clear white colony, sharpe cell with multilateral budding, while isolate B was regular murky white colony, cylindrical cell with multilateral budding. Isolate A and B grown optimum at 30°C and produce high etanol at 34°brix but the pH growth of yeast were difference. Isolate A optimum growth at pH 5, while isolate B optimum growth at pH 4. The fermentation profile using API 20C Aux kit showed that the yeasts can ferment glucose, glycerol, calcium-2-keto-gluconate, arabinose, adonitol, galactose, sorbitol, methyl-αD-glucopiranoside, N-α-glucosamine, cellobiose, maltose, saccharose, trehalose, and raffinose. Isolate A can ferment inositol and melezitose, while isolate B can ferment xylose and xylitol. Isolate A was identified as Candida famata (63,2%) dan isolate B was identified as Candida guilliermondii (84.3%). Isolate A as the high ethanol productivity then was confirmed the genotypic characteristic was located in the phylum Candida parapsilosis ZA012 (100%).

Keywords: osmophilic yeast, molasses sugarcane, bioethanol, fermentation
IMPROVEMENT ON IN-VITRO EFFECTIVITY OF IBUPROFEN SOLID DISPERSION ON TRANSDERMAL PATCH FORMULATION

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Abstract

Ibuprofen, a Non-Steroidal Anti Inflammatory Drug (NSAID), frequently used as an analgesic, antiinflammatory agent, Rheumatoid Arthritis and Osteoarthritis therapy. Commonly reported side effects of ibuprofen taken orally were abdominal pain, acid or sour stomach, peptic ulcer and upper gastrointestinal hemorrhage. Those side effect can be overcome by formulating ibuprofen into transdermal patch. The objectives of this research were to developed a new product of transdermal patch containing ibuprofen and to determine in-vitro effectivity of ibuprofen transdermal patch. This research carried out into following step: (1) Ibuprofen:PEG 6000 solid dispersion formulation; (2) Transdermal patch formulation; (3) Transdermal patch dissolution/release and penetration profile. The result showed that ibuprofen were able to formulated into solid dispersion and transdermal patch which has physical characteristic as expected. Propylene glycol as penetration enhancer agent was proven to be effective in increasing ibuprofen release from device and increasing penetration of ibuprofen through the skin. Adding propylene glycol into transdermal patch formula, will increase ibuprofen flux release and penetration value.

Keywords: ibuprofen, solid dispersion, patch transdermal, penetration
ASSEMBLY OF SCMV (Sugarcane Mosaic Virus) RESISTANT SUGARCANT BASED OFPDR (PATHOGEN DERIVED RESISTANCE) FOR NATIONAL SUGAR TO ACHIEVE SELFSUFFICIENCY

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Abstract

In sugarcane, one of the most important pathogen causing chlorosis, stunting and reducing sugar productivity up to 50% is Sugarcane mosaic virus (SCMV). Several strategies have been used to develop SCMV-resistant sugarcane cultivar, including traditional breeding and genetic engineering. However, genetic complexity and low fertility of sugarcane render traditional breeding laborious and make it a prime candidate for improvement through biotechnology approach. Pathogen derived resistance (PDR) is one of the strategy to develop SCMV-resistant sugarcane by overexpression of cDNA encoding capsid protein from SCMV. The cDNA of capsid protein (CP-cDNA) from the infected sugarcane leaves was cloned into pRION expression vector and designed as pRION+CP. The construction was conducted by amplification of the CP-cDNA using a set of primer containing NdeI site at N-terminal (forward) and BamHI site in C-terminal (reverse). The CP-cDNA was further digested with NdeI and BamHI and the resulted cDNA fragment was ligated into pRION vector. The nucleotides sequencing result showed that the CP-cDNA was successfully inserted into NdeI and BamHI site of pRION. The resulting construct of pRION+CP was then transformed into Agrobacterium tumefaciens strain GV3101 to create transgenic SCMV resistant in sugarcane through shoot apical eksplant. In this research, the transformation of coat protein (CP) genes into plant genome with the aim of obtaining genetically engineered crop being resistant to the attack of SCMV virus. The transformation on sugarcane used Agrobacterium tumefaciens vector containing plasmid binary construct pRI ON 101 CP+725 DNA. The analysis of transformation result used Polymerase Chain Reaction (PCR) method with primer nptII producing DNA band ± 550 bp. The research results indicated that it was obtained putatively transformant plant with the success rate of transformation by 8%.

Keywords: Agrobacterium tumefaciens, Coat protein, PCR, Pathogen derived resistance, SCMV, transformation.
QUORUM SENSING Bacillus spp AGAINST Ralstonia solanacearum

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Abstract

Bacillus sp is a bacteria capable of synthesizing AHL lactonase which serves to disable signals from N-acyl homoserine lactone. R. solanacearum is one of the bacteria that used N-acyl homoserine lactone (AHL) as a signal in degrading plant cell wall. The research aimed to determine the anti quorum sensing process of Bacillus spp number 10 and 12 of isolates on the development of R. solanacearum. Both genera of bacteria were isolated from the soil taked in potato cultivation areas. Anti quorum sensing test was done by potato tuber decay test and hypersensitive test on tobacco plant leaf. Bacillus spp isolates 10 and 12 were able to inhibit spoilage compared to control (without Bacillus isolate). Similarly for the hypersensitivity test, both isolates were able to suppress the development of symptoms of the disease by up to 50 percent compared to controls. This suggests that Bacillus number isolates 10 and 12 were able to synthesize AHL-Lactonase to inactivate N-acyl homoserine lactone from R. solanacearum. This is also evident from the SDS-PAGE Electrophoresis test, isolates 10 and 12 are able to synthesize lactonase both extracellular and intracellular, with the formation of protein band AiiA having molecular weight ranging from 28-30 kDa.

Keyword : Bacillus spp., Ralstonia solanacearum, Lactonase, Quorum sensing
EXPLORATION OF PLANT GROWTH PROMOTING RHIZOBACTERIA OF OPEN POST COAL MINING AND ITS POTENTIAL FOR REVEGETATION

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Abstract

The mining industry was not only generated foreign exchange but also produce the negative impact in the form of environmental damage. Open mining systems on the surface soil changed landscapes of soil and ecosystem equilibrium on the surface soil. This causes the structure of the land was overburden and topsoil mixed or goes down in the inner layer. Carrying capacity of the post-mining topsoil for plant growth to be low, a decline in soil nutrient status and microbial populations and changing the micro-climate was not good for living organisms. Indirectly, it can affect the growth of plants. The existence of potential soil microbes could played a very important role for the development and survival of plants. One group of microbes that have an important role in soil fertilizer is Plant Growth Promoting Rhizobacteria (PGPR).

The purpose of this study was to find out the total population bacteria on the coal mined land, to find out bacteria land of origin coal mined land that has characteristics as a candidate PGPR and to find out the state of biochemical the soil at the coal mined land. This research used survey method with several steps such as isolation bacteria from coal mined land, selection of bacteria as candidate PGPR, identification bacteria as PGPR potential, and measurement of the quality of biochemistry land. Bacteria was selection into candidates PGPR such as the ability in dissolving organic phosphates, fixation nitrogen, produce growing hormone (IAA) and siderophore. Isolates bacteria was identified by macromorphology-micromorphology observations and biochemical tests.

The results showed that the total number of bacteria on the coal mined land varied at every location, L1 with the shortest reclamation had the lowest population of bacteria, whereas in L3 locations had the highest population of bacteria. Bacteria isolates originated from the coal mined land showed characteristics as PGPR candidates due to they were able to in dissolve phosphate, to fix nitrogen, to produce growing hormone (IAA), and siderophore. The biochemical conditions of the soil at three different locations coal mined lands in accordance with the length time of the reclamation. L3 with the longest reclamation had better condition biochemical than the other of the two locations.

Keywords: PGPR, post open coal mining, revegetation, soil enzyme activities, microbial population
INVENTORY GENUS ARTOCARPUS IN THE MERU BETIRI NATIONAL PARK (TNMB)

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Abstract

MeruBetiri National Park (MBNP) provides a large amount of vegetation such as tropical rain forest vegetation with huge number of valuable plant species. For example, the plant species belong to the Moraceae family, especially from the genus Artocarpus that has been utilized to produce high value fruits, carbohydrate source, good wood quality, and potential resource for phytopharmaca. At this moment, some members of Artocarpus are listed as endangered species. Therefore, inventory the member of Artocarpus in MBNP are required in order to preserve the germplasm and managed sustainably. The research was conducted in Baban resort by inventory method. The results showed that in Baban resort of MMNP, only 1 species of Artocarpus was observed i.e., Artocarpus elasticus. Ironically, 10 of 22 trees of Artocarpus elasticus found are dead. High possibility that the death of the trees are caused by human being since the scratched mark by the sharp objects are found. It is plausible since the member of Artocapus is able to produce the milky sap in the leaves, twigs and stems. Therefore, this phenomenon should receive serious attention in conservation programs given the importance benefits of this species in the ecosystem.

Keywords: Meru Betiri National Park, Artocarpus
THE INTENSITY ATTACK OF COFFEE BERRY BORER (Hypothenemus hampei Ferr.) AFTER APPLICATION OF Acorus calamus L. AND ORGANIC INSECTICIDE IN COFFEE PLANTATION

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Abstract

Hypothenemus hampei Ferr. is a damaging insect on coffee berry. The borer activity H. hampei is one of the causes of reducing coffee production in Indonesia. So far, to control this insect, chemical insecticide were applied. These methods gave a bad impact on the coffee been quality. Therefore, the use of insecticide with safe friendly-environment is needed. One of the plants with potential insecticide compound is Acorus calamus L. Currently, several commercial organic insecticide are readily found in the market and used by several farmers. The aims of this study is to evaluated the effect of hexane fraction of A. calamus and commercial organic insecticide on H. hampei in the field. The organic insecticide at 0.74 % and hexane fraction at concentration 1.2 % were evaluated in the field by spraying methods. The results showed that both of insecticide had no significant effect on the coffee berry infestation after 7 to 28 days spraying (p>0.05). However, the weekly spraying showed prospective results to reduce the insect infestation.

Keywords: Acorus calamus L., coffee berry insect, organic insecticide, regular spraying
THE ZONATION PATTERN OF MACROALGAE ON THE INTEGIDAL ZONE IN THE BATU LAWANG COASTAL AREA, ALAS PURWO NATIONAL PARK, EAST JAVA, INDONESIA

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Abstract

The distribution of organisms including macroalgae along horizontal gradient in the intertidal zone has long been studied and it is considered universal. This research was conducted to determine the zonation pattern of macroalgae on the intertidal zone in the Batu Lawang coastal area, Alas Purwo National Park, East Java, Indonesia. The data of macroalgae (the coverage each species) was collected in the plots that there were placed on the line transects. The length of line transect was 90 m. The line transects were placed start from the coastline to the sea. Macroalgae data were analyzed to determine of species dominance using importance value index, and to determine of the zonation pattern using moving split window method. The result showed that in the intertidal zone was found eleven species of macroalgae that there were Boergesenia forbesii, Galaaura rugosa, Gracilari gigas, Gracilaria salicornia, Hypnea spinella, Hypnea sp., Padina australis, Portieria hornemanni, Turinaria ornata, Ulva lactuca, dan Ulva sp. The dominant species was Hypnea spinella with the importance value index was 5.42%. Macroalgae in the research location formed three zones based on the square euclidean distance value. After each zone was determined of species dominance, all of the macroalgae zones have the same name that name was Hypnea spinella zone.

Keyword: zonation pattern, macroalgae, intertidal zone, moving split window
CHARACTERIZATION OF SPORES FERN PLANTS
TERRESTRIAL FROM WILDLIFE RESERVE "YANG PLATEAU" THE ARGOPURO MOUNTAINS

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Abstract

Research on the characterization of spores terrestrial fern plants (Pteridophyta) from mosses forest wildlife reserve "Yang Plateau" of the Mountains Argopuro found 12 species of terrestrial fern plants with 2 types of spores trilete and monolete. Trilete spores are found in one species of terrestrial fern plant namely Pteris tripartita. Monolete spores are found in 11 species ie Asplenium scolopendrium, Asplenium excisum, Asplenium normale, Blechnum nudum, Lastreopsis rufescens, Lastreopsis munita, Lastreopsis smithiana, Lastreopsis grayi, Sticherus lobatus, Diplazium pallidum and Athyrium mearnsianum. The spores of terrestrial fern plants that have been observed are 5 ie suboblate (1 species), prolate (3 species), peroblate (2 species), oblate (1 species) and subspheroidal (5 species).

Keywords : characterization, spore, fern
METHOXYCHLOR EFFECTS ON EPIDIDYMIS STRUCTURE AND SPERM QUALITY OF MICE (Mus musculus L) Balb C Strain

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Abstract
The aim of this experiment is to analyze the effects of methoxychlor on epididymis structure and sperm quality of mice (Mus musculus L) Balb C Strain. Mice were applied intraperitonial methods by methoxychlor at several doses that is 0.14 mg/g bw, 0.28 mg/g bw and 0.42 mg/g bb for 36 days. Mice were killed on 37th days after treatment. Afterward, the cauda epididymis was removed for histology preparation by using paraffin method with Hematoxylin-Eosin stained. The cauda epididymis was taken out as well for measurement of spermatozoa quality. The results showed that methoxychlor affected epididymis structure and sperm quality. The epididymis epithel size tend to decrease. In addition, the sperm quality was decreased with the number of abnormal sperm were increased. The application of Methoxychlor at 0.42 mg/g bb showed the worst effect on epididymis structure and sperm quality.

Keywords: methoxychlor, epididymis structure, sperm quality, mice
QUANTIFICATION OF FUNGAL INFECTION IN RICE THROUGH TAQMAN REAL-TIME PCR

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Abstract

Rice blast, sheath blight and brown leaf spot are major diseases in the paddy field. The diseases are caused by *Magnaporthe oryzae*, *Rhizoctonia solani* and *Cochliobolus miyabeanus*, respectively. Considering the important status of these fungal pathogens in affecting rice yield, a quick and accurate identification for the disease progression or infection are indispensible. A Taqman real-time PCR was employed for disease evaluation and to determine fungal proliferation in planta. The PCR was performed by using selected Taqman probe and primer pair specific to each fungal strain that encode unigene in their genome. Standard curve were constructed by using cloned amplicon or fungal genomic DNA with increasing a series of concentration. Based on the crossing point (CP) obtained from real-time PCR, the fungal proliferation and disease progression was determined. This system was able to estimate fungal genomic DNA up to the picogram level. In sum, this evaluation system is applicable, reliable and can be a powerful alternative for the estimation of major rice disease caused by fungal pathogens.

Keywords: fungal pathogen, quantitative PCR, rice disease
RELATIONSHIP OF PIPERACEAE BASED ON
MORPHOLOGICAL CHARACTER OF VEGETATIVE
ORGAN IN MERU BETIRI NATIONAL PARK JEMBER EAST
JAVA

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Abstract

The family of Piperaceae in Meru Betiri National Park, Jember East Java is represented by ten species: Peperomia pellucida, P. Sarmentosum, P. aduncum, P. auriculatum, P. retrofractum, P. nigrum, P. canicum, Piper Sp 1, P. betle and Piper Sp 2. Taxonomic studies were performed to determine the relationship between each species based on morphological characters. By using hierarchical cluster analysis, the relationships between species were illustrated in a dendrogram. The results show that from 10 species collected can be grouped into 7 clusters as follow: (P. aduncum + (Peperomia pellucida) + (P. retrofractum) + (P. canicum) + (P. betle) + (P. sarmentosum) + (P. auriculatum + Piper Sp. 2 + P. nigrum + Piper Sp.1) ). The closest relationship was obtained between species of SP 4 (P. auriculatum) and SP 10 (Piper Sp. 2) with 0.7% similarity level and 24.307 of the coefficient value. The farthest relationship was obtained between SP 1 (Peperomia pellucida) and SP 3 (P. Aduncum) with 25% similarity level and a coefficient value of 387.415.

Keyword: relationship, Piperaceae, morphology, taxonomic characters.
INBREEDING EFFECT ON VIABILITY OF *Drosophila melanogaster* Meigen. FROM WILD TYPE

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Abstract

One of the system mating or breeding in natural is inbreeding. An inbreeding is the production of offspring from the mating of individuals or organism that are closely related genetically (through common ancestry). Negative effect of inbreeding is inbreeding depression. Inbreeding depression leads to reduce quality, viability, productivity and fitness. The aim of this study to analyze the effect of inbreeding and the type of inbreeding to viability of *Drosophila melanogaster* Meigen from wild type. The research design by using Random Design Completely with 4 treatment i.e outbreeding, and three of type inbreeding (full sib mating, half sib mating and uncle- niece mating), the treatment is 6 replication respectively. The result showed that the inbreeding lead to reduce on viability of *Drosophila melanogaster* Meigen from wild type on all stage development (larva – pupa, pupa – imago and larva – imago). While the differences of type inbreeding didn't effect to viability of Drosophila melanogaster Meigen from wild type.

Keyword: Inbreeding, *Drosophila melanogaster* Meigen, viability
SCREENING OF RESISTANT VARIETIES AND *Trichoderma harzianum* DOSE FOR BIO-CONTROL OF FUSARIUM WILT OF CHILI (*Fusarium oxysporum* f. *Sp. Capsici*)

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Abstract

Chili (*Capsicum annuum*) has been an important commodity used as a vegetable and spice crop worldwide, that is produced and consumed as fresh or processed and its socio-cultural role is remarkable worldwide. The enormous popularity and demand for chili is providing a boost to the chili industry, but its production is increasingly constrained by diseases. Chili producers have reported *Fusarium wilt*, as the frequently encountered disease. The present investigation focuses on biological control, which is found effective to manage this disease. A study has been conducted the resistance of several varieties of chili plants against Fusarium wilt disease caused by *Fusarium oxysporum* f. *Sp. Capsici*. The chili varieties observed were PM-999 F1, Lado F1, and Arzeta F1. *Trichoderma harzianum* doses which is used for biocontrol *Fusarium oxysporum* f. *Sp. Capsici* were 10 gr/plant, 20 gr/plant and 30 gr/plant. The results showed that Lado F1 variety with the doses of *Trichoderma harzianum* used 30 gr/plant were highly resistant to Fusarium wilt disease. The other two varieties showed a lower level of resistance to the wilt disease compared to *Trichoderma harzianum* used 30 gr/plant.

**Keywords**: chili, wilt disease, *Fusarium oxysporum*, chili variety
DISTRIBUTION OF SEAGRASS IN INTERTIDAL ZONE TANJUNG BILIK AT BALURAN NATIONAL PARK

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Abstract

Intertidal zones are coastal areas influenced by the sea levels. Among those, Tanjung Bilik Baluran National Park is frequently occupied by seagrasses. This species can be play important roles ecologically as producers, nursery areas, or feeding grounds for many organisms such as gastropods, starfish, sea turtles or others. The purpose of this research study was to determine the distribution of seagrass in Intertidal Zone Tanjung Bilik-Baluran National Park (BNP). The survey method was used to collect data bay using Geographical Positioning System (GPS). Each seagrass species found were delineated to get information of its position and substrate. ArcGIS 10 software were used to digitize the species distributions. There were about four seagrasses species collected from the area which were Thalassia hemprichii, Enhalus acoroides, Halophila minor, and Halodule pinifolia. These community were distributed randomly at the Tanjung Bilik-BNP.

Keywords: Distribution, Seagrass, Intertidal Zone, Tanjung Bilik
TRANSFORMATION OF SOSPS1-ΔN MUTANT GENE IN TOMATO PLANT (*Lycopersicum esculentum*) MEDIATED BY *Agrobacterium tumefaciens* VECTOR

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Abstract
Sucrose phosphat synthase is an important plant enzyme involved in sucrose biosynthesis in cytosol. SPS activity is effected by the existence of light cycle. ΔN-terminal region in sps is fosforilation area that is respected to regulated sps activity in plants. In this study, tomato plants variety rampai that is inducted by Pri 101 AN plasmid is used as modeling plants. Transformation mediated by Agrobacterium tumefaciens GV 3101 are applied 3 times to the modelling plants and 5 times selection phase using kanamycin 50 ppm. Results from this study we have gotten 10 transgenic tomatoes contain SoSPS1-ΔN gene. Which increasing in sucrrose contain ammount weight of fruits compared with wild type.

Keywords: Genetic transformation, the phosphorilation of SoSPS1-AN, Sucrose Phosphate Synthase (SPS)
THE EFFICACY OF BIOLOGICAL CONTROL AGENTS OF
Heterorhabditis SP. AND Serratia SP. TO THE POPULATIONS
OF NILAPARVATALUGENS AND
SCIRPOPHAGAINCERTULAS PESTS ON RICE PLANT IN
PANCAKARYA VILLAGE, JEMBER

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Abstract

One of the problems in rice farming techniques is the presence of insect disturbances. Some insects that interfere with rice plants are the brown planthopper (Nilaparvatalugens) and the yellow stems borer (Scirpophagaincertulas). Conventional control measures are still using chemical insecticides with high spraying frequency poses negative effects on environment, health, resurgence and insect resistance. Therefore, it is necessary to look for an environmentally friendly alternative with the use of biological agents such as bacteria, entomopathogenic nematodes, and vegetable pesticides. The purpose of this study not only to determine that the efficacy of Heterorhabditis sp. and Serratia sp. can reduce the population of brown planthopper pests and yellow stem borer pests, but also to determine the effect on growth and production of rice crops. The results showed that the application of several biological agents to N. lugens population before and after treatment was different but not significant (p-value = 0.053). Similarly, the application of some biological agents on the before and after treatment of population S. incertulas showed different results, but not significant (p-value = 0.637).

Keywords: Heterorhabditis sp., Serratia sp., Nilaparvata lugens, Scirpophaga incertulas
GENETIC STABILITY ASSAY OF GENETIC MODIFIED SUGARCANE THAT OVEREXPRESSION SOSPS1 AND SOSUT1 GENE

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Abstract
Sukrosa and starch are the final products of the carbon assimilation in the photosynthesis process that occurs in the leaves. The metabolism of sucrose in the leaves is affected by several enzymes, such as sucrose phosphate synthase (SPS), which is the key of enzyme that has role in the biosynthesis of the sucrose in sugarcane (Saccharum officinarum). Sucrose biosynthesis results continue by translocated from its sink to source by the sucrose transporter protein (SUT). This research is shown to know the stability of SoSPS1 and SoSUT1 genes of genetically modified single and double gene overexpression of SoSPS1 and SoSUT1 genes in third generation. The stability test of sugarcane was initiated by confirmation of SoSPS1 gene and SoSUT1 gene by PCR analysis using primer F / R nptII and primary F / R nptII. The results of PCR analysis in sugarcane transgenic overexpression of a single gene SoSPS1 third generation has a percentage of 100% genetic stability, sugarcane transgenic overexpression of a single gene genetic stability SoSUT1 has a percentage of 73.3% and in sugarcane transgenic overexpression double SoSPS1 and SoSUT1 genes genetic stability has a percentage of 50 %. Enzyme activity analysis of all sugarcane transgenic overexpression of a SoSPS1 single gene and overexpression double gene SoSPS1 and SoSUT1 have increased SPS activity compared to control plants, so that the average content of sucrose stem higher than the control plants (wildtype). Transgenic sugarcane plants produce less and equal than cane control plant.

Keywords: Gene Stability, SoSPS1 gene, SoSUT1 gene
TRANSFORMATION OF SOSPS1-S162A MUTANT GENE IN TOMATO PLANT (*Lycopersicum esculentum*) MEDIATED BY AGROBACTERIUM TUMEFACIENS VECTOR

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Abstract

Sucrose has important role to growth and development of plant. The synthesis of sucrose is catalyzed by sucrose phosphate synthase (SPS) enzyme. The activity of SPS is regulated by allosteric effectors such as phosphorylation of reversible protein from specific serine/threonin residue that has responsibility toward transition of light/dark. In sugarcane plants, serine-related SPS regulation lies in the order of 162 amino acids. To investigate the role of the serine active site, a serine mutation has been made to alanine in cane SPS (SoSPS1-S162A) on a transformed pRI 101-AN plasmid in Agrobacterium tumefaciens GV 3101 strain and tested on transgenic tomato plants. Explant used in this research is apical buds of tomato plants of Rampai varieties in vitro aged 14 days. The transformation was performed 3 times, with each transformation using 5 selections with kanamycin 50 mgL-1. There were 10 positive plants containing SoSPS1-S162A gene mutations, that is V1, V2, V5, V7, V9, V10, V11, V13, V14, dan V15 event. With the number of fruit and the total weight of the SoSPS1-S162A plant is relatively higher compared with SoSPS1 transgenic plants, and Wild type plants, but the content of sucrose is still not homogeneous.

Keywords: Genetic transformation, the phosphorilation of serine, Sucrose Phosphate Synthase (SPS)
THE POTENTIAL OF PLANT ACTIVITY SCREENING AS ANTIMICROBIAL MATERIAL FROM THE UPPER AREA OF IE SEU-UM (OUTFLOW GEOTHERMAL ZONE) ACEH BESAR DISTRICT

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Abstract

The increasing cases of microbial resistance against antimicrobials encourage the discovery of new antimicrobials finding. Mount Seulawah Agam as geothermal area has a wealth of biodiversity with potential antimicrobial materials. This study aimed to determine the secondary metabolite compounds and antimicrobial activity of methanol extract plants that found in the upper area of Ie Seu-um (Outflow Geothermal Zone) Aceh Besar district. Sampling method was done by using plot method (plot observation), then were observed six species, amongst others; Oldenlandia biflora L., Cleome aspera J. Koenig ex DC., Eupatorium inulifolium Kunth, Abutilon indicum (L.) Sweet, Tridax procumbens (L.) L. and Cissus adnata Roxb. Phytochemical test result was conducted qualitatively, and indicated that plant samples in the Ie Seu-um area were dominated by tannins, steroids and saponins. Test of antimicrobial activity was conducted with Kirby-Bauer method by using methanol extract of 50% concentration against Staphylococcus aureus, Escherichia coli and Candida albicans. The test results showed that all the antimicrobial activity of plant samples, except Tridax Procumbens (L.), have antibacterial activity against Staphylococcus aureus and Escherichia coli. Cissus adnata Roxb did not have activity against Escherichia coli. The test result revealed there is no plants have antifungal activity against Candida albicans.

Keywords: Geothermal manifestation, Ie Seu-um upper area, Staphylococcus aureus, Escherichia coli, Candida albicans, antimicrobial
INTERMOLECULAR COPIGMENTATION OF JAMBOLAN (Syzygium cumini) FRUIT ANTHOCYANINS BY ROSEMARY POLYPHENOLIC EXTRACT AS COPIGMENT AT DIFFERENT PH AND COPIGMENT CONCENTRATION

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Abstract

Anthocyanins of jambolan fruits were copigmented through intermolecular copigmentation using rosemary polyphenolic at different pH values and copigment concentration. The colour characteristic, anthocyanin content, polyphenolic content, and antioxidant capacity were investigated in buffer solution at pH values of 1 - 7 and different copigment concentration (0; 1.5; 3; 4.5; and 6 mg/mL). The intermolecular copigmentation of jambolan anthocyanins with rosemary polyphenolic extract could enhance colour intensity at pH 1 - 4 than pH 5 - 7, which was observed through spectrometric parameters such as hyperchromic effect (∆A_{vis-max}) and bathochromic shift (∆λ_{vis-max}). The higher addition of rosemary polyphenolic copigment also enhanced color intensity of anthocyanins. Furthermore, the addition of rosemary polyphenolic copigment gave increasing of polyphenolic content and antioxidant capacity (TEAC/trolox equivalent antioxidant capacity) in pH values of 1 - 7. Rosemary polyphenolic can be selected as copigment for the jambolan anthocyanins when incorporated in the acid food system.

Keywords: Syzygium cumini, anthocyanin, intermolecular copigmentation, rosemary polyphenolic copigment, antioxidant activity.
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