The 6th International Conference of Science and Technology (ICST)

Grand Dafam Q Hotel Banjarbaru, 07 - 08 Juli 2023

SEMIRATA 2023
BKS MIPA
PTN Wilayah Barat

BOOK OF ABSTRACTS

"Harmonizing People, Nature, and Culture Through Scientific Collaboration"

Organized by:

Faculty of Mathematics and Natural Sciences
UNIVERSITAS LAMBUNG MANGKURAT

The 6ᵗʰ International Conference of Sciences And Technology (ICST)

"Harmonizing People, Nature, and Culture Through Scientific Collaboration"

Presented by:

Faculty of Mathematics and Natural Sciences

Universitas Lambung Mangkurat

PROGRAMME AND ABSTRACTS

Editor:

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Presented by:

Faculty of Mathematics and Natural Sciences

Universitas Lambung Mangkurat

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PREFACE

Dear colleagues,

On behalf of the conference committees, we are excited to invite you to join us at ***The 6th International Conference of Science and Technology* (ICST) SEMIRATA BKS PTN Barat Bidang MIPA 2023,** which is held in Banjarbaru, South Kalimantan, Indonesia on July 7-8th, 2023 as a hybrid conference. This conference is organized by the Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat and supported by 32 universities in Indonesia, which are members of BKS PTN Barat Bidang MIPA.

Our conference theme is "***Harmonizing People, Nature, and Culture through Scientific Collaboration***". Scientific collaboration means working together in a joint intellectual effort to produce knowledge and innovation for a common purpose or benefit. The collaboration outcomes from academic perspectives are identification of new leading-edge research areas, increased publications and citations opportunity, ability to evidence translation of academic research into enterprise, innovation, and commercialization, and increased capture of the research funding. The theme will be addressed through many unique and innovative lenses, and our keynote and invited speakers have stepped up to share their knowledge, experience, and expertise.

We encourage academicians, researchers, experts, and scientists in the mathematics and natural sciences field and those interested in attending this conference. Only through an exchange of the widest variety of research can we offer the best program and benefits to our members and nature through scientific collaboration.

We look forward to welcoming you to Banjarbaru, South Kalimantan, Indonesia. We hope you will join us to make **The 6th International Conference on Science and Technology (ICST)** a memorable event.

Sincerely yours,

Chair of Executive
Dewi Anggraini, S.Si., M.App. Sci., Ph.D.

SCHEDULE

The 6th International Conference of Sciences And Technology (ICST)

*"Harmonizing People, Nature, and Culture Through
Scientific Collaboration"*

Jum'at, 7 Juli 2023 *Friday, July 7, 2023*	
TIME (WITA)	**AGENDAS**
07.00 – 08.00	Registrasi Peserta *Participants' Registration*
08.00 – 08.05	**Pembukaan** ***Opening Ceremony***
08.05 – 08.15	Menyanyikan Lagu Indonesia Raya *Singing the Indonesian National Anthem, "Indonesia Raya"*
08.15 – 08.30	Penampilan Tari Tradisional Banjar: "Baksa Kembang" *Banjarese Traditional Dance Performance: "Baksa Kembang"*
08.30 – 08.40	Laporan Ketua Panitia *Committee Chairperson Report*
08.40 – 08.50	Sambutan Ketua BKS PTN Barat Bidang MIPA *Welcome speech by the Head of BKS PTN West Region*
08.50 – 09.00	Sambutan Rektor, Universitas Lambung Mangkurat, sekaligus membuka secara resmi kegiatan SEMIRATA 2023 *Welcome speech by the Rector, Universitas Lambung Mangkurat, as well as officially opening the SEMIRATA 2023*
09.00 – 09.10	*Do'a* *Prayer*
09.10 – 09.30	*Sesi foto* *Photo session*
	Pengumuman Hasil Kompetisi Mahasiswa *Announcement of Student Competition Results*
	Rehat *Coffee Break*
09.30 – 10.05	Pembicara Utama 1: Ir. Suharti, M.A., Ph.D *Keynote Speaker 1: Ir. Suharti, M.A., Ph.D* *Ministry of Education, Culture, Research, and Technology - Indonesia*
10.05 – 10.40	Pembicara Utama 2: Prof. Tim Roberts *Keynote Speaker 2: Prof. Tim Roberts* *School of Environmental and Life Sciences, The University of Newcastle - Australia* *Presentation Title:* *"Towards a Sustainable Future Through Micro-Collaborations".*
10.40 – 11.15	Pembicara Utama 3: Dr. Deden Rukmana *Keynote Speaker 3: Dr. Deden Rukmana* *Department of Community and Regional Planning, Alabama A&M University-USA* *Presentation title:* *"Framing the New Capital 'Nusantara' for Nation Building and Sustainable Development".*
11.15 – 11.50	Pembicara Utama 4: Prof. Rodiansono, S.Si, M.Si, Ph.D. *Keynote Speaker 4: Prof. Rodiansono, S.Si, M.Si, Ph.D.* *Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat – Indonesia* *Presentation title:* *"Advanced Heterogeneous Catalysts for Transformation of Biomass-Derived Oxygenated into High Value-Chemical Platforms".*
11.50 – 13.30	Istirahat, Solat, dan Makan Siang

	Break, Pray, and Lunch
13.30 – 16.50	Rapat Tahunan Dekan MIPA BKS PTN Barat Bidang MIPA *Annual Meeting: Deans of MIPA BKS PTN West Region*
13.30 – 16.50	Rapat Tahunan Ketua Jurusan/Ketua Program Studi *Annual Meeting: Heads of Departments and Study Programs*
13.30 – 16.50	Rapat Pengelola Jurnal *Annual Meeting: Journal Managers*

13.40 – 16.50	Sesi Paralel
	Parallel Sessions
	
	Room Onyx: Scope: Mathematics and Statistics; Physics and Its Applications; Computation and Simulation; Mathematics and Science Education
	
	1. *Invited Speaker: Prof. Setia Pramana, S.Si., Ph.D.*
	   Head of Data Processing and Analysis, Statistics Indonesia – Indonesia
	   Presentation title:
	   "Modernization of Official Statistics"
	
	2. *Invited Speaker: Dr. Eng. Imam Tahyudin, S.Si., M.Kom., M.M.*
	   Faculty of Computer Science, Amikom Purwokerto University - Indonesia
	   Presentation title:
	   "Stroke Analysis using Machine Learning Approach"
	
	Room Berlian: Scope: Chemistry and Environmental Sciences; Biology and Biodiversity; Biomaterials and Natural Products
	
	1. *Invited Speaker: Dr. Ir. Badruzsaufari, M.Sc.*
	   Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat - Indonesia
	   Presentation Title:
	   "Current Research on Nasalis larvatus and Its Fecal Bacteria Based on eDNA".
	
	2. *Invited Speaker: Dr. Sri Yani Purwaningsih, S.Si., M.Si.*
	   Faculty of Science and Data Analytics, Department of Physics, Institut Teknologi Sepuluh Nopember – Indonesia
	   Presentation title:
	   "Study of Nanostructures and Optical Properties of ZnO Films for Gas Sensor Materials Applications"
	
	Sesi Paralel Online
	Online Parallel Sessions
	
	1. *Invited Speaker: Prof. Ejeatuluchukwu Obi, Ph.D.*
	   Department of Pharmacology and Therapeutics, Faculty of Medicine, College of Health Sciences, Nnamdi Azikiwe University - Nigeria
	   Presentation Title:
	   "Heavy Metal Contamination of Herbal Supplements: Global Concern".
	
	2. *Bustang, S.Pd, M.Sc., Ph.D.*
	
	Online Room 1 : Scope: Mathematics and Statistics
	Online Room 2 : Scope: Mathematics and Statistics
	Online Room 3 : Scope: Physics and Its Applications; Computation and Simulation;
	*** Mathematics and Science Education***
	Online Room 4 : Scope: Chemistry and Environmental Sciences
	Online Room 5 : Scope: Biology and Biodiversity
	Online Room 6 : Scope: Biology and Biodiversity; Biomaterials and Natural Products

17.00	**Penutupan** *Closing Ceremony*
19.00-22.00	***Gala Dinner***
19.00 - 19.15	Sambutan Dekan Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Lambung Mangkurat

	Welcome speech by the Dean of Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat
19.15 – 19.25	*Do'a* *Prayer*
19.25 – 19.30	Penandatanganan MoU Kerjasama *Signing of MoU of Cooperation*
19.30 –22.00	Makan malam *Dinner*

Sabtu, 8 Juli 2023 - Karyawisata ***Saturday, July 8, 2023 - Field Trip***	
TIME (WITA)	**AGENDAS**
04.30-17.00	Karyawisata dengan tujuan sebagai berikut: *Field trip with the following destinations*: 1. Pasar Terapung Lok Baintan - *Lok Baintan Floating Market* 2. Soto Banjar: Kuliner Khas Banjarmasin - *Soto Banjar: Banjarese Typical Culinary* 3. UMKM Sasirangan Diyang Kinjut: Kain Tradisional Banjarmasin - *Micro, Small, and Medium Enterprises Sasirangan Diyang Kinjut: Banjarese Traditional Cloth* 4. Pasar Intan Martapura - *Martapura Diamond Market*

PROGRAMME

The 6th International Conference of Sciences And Technology (ICST)
Banjarbaru, July 7th 2023

Room Onyx (offline)
Scope: Mathematics and Statistics; Physics and Its Applications; Computation and Simulation;
Mathematics and Science Education

Moderator: Dr. Suryajaya

NO	TIME	PARTICIPANT	NAME	TITLE
	14.00 – 14.20	Invited Speaker-1 : Prof. Setia Permana, Ph.D		
	14.20 – 14.40	Invited Speaker-2 : Dr. Eng. Imam Tahyudin, S.Si, M.Kom.M.M		
1	14.40 – 15.00	FA-01	Dr. Open Darnius, M.Sc	Optimal Correlation Aggregation Algorithm As The Determinant For Peak Over Treshold Of Extreme Data
2		FA-02	Mulia Astuti	Study on Eigenvalue of 3-Uniform n-Regular 3-Partite hypergraph
3		FA-03	Ramya Rachmawati	A probabilistic dynamic programming approach for solving an inventory problem (Case study: Fertilizer stock)
4	15.00 – 15.20	FA-04	Dian Agustina	Spatial Structural Equation Modeling of Poverty Indicators in the South
5		FA-05	Arum Handini Primandari	Analysis of the Impact of a Pandemic on Indonesia's Economic Growth Using Dynamic Time Warping Techniques for
6		FA-06	Yuana Sukmawaty, M.Si	Identification of Climate Zones Based on Rainfall Conditions Using the K-Means Clustering
7	15.20 – 15.40	FA-07	Sri Wahyuningsih	Hybrid Model of Transfer Function and Neural Network to Forecast Reference Coal Prices
8		FA-08	Sudarningsih	Scanning electron microscopy and characterization of magnetic minerals suspended sediments from Citarum River, West Java, Indonesia magnetic
9		FA-09	Prof. Dr. Rakhmawati Farma, M.Si	Preparation and electrochemical performances of activated carbon derived from the midrib of Roystonea regia
10		FA-10	Elfi Yuliza	Simple Design of a Laboratory Scale Archimedes Screw Turbine
11	15.40 – 16.00	FA-11	Dr. Minarni, M.Sc	Lased Induced Fluorescence Imaging For Ripeness Detection of On Tree-Oil Palm Fresh Fruit Bunches
12		FA-12	Dr. Lizalidiawati, S.Si, M.Si	Identification Of Rip Current Zones In The Pantai Panjang Waters Of Bengkulu City

13		FA-13	Awitdrus	Arenga pinnata fibers-derived activated carbon for high performance of symmetrical supercapacitor
14		FA-14	Dr. Suryajaya, S.Si, M.Sc.Tech	Performa Of Activated Carbon From Water Chestnut (Eleocharis dulcis) AS Fe Adsorbent
15	16.00 – 16.30	FA-15	Ashar Muda Lubis	Ketahun Segment of Sumatran Fault System is creeping or locking; Insight from GPS inter-seismic deformation across the fault
16		FA-16	Tulus Joseph Herianto	Computation Analysis of Flow in a Round Pipe with Navier-Stokes Equations

Room Berlian (offline)

Scope: Chemistry and Environmental Sciences; Biology and Biodiversity; Biomaterials and Natural Products

Moderator: Hasrul Satria Nur, S.Si, M.Si

NO	TIME	PARTICIPANT	NAME	ARTICLE TITTLE
	14.00 – 14.20	Invited Speaker-1 : Dr. Ir. Badruzsaufari, M.Sc.		
	14.20 – 14.40	Invited Speaker-2 : Dr. Sri Yani Purwaningsih, S.Si., M.Si		
1		FB-01	Noer Komari	Mercury Binding Antioxidant Enzymes Of Oreochromis Niloticus: In Silico Evaluation
2	14.40 – 15.00	FB-02	Randy Saputra	Analysis of the Balangan River Pollution in Balangan Regency Based On the STORET Method and Pollution
3		FB-03	Rahmi, S.Pd., M.Si	Conversion Of Pp And Ldpe Type Of Plastics Into Liquid Fuel Using Pyrolysis Method
4		FB-04	Dr. Nurhayati, MSc	The Synthesis and Characterization of CaO Catalyst from Anadara Granosa Impregnated SiO2 from Coconut Husk Waste as Heterogeneous Catalysts for Biodiesel Production.
5	15.00 – 15.20	FB-05	Dr. Rahmat Gunawan, M.Si.	Ruthenium Complex and Metyl Dendrimer Compounds As Artificial Photosynthesis. Firts Principle Study for Renewable Energy
6		FB-06	Dr. Nurhasanah, M.Si	Characterization of Biosurfactants From Local Indigenous Microbes in The Sediments of Panjang Port Waters, Lampung
7	15.20 – 15.40	FB-07	Lenny Marlinda	Gasoil Range Hydrocarbons Product from Hydrocracking Rubber Seed Oil (Hevea brasilliensis) over Co-Ni/HZSM-5 Catalyst
8		FB-08	Assoc. Prof. Dr. Herman, M.Sc.	DNA Barkodes pada Maman (Cleome gynandra) Asal Provinsi Riau

9		FB-09	Anang Kadarsah, S.Si., M.Si.	Presence of Water Pollution Sources on Phytoplankton Abundance and Water Quality in Tamiyang Lake of Banjar Regency
10		FB-10	Prof.Dr. Abdul Razak, S.Si.M.Si	Nano-Etnosciences : Application Nanobubbles for Traditionaly Product in West Sumateras
11	15.40 – 16.00	FB-11	Dr. Jusmaldi, M.Si.	Biometric Aspects and Sex Ratio of the Ganges River Sprat (Corica soborna Hamilton, 1822) From Downstream Mahakam River, East Kalimantan
12		FB-12	Dr. Rr. Sri Catur Setyawatiningsih, M.Si	The Herpetofauna Diversity in Bina Widya Campus of Riau University
13		FB-13	Dr. Yusfiati, M.Si	Myometrium Structure Of Postpartum Rats Due To Administration Of Ethyl Acetate Fraction Of Pelawan (Tristaniopsis obovata Benn.)
14	16.00 – 16.20	FB-14	Dra. Titrawani, M.Si	Hematology Of White Rats (Rattus norvegicus Berkenhout, 1769) After Givingtraditional Herb, Communities Of The Melayu Lingga
15		FB-15	Dr. Ninik Nihayatul Wahibah, M.Si	Analysis of Nucleotide Binding Site-Leucine Rich Repeat Sequence of Liberica Coffee from Riau
16		FB-16	Dr. Mayta Novaliza Isda, MSi	The Addition Of Benzyl Amino Purine In The Formation Of Fields From Tembesu Seed Explants (Fagraea fragrans Roxb) On Murashige Skoog Media
17	16.20 – 16.40	FB-17	Ir. Bambang Hariyadi, M.Si., Ph.D.	Adaptation of Seed Germination and Growth of Putat (Barringtonia acutangula L. Gaertn) in Riparian Lake Habitat
18		FB-18	Putri Berliana	Study In Silico Of Anti-SARS-COV-2 and Anti-HIV Potential New Candidates From Alphitonia Species Using Plants Application
19		FB-19	Azidi Irwan, S.Si., M.S.i	Analysis of Limau Kuit Leaves Volatile Compounds Obtained by Soxhlet n-Hexane Extraction with GCMS
20	16.40 – 16.55	FB-20	Riryn Novianty, M.Si	Antidepressant activity of old areca nut n-hexane extract using Forced Swim Test Method In male mice (Mus Musculus) tested simultaneously

Online Room – 1
Scope: Mathematics and Statistics

Moderator: Dr. Muhammad Ahsar Karim

NO	TIME	PARTICIPANT	NAME	ARTICLE TITTLE
	14.00 – 14.40	Invited Speaker-1 : Prof. Ejeatuluchukwu Obi, Ph.D Invited Speaker-2 : Bustang, S.Pd, M.Sc, Ph.D		
1	14.40 – 15.00	NA-01	Muhammad Andra Firmansyah Faris, S.Stat	Implementation Of Binary Probit Regression Based On R-Shiny Interactive Web Application To Determine Status Of Stunted From Toddlers In South Kalimantan Province
2		NA-02	Andi Aulia Khairunnisa	The Application Of Sem-Pls In Determining Factors Affecting The Gender Development Index In Indonesia In 2020
3		NA-03	Febby Chindy Amelia Saputri	Intervention Model Analysis on the Number of Foreign Tourist Visits to Indonesia in the 2012-2023 Period
4	15.00 – 15.20	NA-04	Evy Sulistianingsih	Risk Analysis of Stock Portfolio Comprised of BBNI And BBCA using Monte Carlo Control Variates Value at Risk
5		NA-05	Muhammad Anshar, S.Mat	Mathematical Model Of Distribution Of Constituents In The Presidential Election With The Existence Of Mass Media
6		NA-06	Septri Damayanti, S.Si., M.Si.	Earthquake Frequency Data Modeling in Mentawai Islands Using Fuzzy Time Series Lee and Fuzzy Time Series Ruey Chyn Tsaur.
7	15.20 – 15.40	NA-07	Dr. Jose Rizal	The Probability Model of the Number of Earthquakes in the Sumatra Megathrust Zone
8		NA-08	Nur Maulida Assyifa	Factors that Affect Child Labour in South Kalimantan in 2021 Using Binary Logistic Regression
9		NA-09	Nur Salam.,S.Si.,M.Sc.	Application Of The Arima Method For Forecasting Coffee Production In South Kalimantan Province
10	15.40 – 16.00	NA-10	Tarisa Umairah	Arima Model Verification With Outlier Factors Using Control Chart (Case Study : Gross Domestic Product in Indonesia)
11		NA-11	Dewi Setyo Utami	Arima Time Series Modeling With The Addition Of Intervention And Outlier Factors (Case Study: Inflation Rate in Indonesia)
12		NA-12	Ratna Annisa Kumala Dewi	Intervention Analysis In Forecasting The Number Of Arrival Passangers At Syamsudin Noor Airport Banjarbaru

NO	TIME	PARTICIPANT	NAME	TITLE
13		NA-13	Dr. Syaripuddin, M.Si	Application of Quadratic Programming Using Wolfe Method on Portfolio Optimization
14	16.00 – 16.20	NA-14	Yuni Listiana	The Central Local Metric Dimension of Related Wheel
15		NA-15	Zulfia Memi Mayasari, M.Si	Some Characteristics of Cayley Graphs on $(Z_n\backslash\{0\}, \llbracket \bullet \rrbracket \_n)$ Group Subsets, n Prime
16		NA-16	Dra. Baki Swita, M.Sc	Super Edge Magic Total Labeling of B[(4,m),(3,n),2]-Cycle Books for m even and n=2
17	16.20 – 16.40	NA-17	Dr. Nilamsari Kusumastuti	Homorphic Ordering Of The Max-Plus Formal Polynomials And The Max-Plus Polynomial Functions
18		NA-18	Itsar Mangngiri	An Order-p Tensor Multiplication with Circulant Structure
19		NA-19	Yudhie Andriyana, M.Sc., Ph.D	Flexible noncrossing conditional quantile curves implemented to longitudinal observations
20	16.40 – 17.00	NA-20	Nada Agustina, S.Stat.	Application of the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) Model in Forecasting the Value of Indonesian
21		NA-21	Widya Kusuma Arum	Clustering Analysis Of Lecturer Profiles Using Gower Distance And K-Medoids Algorithm
22		NA-22	Napisah	Optimal Control of Dengue Fever Disease with Treatments and Vector Control
23	17.00 – 17.20	NA-23	Winda Adinda Tanjung, S.Stat	Cox Regression Analysis to Determine the Factors That Influence the Length Of Study Of S1 Students At The Faculty Of Mathematics And Natural Sciences, University Lambung Mangkurat

Online Room – 2
Scope: Mathematics and Statistics

Moderator: Selvi Annisa, S.Si., M.Si

NO	TIME	PARTICIPANT	NAME	TITLE
	14.00 – 14.40	Invited Speaker-1 : Prof. Ejeatuluchukwu Obi, Ph.D Invited Speaker-2 : Bustang, S.Pd, M.Sc, Ph.D		
1	14.40 – 15.00	NB-01	Yeni Rahkmawati, S.Mat., M.Si.	Inflation Forecasts for South Kalimantan Province Using ARIMAX Model with Calendar Variation Effect
2		NB-02	Selvi Annisa, M.Si	Rainfall Classification of Banjarbaru using Decision Tree Method

3		NB-03	Dewi Sri Susanti	A Spatial Modelling on The Prevalence of Stunting in Kalimantan, Indonesia
4		NB-04	Fuad Muhajirin Farid	Fertility Modeling of Women of Childbearing Age (WUS) During A Pandemic With Dummy Regression Analysis
5	15.00 – 15.20	NB-05	Dr. Mardiningsih, M.Si	Modelling of Combinatorial Optimization Graph Problem And its Aplications
6		NB-06	Anne Mudya Yolanda, S.Stat., M.Si.	Fuzzy C-Means and K-Means Algorithms in Clustering Green House Gas Missions in 2019 and 2020
7		NB-07	Wahyu Okta Perdana	Development of a Climate Prediction Model in ASEAN Based on Artificial Neural Network (ANN) with Backpropagation Algorithm
8	15.20 – 15.40	NB-08	Andriyani Setyaningsih	Optimal Control of The Mathematical Model Of Dengue Fever
9		NB-09	Abdullah Rifqi	Identification of Factors Affecting Underage Women Marriage Cases In South Kalimantan Using A Geographically Weighted Panel Regression Model
10		NB-10	Naomi Nessyana Debataraja	Implementation of Synthetic Minority Oversampling Technique in Random Forest for Imbalance Class Data
11	15.40 – 16.00	NB-11	Dr. Yulian Fauzi, S.Si., M.Si	Numerical Simulation Of The Tsunami Wave Propagation Model Using The Lax-Friedrichs Method
12		NB-12	Mariatul Qibtiah	Optimal Control Of Dengue Fever With The Influence Of Vaccination And Insecticide Administration
13		NB-13	Afifa Fitrianita	Application of the K-Means Consensus Clustering Method to the Clustering of Acacia auriculiformis Genes in Indonesia
14	16.00 – 16.20	NB-14	Bunga Mardhotillah, S.Si., M.Stat.	Pemodelan Indeks Kualitas Lingkungan Hidup Dengan Indikator Sumber Daya Lingkungan Menggunakan Multiple Indicators Multiple Causes Model
15		NB-15	Gustriza Erda, M.Si	Implementation of Logistic Regression-Based Selection Features to World Climate Change Data
16	16.20 – 16.40	NB-16	Prof. Ir. Sigit Nugroho, M.Sc., Ph.D.	The Disparity of Maternal and Neonatal Death Modeling in Sumatra Region Using Geographically Weighted Bivariate Negative Binomial Regression

NO	TIME	PARTICIPANT	NAME	TITLE
17		NB-17	Bayu Prihandono	Exploring Abstract Algebra Through Discovery: Leveraging Gap Software For Interactive Learning
18		NB-18	Azkia	Geographically Weighted Negative Binomial Regression Modeling to Describe Stunting Cases in The Barito Kuala, South Kalimantan
19		NB-19	Rahma Dina Nur Azizah	Predicting The Consumer Price Index in South Kalimantan Province Using Support Vector Regression Method
20	16.40 – 17.10	NB-20	Audinta Sakti Firmansyah	(λ, μ)-FUZZY SUBRINGS
21		NB-21	Gusti Muhammad Rosyadi	Generalized Ring and Homomorphism of Generalized Ring
22		NB-22	Annida Muallimah	Multi-Fuzzy Subgroup

Online Room – 3
Scope: Physics and Its Applications; Computation and Simulation; Mathematics and Science Education

Moderator: Triando Hamonangan Saragih, M.Kom

NO	TIME	PARTICIPANT	NAME	TITLE
	14.00 – 14.40		Invited Speaker-1 : Prof. Ejeatuluchukwu Obi, Ph.D Invited Speaker-2 : Bustang, S.Pd, M.Sc, Ph.D	
1		NC-01	Dr. Ari Sulistyo Rini, M.Sc	Performance of Sulphur-Doped ZnO Biosynthesized for 4- Nitrophenol Pollutant Photodegradation
2	14.40 – 15.00	NC-02	Dr. Rahmi Dewi, M.Si	Synthesis and Characterization of Optical Properties of Ferroelectric Thin Films 0,6BaTiO3-0,4BaZr0,5Ti0,5O3 dan 0,7BaTiO3-0,3BaZr0,5Ti0,5O3 Using the Sol-Gel Method
3		NC-03	Muchammad Farid, Prof. Dr, MS	Investigation of Landslide In The Ulu Manna District, South Of Bengkulu Based On Horizontal To Vertical Spectral Ratio Inversion
4	15.00 – 15.20	NC-04	Dr. Arif Ismul Hadi, S.Si., M.Si.	Analysis of Soil Site Classes Based on Microtremor Measurements in the South Bengkulu Region, Indonesia for Earthquake Disaster Mitigation
5		NC-05	Dr. Riska Ekawita	Infrared Application in Granular Flow Rate Measuring System

NO	TIME	PARTICIPANT	NAME	TITLE
6		NC-06	Prof. Dr. R. Tony Ibnu Sumaryada Wijaya Puspita, M.Si	The effect of shielding material density in muon tomography
7		NC-07	Rida Samdara	Study of Seismic Vulnerability In Kerinci Area Near Strike-Slip Siulak-Kerinci Segments Using Seismic Method
8	15.20 – 15.40	NC-08	Itqan Athaya Al Khalily S.Si	The Content of Lengkuas (Alpinia galanga L.) 'S Active Compound As An Inhibitor Of Er: A Molecular Docking Approach.
9		NC-09	Nafisah, S.Si	Effect of Kelakai (Stenochlaena Palutris) Extract on Organophosphate Pesticide Exposure: In Silico and In Ovo Cytotoxic Studies
10		NC-10	Zaiyan Ahyadi, S.T., M.Sc.	Design a four floors elevator simulator using Delphi
11		NC-11	Dewi Rahimah, S.Pd., M.Ed., Ph.D.	Pedagogical Guidance Provided in a Teacher Guide Accompanying a Grade 8 Mathematics Textbook Published for Supporting the
	15.40 – 16.00			Indonesian Independent Curriculum
12		NC-12	Maisarah, S.Pd.I., M.Pd	The Effect of Higher Education Gross Enrolment Rate on Human Development Index in Indonesia Using Regression Analysis

Online Room – 4

Scope: Chemistry and Environmental Sciences

Moderator: Rahmat Eko Sanjaya, M.Si

NO	TIME	PARTICIPANT	NAME	TITLE
	14.00 – 14.40		Invited Speaker-1 : Prof. Ejeatuluchukwu Obi, Ph.D Invited Speaker-2 : Bustang, S.Pd, M.Sc, Ph.D	
1		ND-01	Prof. Dr. Yetria Rilda, M.S	Mucor sp. (Fungal Philospheric) of Gambir Leaf Surface (Uncaria) as a Biosynthetic Mg-doped ZnO Nanorods Media for Antibacterial Applications
2		ND-02	Buty Kurnia Hamzani, S.Si	Microplastic Pollution in Surface Water and Sediment of Maninjau Lake in Agam, Indonesia
3	14.40 – 15.00	ND-03	Uce Lestari	Antioxidant Activity, Determination of Spf Value And Screening Phytochemical of Extract Ethanol Leaf Surian (Toona sinensis) In Vitro
4		ND-04	Musbahu Adam Ahmad	Calotropis gigantea Derived Carbon Dots For Breast Cancer Bioimaging
5	15.00 – 15.20	ND-05	Dr. Evi Maryanti, S.Si, M.Si	Mineralogical study of ocher as a pigment material from rock art of the Muna site using a synchrotron-based X-ray radiation technique

			ND-06	Dr.Dra.Charlena,M.Si	Variation of Sintering Temperature in the Synthesis of Fluorapatite Made from Snail Shells (Achatina fulica) Using the Sol-Gel Method
6					
7	15.20 – 15.40		ND-07	Dr. Intan Lestari S.Si, M.Si	Utilization of Low Cost Adsorbent HCl Activated Fly Ash For The Removal of Remazol Brilliant Blue
8			ND-08	Dr. Diah Riski Gusti, S.Si., M.Si	Corrosion Inhibition Efficiency of Mild Steel by Coffee Bean Husks Extract in Sulfuric Acid Solution on The Effect of Temperature
9			ND-09	Dr. Cut Fatimah Zuhra, S.Si., M.Si	Synthesis Of Schiff's Base from Breadfruit Starch (Artocarpus Altilis) Dialdehyde-Aniline and Antibacterial Activity Tests
10	15.40 – 16.00		ND-10	Rima Dwisani	Biofloc-Based Catfish Cultivation in Fishpond and Its Effect on Dynamics of Water Quality
11			ND-11	Dr. Mita Rilyanti, S.Si., M.Si.	Synthesis of Ni/H-Analcime from Sugarcane Bagasse Ash Silica as A Catalyst for Isomerization Glucose
12			ND-12	Prof. Dr. Refilda, M.S.	Physicochemical Analysis of Compost from Vegetable and Fruit Waste and Its Application to Hydroponic Ipomoea reptana Plant
13	16.00 – 16.20		ND-13	Dr. Yefrida	Phenolic, Flavonoid Content, Antioxidant Activity Of Peronema canescens Leaf Ethanol Extract And Its Correlation With Ftir Spectrum Chemometrically
14			ND-14	Mulyono, S.Si., M.Si., Ph.D.	Alkaloid-Producing Bacterial Isolate Demonstrated Antimicrobial Activity against Pathogenic Pseudomonas aeruginosa and Staphylococcus aureus from Lampung Area
15			ND-15	Husna Syaima, M.Si.	Green synthesis of Silver Nanoparticles Using Ketapang Leaf Extract (Terminalia Catappa L.) as Bioreductor
16	16.20 – 16.40		ND-16	Dr. Anthoni Batahan Aritonang, M.Si	Fe-TiO2/SiO2 as a Photocatalyst for the Production of Fatty Acid Methyl Ester (FAME) from Used Cooking Oil
17			ND-17	Anggita Nurfitriani	Selective Conversion Of Furfuryl Alcohol To 1,5-Pentanediol Using Bimetallic Ru-Sn/TiO2 (R)-ZrO2 Catalyst
18			ND-18	Maida Denasyia Ismail	Testing The Activity of Glucose Uptake by Yeast Cells From Ethanol Extract of Rangoon Creeper (Combretum indicum L.)

Moderator: Sasi Gendro Sari, M.Sc

NO	TIME	PARTICIPANT	NAME	ARTICLE TITTLE
	14.00 – 14.20		Invited Speaker-1 : Prof. Ejeatuluchukwu Obi, Ph.D Invited Speaker-2 : Bustang, S.Pd, M.Sc, Ph.D	
1		NE-01	Prof. Dr. Dewi Indriyani Roslim, M.Si.	Analysis of Two DNA Barcodes in Pucuk Seminyak from Riau
2	14.20 – 14.40	NE-02	Dr. Gunawan	Microhabitat Profile And Phytochemical Content Of Rambai (Baccaurea motleyana Mull. Arg.)
3		NE-03	Rahmawati	Identification of Bacteria and Fungi from Rhizosphere in Siam Citrus (Citrus nobilis var. microcarpa) Plantations Singkawang City
4		NE-04	Jantje Wiliem Souhaly	Screening of Active Compounds Piper aduncum Potentially as Anticancer by Targeting in Apoptosis
5	14.40 – 15.00	NE-05	Prof. Dr. Fitmawati, M.Si	Ethnophytomedical Study in Traditional Medicine Systems in Cerenti, Kuantan Singingi, Riau Province, Indonesia
6		NE-06	Rasuane Noor, M.Sc.	Clarity Level Of Plant Tissue Preparations Use Natural Dye: Vitis Vinifera L. Curcuma Longa Linn, And Dracaena angustifolia Roxb
7		NE-07	Hasan Basri, S.Si., M.Si	Effect Hibiscus sabdariffa calyces on Quality Quail Egg Physical (Coturnix coturnix japonica)
8	15.00 – 15.20	NE-08	Diah Wulandari Rousdy	Protective Effect of Cayratia trifolia L. Domin. Fruit Extract on Oxidative Stress and Histological Change in Physical Stress-Induced Mice
9		NE-09	Andifa Anugerah Putra	Intramolecular Profiling of Chromate Reductase in Chromium-Resistant Bacteria from South Borneo's Serpentine Soil: Assessing Bioremediation Effectiveness
10		NE-10	Dr. Yulminarti, M.Si	Composition And Diversity Of Dragonflies In The Riau University Campus Area
11	15.20 – 15.40	NE-11	Dr. Siti Fatonah, M.P	Assessment of Damage and Vulnerability of Mangrove Forests in Sungai Apit, Siak, Riau
12		NE-12	Iga Permata Hany, S.Si	Somatic Embryos Induction of Dendrobium discolor Added with 2,4- Dichlorophenoxyacetic
13	15.40 – 16.00	NE-13	Millania Putri Shayen, S.Si	Effect of Nano Extract Padina minor as Biostimulant on Vegetative Growth of Soybeans (Glycine max (L.) Merr.)

NO	TIME	PARTICIPANT	NAME	ARTICLE TITTLE
14		NE-14	Kurniadi Ilham, M.Si.	Immunohistochemical Analysis of Laminin in the Gonads of Hawksbill Sea Turtles (Eretmochelys imbricata Linn)
15		NE-15	Prof. Dr. Morina Adfa, S.Si., M.Si	The Potential of Teloschistes flavicans growing in Bengkulu as an Antibacterial Against Staphylococcus epidermidis
16		NE-16	Dr. Dwita Oktiarni, S.Si., M.Si	The isolation of Klebsiella variicola's cellulase from Macrotermes gilvus gut in Indralaya Peatlands, Indonesia
17	16.00 – 16.30	NE-17	Salbella Dwi Utari (Mahasiswa)	The Potential of Black Soldier Fly Prepupa Oil (Hermetia Illucens L.) On Wound Healing In Mice (Mus musculus
18		NE-18	Dr. Jani Master, M.Si.	Analysis of Coverage and Distribution of Melastoma malabathricum Invasion in Way Kambas National Park
19		NE-19	Muhammad Syukri Fadil, M.Si	Effect of the Methanol Extract of Dragon Scales Leaves (Drymoglossum piloselloides [L.] Presl.) on

Online Room – 6

Scope: Biology and Biodiversity; Biomaterials anda Natural Product

Moderator: Gusti Atika Urfa, M.Sc

NO	TIME	PARTICIPANT	NAME	ARTICLE TITTLE
	14.00 – 14.20		Invited Speaker-1 : Prof. Ejeatuluchukwu Obi, Ph.D Invited Speaker-2 : Bustang, S.Pd, M.Sc, Ph.D	
1		NF-01	Prof. Dr. Miswar Budi Mulya, M.Si	The Distribution, Density And Growth Patterns Of Green Shellfish (Perna viridis) In Putra Deli Beach At Deli Serdang Regency, North Sumatera
2	14.20 – 14.40	NF-02	Dr. Yurnaliza, S.Si., M.SI	Screening of Phosphate-Solubilizing Fungi from Oil Palm Rhizosphere
3		NF-03	Dr. Kusuma Handayani, S,Si, M.Si	Identifikasi Protein Toksin Bacillus Thuringiensis Asal Kebun Raya Liwa Kabupaten Lapung Barat Menggunakan Metode Sds Page
4		NF-04	Rochmah Agustrina, Ph.D.	Toxicity of methanol extract from kitolod (Hippobroma longiflora (L.) G. Don) leaves and stems to mortality rate of cocoa mealybug (Planococcus minor Maskell., Hemiptera: Pseudococcidae)
5	14.40 – 15.00	NF-05	Ervinda Yuliatin, S.Si., M.Si	Changes in rhizosphere bacteria community profiles within degraded forest, Berambai, East Kalimantan
6		NF-06	Gina Dania Pratami, M.Si	Antifungal Activity Test of Fresh Extract and Simplisia Kitolod Leaves (Laurentia Longiflora (L.) Peterm.) on The Growth of Fusarium oxysporum in vitro
7	15.00 – 15.20	NF-07	Dr. Tanto Budi Susilo	Fuzzy Logic of Formation Early of Language: Specstroscopy-Pneumatics Hb and H. sapiens of Psychis in Cave LB1

8		NF-08	Rinta Dwi Takarini	Study of Morphometric and Meristic Characters of Papuyu Fish (Anabas testudineus Bloch 1972) in South Kalimantan
9		NF-09	Dr. Nuning Nurcahyani, M.Sc.	The Toxicity Test of Sargassum duplicatum Ethanol Extract and Taurine Against Artemia salina
10	15.20 – 15.40	NF-10	Sri Martina Wiraswati	Determination of antifungal mechanisms from rice phyllosphere bacteria againts Pyricularia oryzae race 173
11		NF-11	Rina Falhiyah	Variety of Ferns in the Grand Forest Park Sultan Adam Mandiangin
12		NF-12	Khairun Amalia	Types of Moss in Sultan Adam Mandiangin Grand Forest Park Area
13		NF-13	Dr. Wahyu Supriyati, S.Hut.,M.P.	The Effect of Site On Physical Properties Of Gelam Wood (Melaleuca Cajuputy)
14	15.40 – 16.00	NF-14	Annisa Elcentia Fajarwati, S.Si	A Rapid Identification of Bioactive Metabolites in Water Fraction of the Sponge Aaptos sp. Using Liquid Chromatography-Mass Spectrometry
15		NF-15	Prof. Salprima Yudha S	In-situ Generated CuO/SiO_2 from Oil Palm Leaves as a Silica Source and Copper Nitrate
16		NF-16	Frastica Deswardani, S.Si., M.Sc.	Characterization of Calcium Carbonat ($CaCO_3$) from Pearl Shell (Pinctada Maxima) of Lombok as Raw Material for Thermochemical Energy Storage (TCES)
17	16.00 – 16.20	NF-17	Nur Aisyah Nuzulia	Synthesis and Characterization of Chicken Eggshells Based-Fluorapatite Using Sol-Gel Method
18		NF-18	Dr. Sovia Lenny, M.Si	Isolation of Phenolic Compounds From Bisbul Leaves (Diospyros discolor Willd.)

ABSTRACTS

The 6th International Conference of Sciences And Technology (ICST)

"Harmonizing People, Nature, and Culture Through Scientific Collaboration"
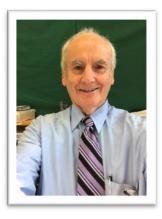
KEYNOTE SPEAKERS

07 – 08 July 2023

Emeritus Professor Tim Roberts
School of Environmental and Life Sciences, The University of Newcastle – Australia
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Research Interests: *Microbiology, Immunology, Conservation, Sustainability*

Towards a Sustainable Future Through Micro-Collaborations

Abstract

Islands such as Kalimantan and Australia are by their isolated nature unique in terms of biodiversity. Long term isolation has led to unique evolutionary forces that have resulted in the emergence of highly specialised species often with entirely new characteristics. Unique species found nowhere else in the world. The isolation of such islands also makes them extremely vulnerable to introduced exotic biota and natural hazards.

With population growth and contact from the outside world the sustainable nature of island ecosystems is under extreme pressure, whether from agriculture, natural resources exploitation, ecotourism, or industrialisation. History shows us that as new groups of humans arrive on an island, change becomes inevitable, rare and valuable natural commodities such as timber, spices, minerals and water become economic commodities on the world market and with this exploitation comes population growth and natural capital destruction.

Through the lens of my research on environmental sustainability, rehabilitation of mined land and my collaborations with Lambung Mangkurat University I will present the argument for the positive value of one-on-one collaborations in moving us to a sustainable future. The UN 2030 Sustainable Development Agenda has given us a roadmap to follow to achieve sustainability in all its guises (economic, social and environmental). The lessons etched in the landscapes of Kalimantan and Australia show us how much there is to do.

Keywords: *conservation, sustainability, bekantan, mining, rehabilitation, partnerships*

Dr. Deden Rukmana
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Framing the New Capital 'Nusantara' for Nation Building and Sustainable Development

Abstract

Capital cities play an important role in a country, including the center of political and economic power and government administration. Moving a capital city is financially demanding, affecting many sectors and redefining the identity of a nation. Many countries relocating their capitals in the past five decades were driven by various factors. Hidden agendas can undermine the well-constructed vision and goals of capital relocation. The hidden agenda refers to unspoken goals and may not be widely accepted by international norms and general principles.

President Joko Widodo announced the decision to relocate Indonesia's capital from Jakarta to East Kalimantan in August 2019. The parliament passed a new national capital law in February 2022, and shortly after, President Widodo named the new capital 'Nusantara.' What are the underlying factors for the capital relocation from Jakarta to Nusantara? Are there hidden agendas in Indonesia's capital relocation? Are the visions of the new capital realistic and relevant to the visions of Indonesia's founders? This paper examines these questions with the frameworks of nation-building and sustainable development. Jakarta's persistent urban problems, including traffic congestion and floods, are examined. Various reports and studies of Jakarta's transportation, land use, environment and other development issues are collected and reviewed. The plan and design of the new capital are also scrutinized.

This paper argues that the new capital can become a global role model in building a new capital that promotes sustainability and growth. Nusantara is not just being built for Indonesians. It is being built for the world. That is why Indonesia's capital relocation from Jakarta to Nusantara must succeed. The paper also discusses some challenges and obstacles that the Government of Indonesia must address to create a sustainable, thriving and livable new capital.

Keywords: *Indonesia, capital relocation, nation-building, sustainable development, and urban planning*

Prof. Rodiansono, S.Si., M.Si., Ph.D

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Research Interests: Heterogeneous catalysis for biomass conversion, bimetallic catalysis, hydrogenation/ hydrogenolysis reactions of biomass-derived platforms (furfural, levulinic acid, and bio-oil), and fatty acids

Advanced Heterogeneous Catalysts for Transformation of Biomass-Derived Oxygenated into High Value-Chemical Platforms

Abstract

The transformation of biomass-derived oxygenated compounds into high value-chemical platforms by means of heterogeneous transition metal-based catalysts have attracted extensive attention due to their unique (chemo) selective behaviour.[1] There are two common approaches for the control of chemoselective behaviour of heterogeneous transition metal-based catalysts; first, diluting the metal active with the second electropositive metals, and second, dispersing the metal on the support which has strong interaction with the metal or metal oxides.[2,3] Herein, we describe our advanced works on the development of synthetic procedure bimetallic nickel and ruthenium-based catalysts both bulk and supported under mild conditions. This synthetic approach offers easy process, cost-effective, and eco-friendly procedure and wide applications for a) chemoselective hydrogenation of unsaturated ketones and aldehydes, b) hydroconversion of C5-furans to bio-based pentanediols, and c) hydroconversion of carboxylic acids into high added-value chemicals. The structure-activity relationship based on the spectroscopic studies using XRD, TEM, XANES, in-situ FTIR, NH3-TPD, N2- and H2-adsorption, and kinetic reaction studies are discussed systematically.

Keywords: heterogeneous catalysis, bimetallic system, biomass conversion, oxygenate compounds, chemical platforms.

The 6ᵗʰ International Conference of Sciences And Technology (ICST)

*"Harmonizing People, Nature, and Culture Through
Scientific Collaboration"*

INVITED SPEAKERS

07 – 08 July 2023

Prof. Setia Pramana, S.Si., Ph.D.
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Modernization of Official Statistics

Abstract

Official statistics serve as a basis for decisions, for example, for politicians and policy makers: democratic societies cannot function properly without a solid basis of reliable and objective statistics. In the human centered society data is the key and need to be provided in real-time, granular, relevance, agile, coherence, and independent. Official statistics, as the main base of policy making need be modernized to meet the requirements. National statistics offices in collaboration with other government and international agencies, academics from multidisciplinary science and communities have to embrace advanced technologies in transforming the statistics production. Several initiatives of using new data sources such as big data are discussed. Mobile Positioning Data have been used to produce different demographics and tourist statistics. Satellite imageries have be utilized from poverty mapping, agricultural and environmental statistics. Furthermore, web crawling data, social media, and online news can be also used to complement the official statistics. Several statistics infrastructure and machine learning methods implemented in official statistics production based on big data are discussed.

Keywords: *Artificial intelligence, big data, remote sensing, mobile phone data*

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Research Interests: Artificial Intelligent, Machine Learning, Decision Support System, Internet Of Things (Iot)

Stroke Analysis using Machine Learning Approach

Imam Tahyudin*, Edi Winarko, Hidetaka Nambo, Eko Winarto, Windiya Ma'arifah, Arif Munandar, Andhika Rafi Hananto

Abstract

Objective and Research Questions: A stroke can occur due to multiple factors, such as hypertension, dizziness, and lack of oxygen to the brain. The symptom of dizziness, an indicator of a stroke, is often disregarded. Neglecting stroke symptoms can lead to sudden death or Sudden Cardiant Death (SDC). Although health checks for stroke are relatively simple, people lack information on early stroke detection. Timely and accurate stroke treatment is crucial as there is a narrow window of opportunity to manage it. Furthermore, the rehabilitation process must be evaluated for both recovered and deceased stroke patients. This study aims to analyze the early detection of stroke, assess the rehabilitation process and predict the mortality risk of stroke patients using machine learning algorithms.

Data Analysis: The study will use MyRisk_Stroke Calculator to evaluate the risk of stroke and a forward chaining expert system to analyze the rehabilitation process based on indications. Moreover, the random forest algorithm, support vector machine, Gradient boosting, and Xtreme Gradient Boosting (XG Boost) will be utilized to predict the mortality risk of stroke patients.

Findings/Observations/Arguments: The results indicate that the average risk of stroke detection is approximately 30% for the next ten years. Additionally, the study successfully developed an expert system to diagnose the stroke type and therapy based on indications. The XG Boost algorithm was the most accurate in predicting the mortality risk of stroke patients in RSUD Banyumas (public hospital), with an accuracy of 84%.

Keywords: Stroke, early detection, rehabilitation process, mortality risk, machine learning

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Current Research on the Nasalis larvatus of South Kalimantan and Its Faecal Bacteria Diversity Base on e-DNA

Badruzsaufari*, Rani Sasmita, Amalia Rezeki

Abstract

Proboscis monkey (Nasalis larvatus Wurmb.) is endemic to the island of Kalimantan and enlisted as an endangered species according to the IUCN and CITES convention. The Indonesian Government regulation and natural habit of the monkey limits access to obtain its genetic and physiological information. Environmental DNA (e-DNA) taken from the monkey faecal offers alternative non-invasive methods. This research aims to analyse proboscis monkey diversity base on the DNA sequence of mitochondrial cytochrome c oxidase II (CoxII), to characterize the whole mitochondrial genome sequence (mtWGS) and to analyse diversity of gastrointestinal bacteria of the monkey. Fresh fecal samples for mtDNA analysis were collected from proboscis monkey groups in Curiak island and Bakut island of Barito river, Sahabat Bekantan Indonesia (SBI) sanctuary, Rantau of Tapin Regency, and Tandilang of Hulu Sungai Tengah Regency. The DNA was extracted from samples using Genomic DNA extraction Zymo Fecal & Soil Extraction Kit. The isolated DNA from all group, except from SBI sanctuary, was amplified with CoxII primers. The amplicons were cloned to pTA2 vector and sequenced by Sanger method. The sequences were then analysed with DNAsp, Popart, and Mega11 for haplotype diversity, network and phylogenetic analysis, respectively. The sequence of mitochondrial DNA genome obtained from e-DNA sample of Rantau using long read technology, Oxford Nanopore Technology and characterized with Geneoius Prime Software. The 16S rRNA gene of extracted e-DNA from Barito River and SBI sanctuary samples were sequenced by high-throughput sequencing platform using IonS5TMXL platform sequencing and subsequently subjected to OTU and diversity analysis. Eight of of CoxII gene DNA sequences were obtained and consisted of 6 haplotypes. The haplotype (Hd) and nucleotide (π) diversities were 1.000 and 0.36190, respectively. A median-joining network identified 2 clusters of haplotypes including 1 haplotype from Sabah/Sarawak that consistent with phylogenetic tree. The complete genome of proboscis monkey mitochondria obtained was 16570 bp in size. Metagenomic analysis of three sample groups, i.e. Bakut, Curiak, and SBI, identified averagely 110916 tags and 1715 OTUs that belong to 10 bacterial phyllum and 35 genus of all samples. The genus abundance and diversity within the groups were relatively similar, but there are a quite dissimilarity among the groups.

Keywords: *e-DNA, non-invasive, diversity, metagenomic, metabarcoding, proboscis*

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Research Interests: Corrosion, Metal Oxide Semiconductor, Sensor Gas, Thin Films

Study of Nanostructures and Optical Properties of ZnO Films for Gas Sensor Materials Applications

Sri Yani Purwaningsih*, Mobin, Triwikantoro, Suminar Pratapa, Darminto

Abstract

The synthesis of ZnO nanoparticles powder in aqueous solution containing zinc acetate dehydrate, hydrochloric acid and ammonium hydroxide by co-precipitation method has been carried out. The powder was synthesized at a reaction temperature of 60 - 85 ° C and the pH of the solution was varied in the range 8 - 10 with a heating time of 6 hours. Nanometer-sized pure ZnO powder was obtained without further calcination. The characterization of ZnO powder from the co-precipitation process included DTA-TGA thermal analysis testing, Fourier Transform Infra-Red (FTIR), x-ray diffraction (XRD), electron microscopy (SEM) equipped with energy dispersive x-ray spectrometer (EDX), and transmission electron microscope (TEM). Quantitative analysis of the weight fraction of the phase formed and the crystal size was also carried out by utilizing the output parameters of the Rietveld and MAUD refinement methods. From the XRD profile, it was found that the powder crystal size ranged from 18 - 132 nm at various pH values of the solution. Based on the results of thermal analysis, the formation of stable ZnO occurs at a temperature of 300 °C. Microstructure studies show that the particle size increases with the pH value. Nanorods are spherical, flower-like and confirmed by SEM images by controlling the reaction rate.

ZnO nanoparticle powder with the smallest crystal size was used as a sensitive gas layer dissolved in ethyl cellulose and terpineol followed by a deposition process to grow the ZnO film on a glass substrate with spin-coating. The effect of annealing temperature on ZnO nanostructured films was investigated on the structure, morphology, and optical properties of the films characterized by XRD, SEM, UV-vis spectrometer, and photoluminescence (PL) spectrometer. Based on the structural study, it shows that the ZnO film deposited on the glass substrate is polycrystalline with a hexagonal wurtzite structure. The x-ray diffraction data showed better crystallinity in the crystal plane 101 for films annealed at 300 °C compared to other ZnO films. The average grain size increased from 31 nm to 36 nm with increasing annealing temperature. The bandgap energy is about 3.4 eV for the film when it is manufactured and varies from 3.25 - 3.18 eV as the annealing temperature increases. The PL results show weak ultraviolet emissions and relatively wide visible emissions associated with various structural defects in the ZnO film, with oxygen void and zinc insertion being the main factors affecting the electronic properties of the ZnO nanoparticle film.

Keywords: ZnO nanoparticle; ZnO films; crystal structure; nanostructures; optical properties; gas sensor materials

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Heavy Metal Contamination of Herbal Supplements: Global Concern

Abstract

This paper explores the presence of heavy metal contamination in herbal supplements. World Health Organization (WHO) estimates that 80 percent of the world's population relies on the herbal supplements as their primary medical intervention. The demand for herbal supplements has grown due to their holistic health approach, perceived safety, and cultural significance. To ensure quality, measures such as eliminating contaminants, maintaining ingredient levels, and adhering to regulations are essential. Heavy metals like lead, mercury, cadmium, arsenic, and chromium can accumulate in plants used for supplements, posing health risks when consumed. Quality control should include monitoring and controlling heavy metal contamination in raw materials and regular testing. Pollution from soil, water, and air sources contributes to heavy metal contamination. Ingesting heavy metals can cause organ damage, neurological disorders, cancer, cardiovascular issues, and reproductive/developmental problems. Pregnant women, children, and the elderly are especially vulnerable. Robust quality control measures are necessary to ensure the safety and efficacy of herbal supplements, protecting consumers' well-being, particularly those at higher risk of heavy metal toxicity.

Keywords: *heavy metal contamination, herbal supplement, quality control*

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Assessment and Task Design in School Mathematics: A Perspective from RME Theory

Abstract

Assessment and task design are at the heart of effective mathematics teaching and learning. However, most of the problems currently used in the assessment and task design within school mathematics, particularly in Indonesia, are categorized as bare problems in which mathematics problems are presented without meaningful context. Many studies have shown that the use of bare mathematics problems is not really supporting the growth and development of students' mathematical thinking. This raises the need to design meaningful mathematical tasks that is in line with the prior knowledge of students and also support their mathematical development. In my presentation, I will talk about the examples and characteristics of meaningful mathematical tasks, present some of the student works when working on these tasks and discuss these mathematics tasks from the perspective of Realistic Mathematics Education theory.

Keywords: *RME theory, assessment, task design, mathematics*

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ORAL PRESENTATION

07 – 08 July 2023

A. MATHEMATICS AND STATISTICS

IMPLEMENTATION OF BINARY PROBIT REGRESSION BASED ON R-SHINY INTERACTIVE WEB APPLICATION TO DETERMINE STATUS OF STUNTED FROM TODDLERS IN SOUTH KALIMANTAN PROVINCE

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Abstract

Stunting is a nutritional problem in children under five years old which results in the condition of toddlers having body length not in accordance with their age. This issue needs more attention by countries in the world because it can have detrimental impact on the life of youth generation. Majority of developing countries have not been able to overcome the children who stunted. Indonesia, with a national stunting prevalence rate of 21.6% in 2022. The Indonesian government has a mission to accelerate stunting handling to prevalence rate of 14% in 2025. Making it happen must be supported by researchers, health facilities and government. This study aims to determine the characteristics of stunting toddlers in South Kalimantan Province, the factors that influence it using binary probit model and create an interactive web application to detect stunting toddlers. The results is the characteristics of stunting toddlers dominated by toddlers without exclusive breastfeeding. The factors are toddler sex, mother's education level, exclusive breastfeeding, sanitary quality, economic status and birth weight. Although antenatal care / K4 has no significant effect, it must get deeper attention in the future. The binary probit model in this study was used as a predictive and case classification tool with accuracy value of 67%. The end of this study was built an app that works online and offline, serves to suspect stunting toddlers on the basis of R-Shiny. The web application titled "Uma di Lanting" which stands for Upaya Mahasiswa Deteksi Dini Lawan Stunting.

Keywords: Stunting, exclusive breastfeeding, Binary Probit Regression Analysis, R-Shiny Interactive Web Application.

PENERAPAN SEM-PLS DALAM MENENTUKAN FAKTOR YANG MEMPENGARUHI INDEKS PEMBANGUNAN GENDER DI INDONESIA TAHUN 2020

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Abstract

The success of development depends on the balance of women's and men's participation in all aspects of life. This can be seen through the index of achievement of basic human development capabilities by taking into account gender inequality. In this study, the variables of the Gender Empowerment Index, Health, Education, and Decent Living Standards were assumed influence on the Gender Development Index. Gender inequality still occurs in various regions in Indonesia, both from differences in development, human resources, and regional potential and other characteristics. Using the Structural Equation Modeling Partial Least Square (SEM-PLS) the results of the study obtained that the Gender Empowerment Index and Education variables have a significant effect on Gender Development Index.

Keywords: SEM-PLS, Gender Development Index, Gender Empowerment Index, Helath, Education, Decent Living Standards.

INTERVENTION MODEL ANALYSIS On The NUMBER of FOREIGN TOURIST ViISITS To INDONESIA in The 2012-2023 PERIOD

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Abstract

Tourism is currently one of the important factors in improving the country's economy. The tourism sector provides positive benefits because it can increase employment opportunities and also the country's productivity. The strategic geographical position makes Indonesia an attractive country to visit, both for domestic and foreign tourists. Visits of foreign tourists to Indonesia have always increased from 2012-2019, but in February 2020 the number of visits decreased quite drastically due to the impact of Covid-19. In this study, intervention analysis was used to examine data on the number of foreign tourist visits in Indonesia. Based on the analysis results, it is known that the best SARIMA model is ARIMA(1,1,0)(1,0,0)12. Through the residual response to the intervention, it is indicated that the intervention that occurred was using the step function. The intervention model formed is ARIMA(1,1,0)(1,0,0)12 b=0, s=1, and r=0 by using the model $Z_t = (-0.000344B)S_t^{(98)} + \frac{a_t}{(1-0.557252B^{12})(1+0.480637B)(1-B)}$. With the selected model, forecasting is carried out for the next 2 periods. The forecast results with the intervention model show that the number of foreign tourist visits to Indonesia has increased. When a comparison is made between the original data and the forecasting data of the intervention model, it is known that the MAPE obtained is 9.2%, which means that the forecasting results are very good.

RISK ANALYSIS Of STOCK PORTFOLIO COMPRISED Of BBNI And BBCA USING MONTE CARLO CONTROL VARIATES VALUE At RISK

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Abstract.

The benefits of investing in stocks can be obtained from the return value generated based on changes in stock prices. However, besides providing potential profits, stock investment also has potential risks caused by the uncertainty of stock price changes. Value at Risk using the Monte Carlo Control Variates approach (MCCV VaR) is one of the VaR methods used to estimate the maximum loss with a certain confidence level and period. MCCV VaR uses the control variates technique, one of the reduction techniques in the Monte Carlo method, to improve the efficiency and accuracy of VaR estimation. This study aims to analyze the risk of a portfolio stock indexed in the LQ45 with MCCV VaR. In addition, this study also analyzes the performance by comparing the MCCV VaR with Standard Monte Carlo VaR. The data used in this study is the closing price of PT Bank Central Asia Tbk (BBCA) and PT Bank Negara Indonesia Tbk (BBNI) from November 1, 2021, to October 31, 2022. The results show that MCCV VaR, in this case, is Rp. 1.941.619, and the variance is 0.00000305 in the 200th simulation. Whereas the Monte Carlo VaR is Rp. 2.109.449,00, and the variance is 0.0000030 on the 1000th simulation. These results are aligned with the previous research claim that the MCCV is able to reduce variances faster than the Monte Carlo standard so that the MCCV VaR is more accurate and efficient compared to the Standard Monte Carlo VaR.

Keywords: Control Variates, Monte Carlo, simulation, portfolio, loss

MATHEMATIC MODEL Of CONSTITUENT DISTRIBUTION In PRESIDENTIAL ELECTION WITH THE EXISTENCE Of MASS MEDIA

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Abstract

The presidential election is the process of selecting people to fill the presidency, in Indonesia direct presidential elections have been held since 2014. The popularity of a candidate is affected by exposure of news from the mass media. News from the mass media can spread from one individual or group to another, thus it can influence the behavior of a constituent, and an epidemiological model can be used. The purpose of this research was to explain the formation of the model, determine the equilibrium point, analyze the stability at the equilibrium point, performing a simulation, and determine the numerical solution. This research was carried out firstly by making the assumptions used in the formation of the model, then determining the equilibrium point of the model. After that, the stability of the equilibrium point will be analyzed by linearizing the model so that the Jacobian matrix was obtained, determining the eigenvalues of the Jacobian matrix, performing a simulation, and determine the numerical solution using the parameters of the 2014 presidential election results and with the fifth order Runge-Kutta method. The result of this study was the formation of two a mathematical model for the distribution of constituents in the presidential election with the existence of mass media, namely when the proportion of constituents affected by positive news is zero ($\varepsilon = 0$) and non-zero is zero ($0 < \varepsilon < 1$). Based on this model when $\varepsilon = 0$, two equilibrium points were obtained, namely the equilibrium point free of constituents supporting political figures (E) and the equilibrium point of constituents supporting political figures (E_1). Then, based on the model when $0 < \varepsilon < 1$, the equilibrium point of the political figure supporting constituents (E^*) is obtained. From the stability analysis of the equilibrium point E and equilibrium point E^*, local asymptotic stability was obtained, and from the numerical simulations, it was obtained that the difference in the vote acquisition.

Keywords: presidential election, mass media, Runge-Kutta

EARTHQUAKE FREQUENCY DATA MODELING
IN MENTAWAI ISLANDS USING FTS LEE AND FTS RUEY CHYN TSAUR

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Abstract.

The Fuzzy Time Series (FTS) model was first studied by Song and Chissom based on the theory of fuzzy sets and the concept of linguistic variables and their applications discovered by Zadeh. Fuzzy Time Series has several models, namely Fuzzy Time Series Lee, Fuzzy Time Series Ruey Chyn Tsaur, and so on. In this study, we will model earthquake frequency data in the Mentawai Islands from 1970 to 2022 using Lee's Fuzzy Time Series and Ruey Chyn Tsaur's Fuzzy Time Series. Based on the accuracy of forecasting measurements using MAPE and MSE in both models, it was found that Lee's Fuzzy Time Series model had a MAPE value of 37.511% and an MSE of 27.073. And in the Ruey Chyn Tsaur Fuzzy Time Series model, the MAPE value is 27.051% and the MSE is 11.671. Thus, the best model used in modeling data on the frequency of earthquake occurrences in the Mentawai Islands is the Ruey Chyn Tsaur Fuzzy Time Series model.

Keywords: Earthquake, FTS Lee, FTS Tsaur, MAPE, and MSE

THE PROBABILITY MODEL OF THE NUMBER OF EARTHQUAKES IN THE SUMATRA MEGATHRUST ZONE

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Abstract.

The Sumatran megathrust zone contains five segments of major earthquake sources, namely Aceh-Andaman, Nias-Simeuleu, Mentawai-Siberut, Mentawai-Pagai, and Enggano. The level of earthquake hazard in this zone can be mapped through the Probabilistic Seismic Hazard Analysis model. In the formation of that model, the frequency of earthquake occurrences is assumed to follow the Poisson distribution, which does not depend on the time variable. However, it is reasonable to suppose that the frequency of earthquake occurrences may depend on the time variable. The research methods include scenario design for modeling, preparation of seismic data, model diagnosis, selection of probability models with parameter estimation, and their interpretation. The seismic data used are the number of major earthquakes from 1971 to 2018, with magnitudes $Mw \geq 4.6$ and earthquake depths ≤ 70 km. Meanwhile, the probability models applied to the present study are the Poisson distribution, the mixture Poisson, and the Poisson-Hidden Markov models (Poisson-HMMs). Based on the results of model diagnosis toward seismic data in the Sumatra megathrust zone, the probability model for the five major earthquake source segments in the Sumatra megathrust zone produces the same model, namely 3-state Poisson-HMM, but with different model parameters for each segment.

Keywords: The number of earthquakes, Poisson distribution, mixture model, and seismic hazard.

FACTORS THAT AFFECT CHILD LABOUR IN SOUTH KALIMANTAN IN 2021 USING BINARY LOGISTIC REGRESSION

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Abstract.

One of the social and economic problems in many countries that is still related to poverty is the phenomenon of child labor. Child labor is a problem because children are in an inappropriate place. School-aged children aged 7 to 18 should be in school, not in the world of work. Based on the results of the 2021 National Labor Force Survey (Sakernas), the percentage of child workers in South Kalimantan is 9 percent. This study uses secondary data from Sakernas 2021. The purpose of this research is to find out the profile and general characteristics, determine the factors that influence the status of child labor, and establish the best model for binary logistic regression. The analytical method used is binary logistic regression. The results of the descriptive analysis through data exploration with tables and graphs show that age, place of residence, school status, and gender of the household head have an influence on child labor status. Older children, residing in rural areas, not attending school, and with female household heads, have a higher percentage of child labor. The results of binary logistic regression analysis indicate that age, place of residence, and school enrollment status significantly influence child labor status in South Kalimantan in 2021.

Keywords: Child Labour, Binary Logistic Regression

APPLICATION OF THE ARIMA METHOD FOR FORECASTING COFFEE PRODUCTION IN SOUTH KALIMANTAN PROVINCE

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Abstract

The agricultural sector is one of the businesses that provides considerable benefits for a country. One of the agricultural sub-sectors that provides benefits is plantations. Coffee plants are familiar plants in the yards of Indonesian people and become one of the leading commodities of the plantation sub-sector. In this case, coffee production is the main target of development in South Kalimantan Province for the next few years. This study aims to obtain the best model so that it can forecast and find out the results of forecasting coffee production in South Kalimantan Province. The Autoregressive Integrated Moving Average (ARIMA) method is the method used in this study to forecast coffee production results in South Kalimantan Province. The results showed that there were 3 ARIMA models that met the forecasting requirements, namely ARIMA (1,2,0) with MSE value 1602502, ARIMA (1,2,1) with MSE value 1049101 and ARIMA model (2,2,1) with MSE value 976202. It can be concluded that the best ARIMA model in forecasting coffee production in South Kalimantan Province uses the ARIMA model (2,2,1) with a smaller MSE value than other models. The forecasting results of coffee production in South Kalimantan Province in 2023 to 2032 tend to decrease, namely with results in 2023 of 605%, in 2024 of 587%, in 2025 of 317%, in 2026 of 290%, in 2027 of 28%, in 2028 by -7%, in 2029 by -262%, in 2030 by -304%, in 2031 by -552% and in 2032 by -601%.

Keywords: Forecasting, Autoregressive Integrated Moving Average (ARIMA), Coffee Production

ARIMA MODEL VERIFICATION WITH OUTLIER FACTORS USING CONTROL CHART (Case Study : Gross Domestic Product in Indonesia)

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Abstract.

Control charts are commonly utilized in quality control processes, particularly in the industrial sector, because control charts are incredibly beneficial in enhancing industrial productivity. However, control charts can also be used in time series modeling to test how accurate a time series model is. This usage of control charts qualifies for the "accuracy measurement." However, there is no guarantee that time series models will generate high accuracy. Many things can affect this, including the presence of outliers. Consequently, it is essential to carry out time series modeling with the inclusion of outlier components. The generated residual time series model is then used to construct a control chart in the role of observation. This study examines the accuracy of the time series model derived from Indonesia's Gross Domestic Product (GDP) data using two different models, namely the ARIMA model without outliers and the ARIMA model with outliers. Both models were run using the same data. The findings of this research suggest that the ARIMA model with outlier components generates a good level of accuracy. This conclusion can be drawn from the fact that the residual values are within the control limits (in control), which clearly indicates this conclusion.

Keywords: *accuracy, economy, Gross Domestic Product, residual, time series*

ARIMA TIME SERIES MODELING WITH THE ADDITION OF INTERVENTION AND OUTLIER FACTORS (Case Study: Inflation Rate in Indonesia)

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Abstract.

Extreme events in a time series model can be detected when the precise timing of the event, known as the intervention, is known. When the exact timing of an event is unknown, it is referred to as an outlier. If these factors are neglected, the model's accuracy will be affected. To overcome this situation, it is possible to add the intervention or outlier factor into the time series model. This study proposes the combination of intervention and outlier analysis in time series models, especially ARIMA. It is intended to minimize the residuals and increase the accuracy of the model so that it is suitable for forecasting. The conflict between Russia and Ukraine was used as an intervention factor in the inflation case in Indonesia. Pre-intervention data is used to construct the ARIMA model (1st model). After that, the modeling process continued by adding the intervention factor to the ARIMA model (2nd model). The effect caused by the intervention allows an outlier to appear, so the process is continued by adding the outlier factor, called an additive outlier, into the second model (3rd model). The MAPE for the first, second, and third models is 7.96%, 7.91%, and 7.57%, respectively. The finding of this research shows that the ARIMA model with the intervention and outlier factors named as the 3rd model is the best model. The forecasting of the inflation rate in Indonesia for five periods ahead in 2023 is in the range of 5.52%.

Keywords: *ARIMA, inflation, economy, accuracy, forecasting*

INTERVENTION ANALYSIS IN FORECASTING THE NUMBER OF ARRIVAL PASSANGERS AT SYAMSUDIN NOOR AIRPORT BANJARBARU.

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Abstract.

Air transport has an important role in increasing growth and development of regions, which gave impetus to industrial activities, tourism and commerce because of its supporting population mobility. The Covid-19 pandemic is responsible for the decrease in air transport passengers at the Syamsudin Noor airport that has also affected economic growth in South Borneo. The decrease and increase in the number of passengers arriving at Syamsudin Noor airport will need to be known through forecasting. The forecasting is done by using the intervention method of analysis, since there is an intervention of Covid-19. This research entitled as Intervention Analysis in Forcasting the Number of Arrival Passangers at Syamsudin Noor Airport Banjarbaru by using data on the number of passengers arriving at the Syamsudin Noor airport from January 2011 to November 2022 as a result of the official statistical center page (BPS) of South Borneo. The research result shows that the model ARIMA $(0,1,1)(1,0,0)^{12}$ with an intervention order b = 0, s = 4, r = 1 was the best model for forecasting. The modeling of interventions shows that the impact of interventions with fluctuating values is likely to increase from the previous period in November 2022. Therefore, the provincial government of South Borneo can prepare for air transportation modes or increasing the number of air transportation modes, as well as developing the potential for tourism in South Borneo and continuing with promotions to attract tourists to South Borneo, so airlines users continuing to increase and can improve economic recovery in South Borneo after the Covid-19 pandemic.

Keywords: Intervention Analysis, Covid-19, Number of Arriving Passengers, Syamsudin Noor International Airport.

OPTIMAL CORRELATION AGGREGATION ALGORITHM AS THE DETERMINANT FOR PEAK OVER TRESHOLD OF EXTREME DATA

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Abstract

The characteristics of some data, especially extreme data, are commonly studied by researchers in the risk field. In general, there are two theoretical approaches on extreme value theory (evt): a method which exceeds Peak over Threshold (POT) and Block Maxima. Both approaches have been developed to determine the distribution of extreme data value. Peak over Threshold as the determinant for the value of extreme data has not been specifically studied so far; therefore, this paper proposes an algorithm which is built based on optimal correlation of the mean excess plot which is called optimal correlation aggregation algorithm.

Keywords: Extreme Value Theory, Quantile, Optimal Correlation, Threshold

STUDY ON EIGENVALUE Of
3-UNIFORM n-REGULAR 3-PARTITE HYPERGRAPH

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Abstract.

Let $\square$ be a hypergraph with adjacency matrix M. The eigenvalues of M are called the eigenvalues of $\square$. A hypergraph is called integral if all eigenvalues of its adjacency matrix are integers. In this article, we prove that 3-uniform n-regular 3-partite hypergraphs of order $3n$ and size n^2 are integral.

Keywords: hypergraph, eigenvalues, integral, 3-uniform, n-regular, 3-partite

APPLICATION OF QUADRATIC PROGRAMMING
USING WOLFE METHOD ON PORTFOLIO OPTIMIZATION

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Abstract.

Quadratic programming can be applied to optimization problems, one of which is the stock portfolio optimization problem. A stock portfolio is a set of investments involving the identification of which securities to choose, and what proportion of funds will be invested in each of these securities. The optimal portfolio is a portfolio that is selected according to the preferences of an investor from the many choices that exist in a collection of efficient portfolios. The stock portfolio can be modeled into a quadratic programming model using Markowitz mean-variance method developed by Harry Markowitz (1956). This study aims to determine the optimal results on portfolio problems using the Wolfe method. The data used in this study are data from 10 stock companies that paid the highest dividends in the IDX High Dividend 20 category for the 2022 period. The results of this study focus on discussing two portfolio models: (1) The portfolio that has negative covariance with a significant difference in expected return rates, namely PT Astra International Tbk and PT. Indo Tambangraya Megah Tbk. Based on Markowitz mean-variance, the expected profit rate is 3.432% and the risk is 0.505%. The optimal proportion of shares invested for PT. Astra International Tbk is 76.401% and for PT. Indo Tambangraya Megah Tbk is 23.599%. (2) The portfolio that has a negative covariance with a slight difference in the expected return rates, namely PT. Bank Rakyat Indonesia (Persero) Tbk and PT. Mitra Pinasthika Mustika Tbk. Based on the mean variance of Markowitz, the expected profit rate is 2.471% and the risk is 0.141%. The optimal proportion of shares invested for PT. Bank Rakyat Indonesia (Persero) Tbk is 56.089% and for PT. Mitra Pinasthika Mustika Tbk is 43.911%.

Keywords: Markowitz Mean-Variance, Optimal Portfolio, Quadratic Programming, Wolfe Method

THE CENTRAL LOCAL METRIC DIMENSION Of RELATED WHEEL

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Abstract.

The local metric set is is a set that can distinguish the existence of two adjacent vertices in a connected graph. Several application of the local metric dimension has been studied, such are a new model for assigning codes to customers in delivery services and a lower bound of the local metric dimension of several graphs in mathematical chemistry. A vertex is central in a graph if its greatest distance from any other vertex is as small possible and it is more interesting if the local metric set consists of all central vertices of a graph. In this paper, we developed a new concept of central local metric dimension by combining the concept of local metric dimension with central vertex of a graph. Let G be a connected graph with vertex set $V(G)$ and order n. Let $W = \{x_1, x_2, \dots, x_k\} \subseteq V(G)$ and $k \le n$, the the metric code of a vertex x of G with respect to W is the k-vector is $r(x|W) = \big(d(x, x_1), d(x, x_2), \dots, d(x, x_k)\big)$. W is a *local metric set* of G if $r(x|W) \ne r(y|W)$, $\forall x, y \in V(G)$ and xy is an edge of G. If W contains all central vertices in G, then W is called central local metric set of G. The minimum cardinality of W is called the central local metric set of G. In main result we find the central local metric set of some related wheel graph such are wheel, friendship, fan, helm and sunflower graph. This result can be utilized to solve problems in network theory.

Keywords: central local metric dimension, central vertex, wheel, friendship, fan, helm, sunflower.

SOME CHARACTERISTICS OF CAYLEY GRAPHS ON $(Z_n\backslash\{0\}, \bullet_n)$ GROUP SUBSETS, n PRIME

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Abstract.

Let G be a group and let $S \subseteq G$ such that the identity element $e \notin S$. The Cayley graph denoted as $CAY(G, S)$ is defined as a graph which the set of vertices and the set of edges satisfying these two axioms: (i) Every elements in a group G are vertices in $CAY(G, S)$, (ii) A pair of vertices u and v is an edge in $CAY(G, S)$ if and only if $v = u \circ s$, $s \in S$. In this paper, we investigate the characteristic Cayley graph of $(\mathbb{Z}_n\backslash\{0\}, \bullet_n)$ group subsets for n prime. The results show that, the Cayley graph of $(\mathbb{Z}_n\backslash\{0\}, \bullet_n)$ group subsets that contains one element in the form $\frac{n-1}{2} - path\ P_2$ and the Cayley graph of $(\mathbb{Z}_n\backslash\{0\}, \bullet_n)$ group subsets that contains two elements in the form graph C_{n-1}, and   graph p cycle $- C_q$ with p, q are factors of $n - 1$.

Keywords: *Cayley graph, characteristic, graph, group, subset*

SUPER EDGE MAGIC TOTAL LABELING Of $B[(4,m),(3,n),2]$-CYCLE BOOKS FOR m EVEN And $n = 2$

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Abstract

Let G be a graph with p vertices and q edges. Edge magic total labeling of a graph G is a rule for labeling of such graph with the positive integers $1,2,3\cdots,p+q$ such that the sum of the labels of an edge with the labels of its end vertices is constant for every edge. Edge magic total labelling of G is called super edge magic total labeling if labels of its vertices are the integers $1,2,3\cdots,p$. Edge magic total labelling of graph $B[(a,m),(b,n),2]$-cycle books is an open problem. Graph $B[(a,m),(b,n),2]$-cycle books are constructed from m copies cycles of order a and n copies of cycle of order b with common edge P_2. The aim of this research is to investigate super edge magic total labeling of graph $B[(4,m),(3,n),2]$-cycle books. This research found super edge magic total labelling of graph $B[(4,m),(3,n),2]$-cycle books for all m even and $n = 2$. The method which is used in this research are modus ponens and modus tolens proof methods. The results of this research will enrich theoretical bases for development technology information.

Keywords: edge magic total labelling, super edge magic total labeling, cycle books

HOMORPHIC ORDERING OF THE MAX-PLUS FORMAL POLYNOMIALS AND THE MAX-PLUS POLYNOMIAL FUNCTIONS

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Abstract.

Max-plus algebra, denoted by $\mathbb{R}_{\max}$, is a set $\mathbb{R} \cup \{-\infty\}$ with two binary operations, maximum and addition, represented as $\oplus$ and $\otimes$, respectively. Several studies have shown that max-plus algebra is a semifield. The set of n-dimensional vectors over $\mathbb{R}_{\max}$, denoted by $(\mathbb{R}_{\max})^n$ is a moduloid over $\mathbb{R}_{\max}$. Moduloid is an analogy of vector space in conventional algebra. Max-plus algebra has differents structure than classic algebra, making further study interesting. The concepts in $\mathbb{R}_{\max}$ can be adapted to formal polynomials and polynomial functions over max-plus algebra. Therefore, this study aims to analyze the structure and the ordered relations on the set of formal polynomials over max-plus algebra $(\mathbb{R}_{\max}[\gamma])$ and the set of polynomial functions over max-plus algebra $(\mathcal{P}(\mathbb{R}_{\max}))$. The starting point is to analyze the structure of $\mathbb{R}_{\max}[\gamma]$ and $\mathcal{P}(\mathbb{R}_{\max})$. Then, we define the binary relation $\preccurlyeq_1$ on $\mathbb{R}_{\max}[\gamma]$ and the binary relation $\preccurlyeq_2$ on $\mathcal{P}(\mathbb{R}_{\max})$, which holds the partial ordered relation axioms. Furthermore, we analyze the ordered relation between $(\mathbb{R}_{\max}[\gamma], \preccurlyeq_1)$ and $(\mathcal{P}(\mathbb{R}_{\max}), \preccurlyeq_2)$. This research show that $(\mathbb{R}_{\max}[\gamma], \preccurlyeq_1)$ and $(\mathcal{P}(\mathbb{R}_{\max}), \preccurlyeq_2)$ are partially ordered idempotent algebra (POIAs), and these two POIAs are orderly homomorphic.

Keywords: partial order, idempotent algebra, moduloid, POIA, orderly homomorphic

AN ORDER-p TENSOR MULTIPLICATION WITH CIRCULANT STRUCTURE

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Abstract.

Research on mathematical operations involving multidimensional arrays or tensors has increased along with the growing applications involving multidimensional data analysis. The t-product of order-p tensor is one of the tensor multiplication operations defined by Martin (2013). The t-product is defined using an operation that transforms tensors into circulant matrices. This study discusses the t-product of tensors based on their circulant structure. First, we discuss the definition of the t-product of tensors involving circulant matrices. Second, we use the definition of identity, transpose, and inverse tensors for the t-product and investigate their relationship with circulant matrices. Third, we analyse the computation of the t-product involving circulant matrices. The results of the discussion show that the t-product of tensors fundamentally involves circulant matrix multiplication, which means that the operation at its core relies on multiplying circulant matrices. This implies the t-product operation of tensors having properties analogous to standard matrix multiplication. Furthermore, since the t-product of tensors fundamentally involves circulant matrix multiplication, its computation can be simplified by diagonalizing the circulant matrix first using the discrete Fourier transformation matrix. Finally, based on the obtained results, an algorithm will be constructed in MATLAB to calculate the t-product.

Keywords: *Tensors, T-Product, Circulant Matrix, Discrete Fourier Transforms Matrix, MATLAB*

A PROBABILISTIC DYNAMIC PROGRAMMING APPROACH For SOLVING An INVENTORY PROBLEM(Case study: Fertilizer stock)

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Abstract

Probabilistic Dynamic Programming (PDP) is a powerful approach for solving complex optimization problems that involve uncertainties in making sequential decisions. In this paper, PDP is utilized to solve an inventory problem of fertilizers in a warehouse. The goal is to minimize the total cost of holding, ordering, and shortage of inventory while meeting the demand for fertilizers. To apply PDP to inventory problems, a recursive equation that relates the optimal cost of managing the inventory over a planning horizon (from period $t+1$ to T) needs to be formulated. Since the demand is uncertain and variable, the inventory level at the end of each period is a random variable that depends on the realization of the demand in that period. The optimal solution shows how much to order at each period, depending on the current inventory level and the future demand.

Keywords: *Probabilistic Dynamic Programming*, *Inventory*, *Optimization*, *Sequential Decision-Making, Fertilizer Stock*

SPATIAL STRUCTURAL EQUATION MODELING OF POVERTY INDICATORS IN THE SOUTH SUMATRA REGION

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Abstract.

Poverty is a condition where there is an inability to meet basic needs such as food, clothing, shelter, education and health. In the Southern Sumatra region, there are 3 provinces that have a poverty rate above 10%, namely South Sumatra with a poverty percentage of 12.84%, Bengkulu with a poverty percentage of 15.30%, and Lampung with a poverty percentage of 12.62%. Poverty in a region can be influenced simultaneously by various indicators from several fields, such as the economy, education, employment and others. One method that can be applied to model poverty is Structural Equation Modeling (SEM) with the Partial Least Square approach, a statistical technique that is able to analyze patterns of relationships between latent constructs and their indicators, latent constructs with each other, as well as direct measurement errors. Because it is suspected that there is a spatial effect on the problem of poverty, the SEM-PLS spatial will be used. Based on the results of the analysis that has been done, it is known that the SEM spatial model that can be used for modeling poverty in the Southern Sumatra region is the spatial lag model and the spatial error model with a queen contiguity matrix. In the spatial lag model, poverty is significantly affected by lag poverty and health. Meanwhile, in the spatial error model, poverty is significantly affected by the lag of poverty and health.

Keywords: Poverty, SEM-PLS, Spatial

ANALYSIS OF THE IMPACT OF A PANDEMIC ON INDONESIA'S ECONOMIC GROWTH USING DYNAMIC TIME WARPING TECHNIQUES FOR TIME SERIES CLUSTERING

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Abstract.

The economy has experienced a significant decline due to the pandemic. Compared to the 2008 Global Economic Crisis, the 1998 Asian Financial Crisis, and the 1973 oil crisis, Asia's GDP experienced the most drastic decline during the Covid-19 pandemic. Economic activity decreased due to restrictions on human mobility. This study collects data on economic indicators for each province/city to observe economic growth in Indonesia, such as Gross Regional Domestic Product (GRDP) and inflation. The data resources are the National Statistic Bureau (bps.go.id) and the Ministry of National Development Planning of the Republic of Indonesia (https://simreg.bappenas.go.id/). The clustering method on time series data will help find several provinces/cities with similar economic growth patterns to observe the pandemic's impact on their economies. For this purpose, we utilize the Dynamic Time Warping (DTW) distance with the K-Medoids procedure that is more robust to outliers. The DTW is an algorithm for measuring the similarity between two temporal sequences. The clustering of GRDP based on current prices by expenditure has 5 clusters with the most optimal validation index, such as the silhouette, Dunn Index, Davies-Bouldin Index, and Calinski-Harabasz Index. Each cluster has almost the same pattern as the trend tends to increase from before the pandemic, then decreases during the pandemic. The decrease in GRDP is less significant than the minimal data on GRDP that happened before the pandemic. While the economic growth, only 1 out of 6 clusters has positive economic growth during the pandemic. Economic growth has skyrocketed even for the first quarter of 2023, almost the same as before the pandemic. Moreover, it shows that the government's efforts have been quite successful in recovering the economy.

Keywords: Clustering Analysis, Dynamic Time Warping, Economic Growth, K-Medoids

FLEXIBLE NONCROSSING CONDITIONAL QUANTILE CURVES IMPLEMENTED TO LONGITUDINAL OBSERVATIONS

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Abstract.

The main problem in quantile regression is the issue of the crossings, which means the conditional quantile curves may cross each other. This situation violates the basic property of quantiles as the inverse of the *cumulative distribution functions (CDF)*. Hence, theoretically, the higher level of quantiles implies the higher conditional quantile curves. Due to its crossings issue, we need to develop the classical quantile objective function. We implement our proposed technique to a more complex but flexible model, namely a *varying-coefficient model*. We approximate each coefficients by a linear combination of the basis B-splines and estimate them by minimizing penalized the B-splines objective function, called P-splines quantile objective function. The crossingness is avoided by making a monotonicity constraint started from the median as a special case of quantile regression. The other levels of quantiles are estimated by moving up and down from the constraint median. We implement our technique to a real longitudinal data example. We find that the crossingness issue appeared in the individual quantile objective functions are not happened when we use our proposed technique. By implementing our proposed teachnique, we are able to generate a more flexible and robust growth curves model for longitudinal observation with no crossingness issue.

Keywords: Quantile regression, varying-coefficient model, crossingness, B-splines, P-Splines

APPLICATION Of THE GENERALIZED AUTOREGRESSIVE CONDITIONAL HETEROSCEDASTICITY (GARCH) MODEL IN FORECASTING THE VALUE OF INDONESIAN NON-OIL AND GAS EXPORTS

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Abstract:

Non-oil and gas exports are commodities that make a large contribution to total exports for Indonesia, which directly contributes to economic growth. The movement of the value of Indonesia's non-oil and gas exports from time to time experiences fluctuating conditions, so it is necessary to have an overview of the value of non-oil and gas exports in the future as a material consideration in determining policies related to exports in the future. The purpose of this study is to analyze the best GARCH model and determine the results of forecasting the value of Indonesia's non-oil and gas exports for the next several periods. The data used is the value of Indonesia's non-oil and gas exports which are quantitative with the forecasting method, namely the GARCH model. The method used in this study was started by determining the best ARIMA model which was detected to have heteroscedasticity symptoms tested by the ARCH-LM test, then GARCH modeling was carried out with the stages of model identification, estimation and parameter significance test, and determination of the best model, then forecasting was carried out. From this study it was found that the best GARCH model in forecasting the value of Indonesia's non-oil and gas exports is GARCH(1,2) with ARIMA(0,1,1). Forecasting results show that the value of Indonesia's non-oil and gas exports from January to December 2023 tends to increase.

Keywords: *Indonesian Non-Oil and Gas Export Value, Heteroscedasticity, GARC*

CLUSTERING ANALYSIS OF LECTURER PROFILES USING GOWER DISTANCE AND K-MEDOIDS ALGORITHM

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Abstract.

A way to preserve the quality of higher education is to improve the quality of human resources through lecturers. Profiling the lectures will help related parties provide suitable policies or programs. In order to do lecturers' profiling, this research used 8,404 lecturers' profiles data obtained from the Higher Education Service Institute (_Lembaga Layanan Pendidikan Tinggi_ abbreviated as LLDIKTI) Region V Yogyakarta, Indonesia. We employed the Gower distance with the K-Medoids procedure. The Gower distance is a metric that measures the dissimilarity of two items with mixed numeric and categorical data. The pre-processing includes checking outliers for numerical data and customizing the categorical data as factors. Determining the initial number of clusters operated the elbow and silhouette methods, resulting in k=4. Cluster evaluation measures silhouette and Dunn Index. Lecturer members in each cluster have different characteristics. Lecturers in cluster 1 have the best quality compared to other clusters. Meanwhile, cluster 4 is a group of lecturers who do not yet have functional positions and lecturer profession certification. Thus lecturers in this cluster require more programs to encourage them.

**Keywords:** _Clustering Analysis, Gower Distance, K-Medoids, Lectures Profiling, Pam_

IDENTIFICATION OF CLIMATE ZONES BASED ON RAINFALL CONDITIONS USING THE K-MEANS CLUSTERING METHOD

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Abstract

High-intensity rainfall is one of the natural phenomena which is usually expected has impacts in climate variability. This aim study are knowing the characteristics of rainfall and identification climate zones based on rainfall in South Kalimantan Province. Descriptive statistical is using to describe the characteristics of rainfall and get climate zones using the K-Means Clustering method. Beside that, to get the best cluster can be using the ratio criteria of the standard deviation value within the group (SW) and the standard deviation between groups (SB). Based on the criteria for the ratio of SW and SB values, this study get to known that 3 (three) clusters using the K-Means method has a smaller ratio value than the ratio of other clusters. This suggests that the climate zones using 3 (three) clusters has a high degree of homogeneity within the group so that the performance of climate zones is the best.

Keyword: curah hujan, Zona Musim (ZOM), K-Means Clustering

OPTIMAL CONTROL OF DENGUE FEVER WITH TREATMENTS AND VECTOR CONTROL

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Abstract.

Dengue Fever is a public health problem whose reach is expanding as the population density increases. The spread of Dengue Fever can be studied by applying optimal control theory with several appropriate control variables to control the spread of this disease. This study aims to describe the formation of the Dengue Fever disease model, explain the stability analysis of the model, explain the optimal form of control function, and carry out simulationseand interpretations. The method used is Linearization, Routh-Hurwitz Criteria, Pontryagin maximum principle, Runge-Kutta Order 4, and Forward-Backward Sweep. The result obtained is the formation of the SEIRS SI model. Two balance points were obtained from the model formed, namely the endemic disease free balance point. Then, the results of the stability analysis of the model are local asymptotically stable at the endemic and disease-free equilibrium points. Furthermore, the optimal control function is obtained in the model of the spread of Dengue Fever with treatments and vector control. The results of the optimal control numerical simulation show that when applying two controls in the form of treatments and vector control, the rate of Dengue Fever infection decreases over time.

Keywords: Dengue Fever, Stability Analysis, Optimal Control, Treatments, Vector Control.

INFLATION FORECASTS FOR SOUTH KALIMANTAN PROVINCE USING ARIMAX MODEL WITH CALENDAR VARIATION EFFECT

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Abstract.

Inflation is an important economic indicator in showing price changes in an area. For sustainable economic growth, stable inflation is a prerequisite for improving people's welfare. The importance of controlling inflation is based on the consideration that high and unstable inflation has a negative impact on the social and economic conditions of society. In 2022, a city in South Kalimantan Province will be the biggest contributor to inflation at the national level, namely 8.65% (yoy). One way to control inflation is through forecasting to predict future inflation. Forecasting inflation for South Kalimantan Province can use the Autoregressive Integrated Moving Average with Exogenous Variable (ARIMAX) model. The ARIMAX model is a model that was developed from the Autoregressive Integrated Moving Average (ARIMA) model by adding exogenous variables that are considered to have an effect on the data. The best ARIMAX model obtained is ARIMAX(0,1,1) with the effect of variations in the calendar where there are an increase in fuel prices, Idul Fitri and Christmas. The ARIMAX(0,1,1) model is used to forecast monthly inflation for South Kalimantan Province from May 2023 to July 2023. The results of forecasting the inflation rate for South Kalimantan Province from May 2023 to July 2023 are 0.262% (mom). This shows an increase in inflation from the previous month, which was 0.11%. Based on these results, the South Kalimantan provincial government must remain vigilant about rising inflation and must increase efforts to maintain inflation stability in the South Kalimantan province.

Keywords: Inflation, South Kalimantan, ARIMAX, Calender variation effect

RAINFALL CLASSIFICATION OF BANJARBARU USING DECISION TREE METHOD

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Abstract.

High intensity rainfall hit Banjarbaru City in 2021. This has caused a flood emergency in various areas of the city. In addition, all community activities were also disrupted, starting from government, education, plantations, to costruction. Heavy rainfall can cause flash floods and landslides. So the prediction of rainfall is very important as an early warning in case of bad weather. The purpose of this study is to classify rainfall values (sunny or rainy) in Banjarbaru City based on minimum temperature, maximum temperature, average humidity, irradiation time, and wind speed using decision tree method. The data used in this research is the rainfall data of Banjarbaru City from January 2021 to March 2023. This data is imbalanced data, so prior to modeling it must be undersampled first. The results of classifying rainfall using undersampling and decision trees provide an accuracy of 75%, a sensitivity of 76.67%, and a specificity of 74.47%.

Keywords: imbalanced dataste, rainfall, decision tree, undersampling, classification

A SPATIAL MODELLING ON THE PREVALENCE OF STUNTING IN KALIMANTAN INDONESIA

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Abstract.

A statistical model used to estimate the relationship between variables in spatial data is the spatial regression model. Spatial regression modeling is frequently used to model health data, such as chilhood stunting. From 2020 until 2022, the prevalence of stunting in Kalimantan remains high, exceeding the WHO's predicted target of 20%. Approximately 80% of Kalimantan's regencies have stunting prevalence rates that surpass the WHO threshold of 20%. The goal of this study is to determine the general description of stunting cases in Kalimantan, and identify the factors that influence stunting instances, all of which will be described using a thematic map. Before constructing the model, it is required to check the data for the fulfillment of the assumptions, normality, multicollinearity, and spatial heterogeinity. Furthermore, spatial regression analysis, specifically Geographically Weighted Regreesion (GWR) was used for statistical modeling. The spatial description of the data reveals that the prevalence rate of stunting differs by regency. The results of spatial regression modeling show that the factors influencing stunting differ for each region.

Keywords: Stunting, Spatial Regression Model, Kalimantan.

FERTILITY MODELING OF WOMEN OF CHILDBEARING AGE (WUS) DURING A PANDEMIC WITH DUMMY REGRESSION ANALYSIS

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Abstract.

Fertility in South Kalimantan Province has declined in the last five decades. The 1971 Population Census recorded a TFR of 5.43 while the Long Form SP2020 results recorded a TFR of South Kalimantan Province of 2.31 which means only about 2-3 children were born to women during their reproductive period. There are 7 districts that have TFR values above the TFR of South Kalimantan Province, one of which is in Balangan Regency of 2.36. This study aims to determine the factors that affect the fertility of Women of Childbearing Age (WUS) during a pandemic. This research method uses a quantitative approach with dummy regression analysis. The research data was obtained from the results of a survey of married childbearing age women aged 15-49 years living in the Meratus mountains, Ajung Village, Tebing Tinggi District, Balangan Regency, South Kalimantan Province. The results of the analysis showed that the variables that affected WUS fertility during the pandemic were the age of first marriage and the age of respondents and dummy variables that affected fertility were the level of education and the use of family planning at the error level (α) of 10%.

Keywords: fertility, women of childbearing age, dummy regression

MODELLING OF COMBINATORIAL OPTIMIZATION GRAPH PROBLEM AND ITS APLICATIONS

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Abstract

Combinatorial optimization problems can be formulated in graph form and the form of linear or non linear integer programming. A combinatorial optimization problem in a graph that has many applications in real word, like minimizing conflicts in scheduling, equivalent to colorings. In this paper studied combinatorial optimization problems which special programming, has the objective function or constraints in the form of polynomials, and all of variable are restricted to be integer or biner, and here in after referred to as combinatorics polynomial. The first this paper present a condition such that the combinatorics polynomial has solution. Existence of optimum value will be found by restriction of decision variable and properties of feasible solution set or polyhedra.The seconth eachd, this paper present a procedure for determine the polynomial combinatotic solutions.

Keyword: *combinatorics polynomial, existence, polyhedra*

HYBRID MODEL OF TRANSFER FUNCTION AND NEURAL NETWORK TO FORECAST REFERENCE COAL PRICES

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Abstract.

The transfer function is a forecasting model that pays attention to the dependence of one variable by involving the dependence of another variable. This transfer function model is capable of capturing linear data patterns. Neural Network (NN) is a forecasting model similar to biological neural networks in carrying out data processing and is able to capture nonlinear data patterns. A hybrid model in forecasting model combines two or more forecasting methods. One of the hybrid models used in forecasting is the hybrid transfer function model – NN. The purposes of this study are to obtain a transfer function model on the Reference Coal Price (RCP) data in Indonesia and obtain the results of RCP forecasting in Indonesia using a hybrid transfer function model – NN with 1 until 3 neurons. The results of the study obtained that the RCP in Indonesia is influenced by coal production and coal exports with a forecasting accuracy rate MAPE of 6.2624%. The accuracy of forecasting (MAPE) using the best transfer function – NN hybrid model is not much different from 1 neuron at 7.0637%, 2 neurons at 6.5240% and 3 neurons at 7.0325%. Forecasting with the hybrid transfer function model – NN shows that RCP in Indonesia for the period May 2023 to April 2024 tends to be stable.

Keywords: forecasting, hybrid model, neural networks, reference coal price, transfer function.

FUZZY C-MEANS AND K-MEANS ALGORITHMS IN CLUSTERING GREEN HOUSE GAS MISSIONS IN 2019 AND 2020

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Abstract.

In the past few decades, addressing the effects of climate change has been concentrated on minimizing the greenhouse gas effect. Therefore it, is necessary to understand the pattern of the greenhouse effect, such as grouping countries based on their greenhouse gas emissions. Findings from grouping using the clustering approach might potentially be used as a control system for developing characteristics-based policies for each cluster in climate change handling. In this study, greenhouse gas emissions in 2019 and 2020 collected from World Bank publications are clustered using Fuzzy C-Means and K-means algorithms. It is efficiently implemented, and countries are grouped into seven clusters. For gas emissions in 2020, The silhouette value of K-Means (0.797) has the greater values when compared to Fuzzy C-Means. According to results of the analysis, the K-Means algorithm is more effective at clustering data in this case study. The research revealed that several nations have been grouped into different cluster. Given that cluster analysis clustered data based on similarity, this revealed that there was a considerable change in gas emission patterns over this time period. This might be used as a basis for developing policies related to climate change early warning systems.

Keywords: climate change, greenhouse, clustering, fuzzy c-means, k-means

DEVELOPMENT OF A CLIMATE PREDICTION MODEL IN ASEAN BASED ON ARTIFICIAL NEURAL NETWORK (ANN) WITH BACKPROPAGATION ALGORITHM

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Abstract.

Climate change is an inherent natural phenomenon stemming from global warming. Its ramifications encompass the potential for numerous natural disasters, thereby necessitating multidisciplinary investigations to facilitate early detection and prevention. Recognizing the significance of climate change, the United Nations has incorporated it as a key component within the Sustainable Development Goals (SDGs), specifically addressing it as goal number 13. This research delves into an examination of climate change data spanning from 1990 to 2020 across 11 ASEAN countries, employing the Artificial Neural Network methodology coupled with the backpropagation algorithm. The study incorporates total greenhouse gas emissions as well as 38 independent variables influencing them. In instances of missing data, the average imputation method was employed. Subsequently, the dataset was partitioned into training and testing data sets, utilizing an 80:20% ratio. Data normalization was executed via a min-max scaler, while the optimal parameter values were determined through a grid search. Results of this study indicate the model's exceptional predictive capability for total greenhouse gas emissions, as evidenced by the performance evaluation models of Mean Absolute Error (MAE) = 0.0287 and Mean Square Error (MSE) = 0.0017.

Keywords: artificial neural network, backpropagation algorithm

OPTIMAL CONTROL OF THE MATHEMATICAL MODEL OF DENGUE FEVER

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Abstract.

Dengue Fever is an infectious disease caused by the dengue virus which is transmitted through the bite of the Aedes Aegypti mosquito and is characterized by sudden high fever accompanied by bleeding manifestations and tends to cause shock and death. Various ways have been done to prevent dengue fever, but the results are not optimal. Dengue fever can be suppressed by administering a control in the form of a vaccine called Chimeric Yellow Fever (17) ^DTetravalent Dengue Vaccine (CYD-TDV). This vaccination can be controlled optimally by applying the maximum Pontryagin principle. The Pontryagin maximum principle is the optimal control solution in accordance with the objective of maximizing the performance index. The purpose of this study is to form a model starting from determining assumptions, parameters and building the SIR-SI model, determining stability analysis which then involves optimal constraints with the Pontryagin minimum principle to carry out optimal control strategies for dengue fever models as well as simulations using software. The results of this study are to explain how the model for the spread of dengue virus in the human body is formed, 2 equilibrium points are obtained, namely the disease free equilibrium point locally asymptotically stable and locally asymptotically stable endemic, the optimal control equation obtained, and the graph of the SIR-SI model without using control and use control. Based on the simulation results, providing optimal control in the form of vaccination in humans can control the spread of dengue fever to a minimum.

IDENTIFICATION OF FACTORS AFFECTING UNDERAGE WOMEN MARRIAGE CASES IN SOUTH KALIMANTAN USING A GEOGRAPHICALLY WEIGHTED PANEL REGRESSION MODEL

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Abstract. The topic of this study was chosen because the percentage of underage female marriages in South Kalimantan Province was the highest in Indonesia over the last five years, from 2018 to 2022. This signifies that there are social issues in the local community that the government must address. One possible answer is to identify the factors that contribute to the creation of these conditions in each region. Using the Geographically Weighted Panel Regression (GWPR) method, this study attempts to determine the factors that influence the rise of underage female marriage instances in South Kalimantan Province. The number of poor individuals, population density, average duration of schooling, adjusted per capita expenditure, and total population were chosen as independent variables. Data acquired from South Kalimantan Province's Central Bureau of Statistics' periodic releases. Because there was high spatial heterogeneity between each location in this study, it was quite practical to employ the GWPR approach in developing a conjectural model. The results of evaluating the GWPR model with adaptive Gaussian kernel weights provide significant results and the model can explain the variance of data by 55 percent. Testing the parameters of the GWPR model reveals two (two) regional groupings with distinct influencing variables. The first group consists of ten (ten) regions that are considerably impacted by both the number of impoverished people and the average length of schooling, whereas the second group consists of three (three) regions that are impacted solely by the average length of schooling.

Keywords: Spatial Modelling, underage female marriages, South Kalimantan Province

IMPLEMENTATION OF SYNTHETIC MINORITY OVERSAMPLING TECHNIQUE IN RANDOM FOREST FOR IMBALANCE CLASS DATA

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Abstract.

Pelabuhan Perikanan Nusantara (PPN) is one of the ports in Indonesia that is under the auspices of the Kementerian Kelautan dan Perikanan (KKP). One of the problems faced by PPN Pemangkat in increasing economic development through capture fisheries is the problem of the production value per year that can be obtained. Random Forest is a classification method that provided in Data Mining. One of the problems in Data Mining classification is the problem of imbalance class data. Imbalance class data occurs when the classes in the dataset are not having the same amount of data. The method that can be used in handling the imbalance class data problem is Synthetic Minority Oversampling Technique (SMOTE). This study aims to classify the measured fishing production value of PPN Pemangkat using Random Forest by using SMOTE to handle the problem of imbalance class data and comparing the results with and without using SMOTE. This research used four predictor variables which include the type of fishing gear (X_1), the number of trip days (X_2), the number of crew members (X_3), and the total weight of fish (X_4) with one response variable (Y) which is the production value. The model performance indicators used include Accuracy, Precision, Recall, Specificity, F1-Score, and G-Mean. The results showed that SMOTE successfully handled the problem of imbalance class data in Random Forest classification. There is even an increase in Specificity and G-Mean model performance indicators by 4.79% and 14.89% respectively compared to Random Forest classification without using SMOTE.

Keywords: PPN Pemangkat, Random Forest, SMOTE

NUMERICAL SIMULATION OF THE TSUNAMI WAVE PROPAGATION MODEL USING THE LAX-FRIEDRICHS METHOD

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Abstract:

Tsunami waves are a series of long waves induced by unexpected and impulsive changes in seawater. This research was conducted to simulate the propagation of tsunami waves using the Lax-Friedrichs method. Tsunami waves are modeled using the shallow water wave equation which consists of the continuity equation and the momentum equation. The differential equation model of tsunami wave propagation consists of wave height, discharge flux height in the x-axis direction, and discharge flux height in the y-axis direction. The step taken is to discretize the wave differential equation using the Lax-Friedrichs scheme. The simulation is carried out by inputting an example case and entering the data into the Matlab program that has been made. The amplitude, wavelength, and time will affect the height of the tsunami waves that are formed. Simulation of the tsunami wave propagation model was carried out with an amplitude of 8 meters and a wave length of 50 km. Based on the calculation results, a relatively small difference is obtained between the initial value determined and the calculation results using the Lax-Friedrichs method, which is 0.013 or has an error of 0.002%, this indicates that the Lax-Friedrichs method is one of the methods that is quite good to use in numerical modeling of tsunami waves.

Keywords: Lax-Friedrichs, Tsunami, Matlab, Differential Equations, Discretization

OPTIMAL CONTROL OF DENGUE FEVER WITH THE INFLUENCE OF VACCINATION AND INSECTICIDE ADMINISTRATION

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Abstract.

Dengue Fever is a disease transmitted by vectors from mosquito bites that infect the Aedes Aegypti mosquito virus, where this virus is transmitted from humans to vectors and from vectors to human hosts through female Aedes Aegypti mosquitoes. This disease is widely developed in tropical and subtropical areas such as Indonesia. There are two living populations that play a role in the spread of DHF, namely humans, who are called hosts, and female Aedes Aegypti mosquitoes, which are known as carriers of the Aedes Aigypti mosquito virus. Mosquitoes can become infected when they bite humans through horizontal transmission, but there is also vertical transmission through sexual contact with infected mosquitoes. This disease has attacked more than 100 countries including Indonesia. The purpose of this study is to explain the model of the spread of Dengue Fever, determine the disease-free and endemic equilibrium points, analyze the stability of the equilibrium points, and determine the optimal form of control. The result of this study is the establishment of the SEIR-SEI model for Dengue Fever. Based on this model, two equilibrium points are obtained, namely disease-free equilibrium points and endemic equilibrium points and the basic matrix is obtained using the Next Generation Matrix method. Furthermore, by analyzing the model, it will be asymptotically stable if $R_0 < 1$ at the disease-free equilibrium point and locally asymptotically stable if $R_0 > 1$ at the endemic equilibrium point. As well as forms of DHF control with policies provided including vaccination and administration of insecticides. Studies on the Dengue Fever disease model have been carried out with various types of analysis. One of them is research conducted by Puntani Pongsumpun, I.-Ming Tang, and Napasool Wongvanich.

Keywords: Dengue fever; SEIR-SEI Models; Next Generation Matrix; Vaccination, and Insecticide Administration

APPLICATION OF THE K-MEANS CONSENSUS CLUSTERING METHOD TO THE CLUSTERING OF *ACACIA AURICULIFORMIS* GENES IN INDONESIA

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Abstract.

Indonesia is one of the top most biodiverse countries, providing an advantage for the development of superior seedlings to maximize the production of raw materials for industry, including the pulp and paper business. The most widely used trees in Indonesia to manufacture pulp and paper is from the *Acacia* genus, which comprised of many species including *Acacia auriculiformis*, which is known to have an increased resistance to disease. The ability of living organisms to do various tasks, including disease resistance is determined by its genetic content that are often represented by its genes. *Acacia auriculiformis* has 25,975 genes, the majority of which have unknown functions. To facilitate the prediction of gene functions in *Acacia auriculiformis,* gene clustering based on DNA sequences is required. In this paper, we clustered *Acacia auriculiformis* genes based on their DNA sequences using the consensus clustering method which can identify robust and stable gene clusters. A total of twelve gene clusters in *Acacia auriculiformis* have been identified. The cluster size varies from twelve to fifty genes. Our research findings can be used to generate hypotheses regarding gene functions based on the genes they are clustered with. The output of this paper is crucial for identifying the genetic potential and charactersitics of *Acacia auriculiformis*.

Keywords: biodiversity, Acacia auriculiformis, clustering, gene, similarity

PEMODELAN INDEKS KUALITAS LINGKUNGAN HIDUP DENGAN INDIKATOR SUMBER DAYA LINGKUNGAN MENGGUNAKAN MULTIPLE INDICATORS MULTIPLE CAUSES MODEL

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Abstract

This research aims to visualize the model of environmental resource factors on the constituent factors of the environmental quality index using the multiple indicators multiple causes (MIMIC) method, using secondary data sourced from IKLH 2020. The predictor variables in this study include air quality, water quality, land cover quality, and environmental quality. Some of the indicators in this research are Conservation Forest Area, Limited Production Forest Area, Fixed Production Forest Area, Protection Forest Area, Coral Reefs, and Mangroves. Data Analysis using MIMIC Model, showing a very significant baseline and model factor. Some predictor coeficients have low standard error (close to zero), as well as significant indicators coefficients, except coral reefs, with a p-value of 0.736. The formed model is worth using, since the RMSEA is worth 0.188. With a P-Value of 0.005. A high R-Squared is given by two indicators, namely Limited Production Forest Area, and Fixed Production Forest Area, respectively valued at 0.968 and 0.790.

Keywords: MIMIC Model, Environmental Resources, Environmental Quality Indices, Math Modelling

IMPLEMENTATION OF LOGISTIC REGRESSION-BASED SELECTION FEATURES TO WORLD CLIMATE CHANGE DATA

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Abstract.

Climate change is one of the most major problems facing all countries throughout the globe. This issue must be addressed immediately since it has so many negative effects. The first step to overcome this problem is to predict the climate data by involving the factors that cause it. One of the algorithms that can predict it is logistic regression. This study will discuss a comparison of backward and forward feature selection methods based on logistic regression on climate change data. The data used is secondary data sourced from World Bank publications consisting of 8215 observations and 64 features with Total greenhouse gas emissions as the dependent variable. It is found that the best method was the forward selection logistic regression method with a balanced accuracy of 95%, followed by the backward selection logistic regression model with a balanced accuracy of 77.34%. Meanwhile, the logistic regression model without selection features has a balanced accuracy of 74.54%. It can be seen that feature selection can improve the model performance.

Keywords: backward selection, climate change, feature selection, forward, logistic regression

EXPLORING ABSTRACT ALGEBRA THROUGH DISCOVERY: LEVERAGING GAP SOFTWARE FOR INTERACTIVE LEARNING

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Abstract.

Transitioning from arithmetic to algebraic thinking is quite a difficult step students experience when studying algebra at university. The ability to think algebra is related to finding patterns from a mathematical problem or a particular contextual situation, making relationships between quantities, and generalizing them through formal symbolic representation and manipulation. One learning model that can be used to improve algebraic thinking skills is based on discovery learning. This study discusses using Groups, Algorithms, and Programming (GAP) software as a discovery learning-based abstract algebra learning tool. The use of GAP here is a tool to explain, explore, and discuss concepts and theorems in algebra, as well as provide various examples and exercises. This learning model makes students active both mentally and physically in attending lectures. Various kinds of experiments with GAP tools direct students to predict a conjecture. Thus, students can build an understanding of theorems in abstract algebra. Implementing this learning is applied in the Introduction to Abstract Algebra course, a compulsory subject in 3rd semester of the Mathematics Department at Tanjungpura University. This learning model is carried out in groups and makes students mentally and physically active in attending lectures. The evaluation results showed that around 72% of students taking the Introduction to Abstract Algebra course succeeded in formulating conjectures and understood the course material well.

Keywords: discovery learning, group theory, exploring conjecture, cyclic group

GEOGRAPHICALLY WEIGHTED NEGATIVE BINOMIAL REGRESSION MODELING TO DESCRIBE STUNTING CASES IN THE BARITO KUALA, SOUTH KALIMANTAN

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Abstract.

Stunting is a persistent nutritional condition in toddlers that causes them to be lower in height than other children their age. Stunted children are more prone to sickness and, as adults, are at risk of developing degenerative disorders. Even if the national frequency has reduced since 2019, the province of South Kalimantan still has a 24.6% prevalence and ranks fifteenth in Indonesia. Barito Kuala Regency, one of region in South Kalimantan Province, has the highest rate of stunting at 33.6%, which is in the Chronic-Acute category ($\geq 20\%$). As a result, the purpose of this study is to use the Geographically Weighted Negative Binomial Regressive (GWNBR) model to characterize the factors that cause stunting in Barito Kuala Regency. The GWNBR model will allow researchers to discover factors that influence stunting in each sub-district. The data used in this study were data from the Barito Kuala District Health Office and the Barito Kuala District Central Statistics Agency (BPS) for 2022 regarding the incidence of stunting and 8 (eight0 affecting variables in Barito Kuala District. According to the study's findings, there are 5 (five) factors that influence the emergence of stunted toddlers. These factors are complete basic immunization, iron pill administration, vitamin A administration, active integrated service stations, and healthy latrines. Each sub-district is influenced by a different number of factors; 13 sub-districts are influenced by three factors, while the remaining four sub-districts are influenced by four factors.

Keywords: Stunting Cases, Geographically Weighted Negative Binomial Regressive.

PREDICTING THE CONSUMER PRICE INDEX IN SOUTH KALIMANTAN PROVINCE USING SUPPORT VECTOR REGRESSION METHOD

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Abstract.

Inflation, which is a phenomenon that represents an increase in the price of goods and can cause a country's economic slump, is one of Indonesia's economic concerns. The Consumer Price Index (CPI) is a popular indicator for measuring inflation since it allows food price stability to be controlled by knowing the CPI number ahead of time. Support Vector Regression (SVR), a prediction method that finds the optimum hyperplane approach in the regression function that gives the smallest error, is one of the statistical methods that may be used to predict CPI. This study employs CPI data for the food ingredients category in the city of Banjarmasin from 2014 to 2022. For the parameter value C = 1 and epsilon = 0.0001, the best predictive model is obtained using the SVR method with the RBF kernel. The prediction model developed is very good and practicable, based on the MAPE value and the coefficient of determination acquired from the prediction. The CPI projection results in Banjarmasin for the foodstuffs category for the next 12 months show an increase, allowing the government and affiliated parties to make policy or anticipate steps.

Keywords: Consumer Price Index, Support Vector Regression, Banjarmasin

(λ, μ) − FUZZY SUBRINGS

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Abstract.

The theory of fuzzy sets in mathematics maps a non-empty set to a closed interval of [0,1]. The application of fuzzy sets to ring structures results in the concept of fuzzy rings, which has become the basis for further research in fuzzy algebra. One of these concepts is the concept of -fuzzy subrings, which generalizes fuzzy subrings. This research investigates the properties of (λ, μ)-fuzzy subrings concerning the intersection, union, Cartesian product operations, and level subsets. The research also involves studying the properties of -fuzzy subrings formed by the image and pre-image of a ring homomorphism. The results of this research include obtaining the properties of (λ, μ)-fuzzy subrings and investigating the properties of (λ, μ)-fuzzy subrings formed by the image and pre-image of a ring homomorphism.

Keywords: *fuzzy sets, ring, ring homomorphism, fuzzy subrings, (λ, μ)–fuzzy subrings.*

GENERALIZED RING AND HOMOMORPHISM OF GENERALIZED RING

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Abstract

A ring is defined as a non-empty set containing two binary operations. For the first operation, it has all the group axioms, like closed property, and associative, has an identity element, and each element has an inverse element. Then the second operation has all the axioms of the semigroup, and the two operations have the left and right distributive properties. The generalized ring concept extends the ring concept in algebraic structures. A generalized ring is defined as a set with two operations. The first operation has different properties from ordinary rings, which are closed and associative, each element has an inverse element, but each element has its own identity. A generalized ring is formed according to the identity difference of every element. This study aims to prove the fundamental properties of generalized rings and homomorphism of generalized ring using procedures starting from literature studies, explaining concepts or examples, and verifying all generalized ring properties and homomorphism of generalized rings. The results of this study are the truth and proven fundamental properties of the generalized ring and homomorphism of the generalized ring, which are adapted from the properties of the ring and homomorphism of the ring.

Keywords: *Ring, Generalized Ring, Homomorphism of Generalized Ring.*

MULTI-FUZZY SUBGROUP

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Abstract

The concept of fuzzy subsets extends the classical set with characteristic functions whose values are in the interval of 0 to 1. Multi-fuzzy set theory is an extension of fuzzy set theory, which has a membership function which is a collection of various fuzzy sets, with values ranging from 0 to 1. The concept of multi-fuzzy subgroups is a combination of group concepts and multi-fuzzy set concepts. The purpose of this study is to implement the fuzzy set theory and group theory in multi-fuzzy subgroups and also to introduce the definition of multi-fuzzy subgroups and prove the theorems and elementary properties of multi-fuzzy subgroups. The result of this research are the knowledge how a multi-fuzzy set is said to be a multi-fuzzy subgroup and proven the theorems and elementary properties of multi-fuzzy subgroups.

Keywords: Group, Subgroup, Fuzzy, Multi-fuzzy, Multi-fuzzy subgroup.

SCANNING ELECTRON MICROSCOPY AND MAGNETIC CHARACTERIZATION OF MAGNETIC MINERALS SUSPENDED SEDIMENTS FROM CITARUM RIVER, WEST JAVA, INDONESIA

Sudarningsih

Abstract:

Suspended sediments were collected from Citarum River, West Java, Indonesia. Their mineralogy and granulometry were analyses using vibrating sample magnetometer (VSM), X-ray diffraction (XRD) and scanning electron microscopy equipped with energy-dispersive X-ray spectroscopy (SEM-EDX) to discriminate the sources of magnetic minerals. Hysteresis parameters verify that the predominant magnetic mineral in suspended sediments is low coercivity ferrimagnetic minerals such as magnetite (Fe_3O_4), while SEM-EDX measurements are expected to show the difference between magnetic minerals derived from lithogenic processes and those derived from anthropogenic processes.

Keywords: suspended sediments, lithogenic, anthropogenic, heavy metal, rock magnetism

PERFORMANCE OF SULPHUR-DOPED ZnO BIOSYNTHESIZED FOR 4-NITROPHENOL POLLUTANT PHOTODEGRADATION

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Abstract.

Wastewater pollution is a major issue that requires proper treatment. This study aimed to enhance the pollutant photodegradation ability of pure ZnO by preparing a sulphur-doped ZnO (ZnO:S) photocatalyst. To minimize the use hazardous chemical, the biosynthesis method with bidara leaf extract (*Ziziphus mauritiana*) was chosen as an alternative for reaction stabilizers. For the synthesis, 0.05 M zinc nitrate hexahydrate was used as a precursore, which was reacted with sodium sulphide as the S dopant (at concentrations ranging 1 to 3%). Microwave irradiation was employed to improve the reaction rate and selectivity. The structural properties, morphology, optical absorption, and surface area of ZnO:S were characterized using X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), UV-Vis spectroscopy, and Brunauer-Emmett-Teller (BET) analysis, respectively. Additionally, ZnO:S photodegradation activity was evaluated against the pollutant 4-nitrophenol under UV irradiation. The crystal structure obtained was hexagonal wurtzite with a ratio of c/a=1.59 and a crystallite size of 12.81 nm. The doping led to a shift in the diffraction peaks, but no phase changes were observed in the ZnO structure with the addition of sulphur. The FESEM analysis revealed a flower-shaped morphology in all samples. The optical absorption peak of ZnO:S is shown at 356-363 nm with a bandgap energy of ~3.14 eV. ZnO:S exhibits a higher surface area (31.7 m^2g^{-1}) compared to ZnO (24.47 m^2g^{-1}). The highest photodegradation efficiency, reaching 85.89%, was achieved with 1% ZnO:S. Therefore, the incorporation of sulphur atom into ZnO through doping demonstrated an enhanced performance in the photodegradation of wastewater pollutant.

Keywords: Bidara leaf extract, Doping, Photodegradation, Sulfur, ZnO, 4-Nitrophenol

PREPARATION AND ELECTROCHEMICAL PERFORMANCES OF ACTIVATED CARBON DERIVED FROM THE MIDRIB OF *ROYSTONEA REGIA THROUGH OPTIMIZATION* OF ZnCl₂ MOLARITY FOR SUPERCAPACITOR MATERIAL

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Abstract.

Lignocellulosic based activated carbon derived on biomass is an abundant source of carbon in the universe that is renewable, economical, and environmentally friendly as energy storage. This study converts Roystonea regia (RR) midrib biomass to supercapacitor carbon material by optimizing the chemical activation process by varying the molarity of $ZnCl_2$. The activated carbon conversion process involves pre-carbonization, activation of $ZnCl_2$ (0.3, 0.4 and 0.5), carbonization and physical activation. The biomass was successfully converted into carbon which was confirmed from X-Ray Diffraction and Fourier Transform Infrared Spectroscopy characterization as well as Cyclic Voltammetry and Galvanostatic Charge Discharge measurement. The electrochemical performance of the RR supercapacitor cell was analyzed in a symmetrical two-electrode system in 1 M H_2SO_4 electrolyte solution. The RR-04 supercapacitor cell showed the highest specific capacitance of 174 Fg^{-1} at a scan rate of 1 mV/s. Furthermore, *Roystonea regia* midrib biomass is a potential raw material, as a carbon material for supercapacitor cells with high performance.

Keywords: Biomass, Roystonea regia, activated carbon, ZnCl₂ molarity, supercapacitor

SIMPLE DESIGN Of A LABORATORY SCALE ARCHIMEDES SCREW TURBINE

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Abstract.

Renewable energy is one of the efforts to equalize access to electricity, especially in Indonesia with characteristics of islands and hills. Indonesia is rich in various renewable energy sources such as solar, water, wind, ocean waves, etc. However, limitations in the management of renewable energy resources and the availability of technology are the problems that this potential has yet to be utilized. Therefore, this study carried out a laboratory-scale design of a micro hydro power conversion system based on an Archimedean screw turbine. Moreover, this study aims to obtain the optimal parameters of the Archimedes screw turbine system which can generate greater electric power. The INA219 sensor was used to calculate the power generated by the system. Based on the results of laboratory scale tests, it was found that the water flow rate, number and pitch angle of the blades affect the system's performance in generating electric power. Furthermore, the greater the flow of water used, the greater the power generated. While, for variations in pitch and number of blades, there is an optimum value.

Keywords: Archimedes Screw, Turbine, Laboratory Scale, INA219 Sensor, Power

SYNTHESIS AND CHARACTERIZATION OF OPTICAL PROPERTIES OF FERROELECTRIC THIN FILMS 0,6BaTiO$_3$-0,4BaZr$_{0,5}$Ti$_{0,5}$O$_3$ dan 0,7BaTiO$_3$-0,3BaZr$_{0,5}$Ti$_{0,5}$O$_3$ USING THE SOL-GEL METHOD

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Abstract.

Ferroelectric material is an excellent material used as an electronic device. This ferroelectric material also has a high dielectric constant value so it is good for use in Ferroelectric Random Access Memory (FeRAM) and microwaves. In this study, ferroelectric thin films of 0.6BaTiO3-0.4BaZr0.5Ti0.5O3 and 0.7BaTiO3-0.3BaZr0.5Ti0.5O3 were synthesized using the sol gel method. This thin film was made on a fluorine tin oxide (FTO) substrate which was then annealed at 700°C, 750°C and 800°C. This ferroelectric thin film was characterized using an Ultraviolet Visible (UV-Vis) Spectrometer to determine the absorbance, transmittance and energy band gap values. The energy band gap value of thin film 0.6BaTiO3-0.4BaZr0.5Ti0.5O3 at 700°C, 750°C and 800°C were 2.65 eV, 2.56 eV and 2.65 eV respectively and 0.7BaTiO3-0.3BaZr0.5Ti0.5O3 thin films at 700°C, 750°C and 800°C were 2.65 eV, 2.65 eV and 2.65 eV respectively. Increasing the annealing temperature does not significantly affect the value of the band gap energy. From the results of this study it was found that this thin film is a semiconductor material that can be applied and used as an electronic device that can work at ultraviolet light wavelengths.

Keywords: Thin film, sol-gel method, absorbance, transmittance, energy band gap

INVESTIGATION OF LANDSLIDE IN THE ULU MANNA DISTRICT, SOUTH OF BENGKULU BASED ON *HORIZONTAL TO VERTICAL SPECTRAL RATIO INVERSION*

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Abstract.

The value of $Vs30$ as an important parameter in predicting the movement of seismic waves. Data $Vs30$ can be obtained from microtremor data and ultrasound data. This research aims to identify avalanche zones based on HVSR inversion in Ulu Manna District, South Bengkulu in mitigating landslide disasters in the area. The amount of data used was 30 microtremor data measurement points. Microtremor data was processed using Geopsy software which was analyzed using the HVSR system, HVSR inversion was carried out using Hv-Inv software and value of $Vs30$ compared to a value of $Vs30$ from USGS data to obtain accurate results. The results of microtremor data research showed that the value of $Vs30$ in Ulu Manna District ranged from 243,96 m / s – 766,84 m / s and the soil site class was dominated by class D with medium soil texture which was classified as a high seismic vulnerability zone. The ratio of $Vs30$ from the results of microtremor data and USGS topographic models varies around 0.56 – 1.76. This shows that the results of data $Vs30$ microtremors are different, but not much different in value from data $Vs30$ USGS. Based on the results of microtremor data research conducted in the research area coupled with the results of rainfall data (2013 – 2022) in Ulu Manna District which is very high with a total of 3854 – 5513 mm per year, Ulu Manna District is classified as an area prone to potential landslides.

Keywords: $Vs30$, Microtremor, USGS, Seismic Vulnerability Zone, Avalanche.

ANALYSIS OF SOIL SITE CLASSES BASED ON MICROTREMOR MEASUREMENTS IN THE SOUTH BENGKULU REGION, INDONESIA FOR EARTHQUAKE DISASTER MITIGATION

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Abstract

Soil site class is a measure of rock strength in transmitting seismic waves, especially shear waves. Soil classification is characterized by the average shear wave velocity to a depth of 30 m (V_{s30}). This study aims to map earthquake-prone areas based on the V_{s30} value in the South Bengkulu region, Indonesia. To obtain the V_{s30} value in this study, a microtremor measurement was performed. The microtremor data obtained in the field is in the form of an H/V curve that is matched to the model curve, so that a shear wave profile is obtained. Furthermore, from the shear wave profile at a certain depth, the value of V_{s30} is obtained at each study location. The results of the study show that the distribution of V_{s30} values in the South Bengkulu area, Indonesia consists of three soil site classes, namely site class C, site class B, and site class A. Site class A consists of hard rock and site class B consists of rock, while site class C consists of very dense soil and soft rock. Site class B and class C are distributed on a southwest-northeast direction. For earthquake disaster mitigation, it is necessary to be aware of areas consisting of soft rocks. In general, this area is quite safe from the threat of earthquakes.

Keywords: site class, microtremor, shear wave, V_{s30}, earthquake.

LASED INDUCED FLUORESCENCE IMAGING FOR RIPENESS DETECTION OF ON TREE-OIL PALM FRESH FRUIT BUNCHES

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Abstract

Ripeness detection of oil palm Fresh Fruit Bunches (FFBs) before harvesting is very crucial factor for obtaining good quality FFBs sent to oil mills. Traditional ripeness detection of FFBs is based on FFB surface colour and number of loosed fruitlet above ground. It is prone to subjectivity and difficulty for higher oil palm trees. Developed ripeness detections of FFB are mostly based on computer vision methods. This study proposed a laser induced fluorescence imaging (LIFI) to detect the ripeness of oil palm FFBs. The LIFI system consisted of a USB-monochrome CMOS camera with lens, two diode lasers with 405 nm and 650 nm in wavelengths, and an optical filter. The relationship of fluorescence intensity and ripeness stages of FFBs which were quantified by their firmness levels were evaluated. On tree-oil palm FFBs from Tenera Variety with 3 meter in height which were estimated to be harvested were used as samples. Five fruits from 3 parts of each FFB were illuminated by a focus laser beam and their images were recorded by the camera. The FFBs were then harvested. The fruits were detached for firmness measurement. ROI of 50 x 50 pixels was used to obtain grey values of each image which represents fluorescence intensity by ImageJ software. Laser with 650 nm in wavelength shows higher linear correlation between Fluorescence intensity and firmness levels ranges from 0.52-0.87. Fluorescence intensity decreases as firmness level increases. Higher correlations are also obtained for fruits on middle parts. There is inconsistency of results using the 405 nm laser. Lased induced fluorescence imaging technique is potential for estimating ripeness levels of on tree-oil palm FFBs.

Keywords: Laser Based Imaging, Oil palm fresh fruit bunches, Ripeness, Firmness, Height

INFRARED APPLICATION IN GRANULAR FLOW RATE MEASURING SYSTEM

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Abstract.

The motion characteristics and granular flow rates greatly affect the effectiveness of the production process and the quality of the products produced, one of them is in the pharmaceutical field. However, granular flow rate measurements in laboratories are still manually and in limited quantities. So that in this study, the infrared sensors are used to measure granular flow rates automatically based on microcontroller. The infrared sensor will respond to the flow rate of objects in front of it. When there is a granular in front of the sensor, it will be read as high signal and the other will be read as low signal. The voltage signal will be further processed by the microcontroller so that the granular flow rate can be measured. Several granular in different sizes have been tested on flow rate measurement systems based on infrared sensor. Based on the test results, it was obtained that the infrared sensor has been able to detect granular flow rates in the speed range of 15.424 – 23.357 cm/s.

Keywords: Granular, Infrared, Flow rate, Microcontroller, Measurement.

IDENTIFICATION OF RIP CURRENT ZONES
IN THE PANTAI PANJANG WATERS OF BENGKULU CITY

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Abstract

The Pantai Panjang of Bengkulu City still carries a high risk of accidents, such as being dragged to the offshore. The dragging of tourists to the offshore is to be due by rip current. So, research on the identification of rip current zones in the Pantai Panjang area of Bengkulu City needs to be done. This study uses direct measurement and visualization using drones. Data processing using descriptive method. This area is divided into 3 zones, namely zone 1 Pasir Putih, zone 2 Pantai Panjang, and zone 3 Malabero Marola. The results of this study indicate that the Pantai Panjang of Bengkulu City belongs to the type of sloping beach and the characteristics of a beach that has high waves. Pantai Panjang has a plunging type of breaking wave. The current velocity of rip current in zone 1 gets an average value i.e. 0.18 m/s, in zone 2 is 0.22 m/s, and in zone 3 is 0.25 m/s. Coastal slope greatly affects the occurrence of rip current. Zones have the potential for the emergence of very large rip current, namely zone 3, then zone 2 and zone 1. Pantai Panjang Bengkulu City are included in the accretionary beach rip type.

Keywords: *Pantai Panjang of Bengkulu City, Rip Current, Beach Slope, Breaking Waves, Plunging*

ARENGA PINNATA FIBERS-DERIVED ACTIVATED CARBON FOR HIGH PERFORMANCE OF SYMMETRICAL SUPERCAPACITOR

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Abstract.

Biomass-derived activated carbon materials and supercapacitor electrode materials based on them have attracted much attention over the past years. In this work, activated carbon has been prepared from *Arenga pinnata* fibers (APF) as an electrode material for a symmetrical supercapacitor through the two-different preparation process, i.e. (i) variation in carbonization temperatures (500, 550, and 600 °C), and (ii) variation in KOH concentrations (0.2M, 0.3M, and 0.4M). The morphology, elemental compositions, and phase structure of the APF-AC were characterized using SEM, EDS, and XRD, respectively. Based on SEM images, the different preparation process resultant different in surface morphology of APF-AC. The APF-AC500 and APF-AC600 exhibits a rod-like morphology. Meanwhile, the APF-AC0.2 and APF-AC0.4 have un-uniform porous structure. The APF-AC0.4 exhibits an optimum specific capacitance of 176 F g^{-1} with an energy density of 24.44 Wh kg^{-1} at a power density of 58.69 W kg^{-1} in 1M H_2SO_4 electrolyte. Based on these results, activated carbon prepared from Arenga pinnata fibers has huge application prospects and promising for use as a supercapacitor electrode material.

Keywords: Arenga pinnata fibers; activated carbon; electrode materials; symmetrical supercapacitor

PERFORMA OF ACTIVATED CARBON FROM WATER CHESTNUT (Eleocharis dulcis) AS Fe ADSORBENT

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Abstract.

Performa of activated carbon from water chestnut (Eleocharis dulcis) in adsorbing metal Fe of peat water would be reported in this article. The water chestnut plants, which were taken from Kabupaten Barito Kuala, South Kalimantan, were carbonized at 400 ^{0}C. The carbonized time were varied for 1 and 2 hours. Then the carbons were activated by KOH and H_2SO_4 solutions. The activated time were also varied for 1 and 2 hours. The activated carbon of 60 and 120 mesh in size were placed in peat water to investigate its metal Fe adsorption capacity. The results showed that the efficiency of metal Fe adsorption were in the range of 7.73-22.94%. It is depended on its carbonization time, activator and sizes.

Keywords: Peat water, Barito Kuala, carbonization time, adsorption capacity, activator.

KETAHUN SEGMENT OF SUMATRAN FAULT SYSTEM IS CREEPING OR LOCKING; INSIGHT FROM GPS INTER-SEISMIC DEFORMATION ACROSS THE FAULT

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Abstract

The Ketahun segment of the Sumatran Fault System (SFS) has produced significant earthquakes in the past. Recently, this segment seems tectonically active but earthquakes are very rare. The study aims to determine the inter-seismic deformation using GPS data. Then we also aim to investigate whether the segment is creeping or locking in the last decade through modeling slip rate, locking depth, and the stored accumulated energy along the Ketahun segment. In order to capture inter-seismic movement crossing the fault, in 2018, we had installed 5 GPS stations supported by DDRG project. We used GPS data from these sites and combined with GPS data from the Indonesian Continuous Operating Reference System (Ina-CORS). The GPS data were processed using GAMIT/GLOBK to obtain time series positions for each GPS stations. The results show the slip rate in the segment is 14 ± 0.2 mm/yr with a locking depth less than 20 km. These results indicate that the Ketahun segment seems to be locked and capable of producing an earthquake of Mw ~ 6-7 if a single event occurs by present day. This estimated was made by calculation that the segment has 170 km and assumption of rigidity of the subsurface is 3×10^{11} dyne/cm2. Beside further investigation by more GPS data to obtain more accurate slip rate and locking depth, serious action on seismic hazard preparedness is very vital and important to carried out in the region.

Keywords: Sumatra Faut, Ketahun, slip rate, locking depth, and earthquake

THE EFFECT OF SHIELDING MATERIAL DENSITY IN MUON TOMOGRAPHY

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Abstract.

In recent years, the use of high-penetrate cosmic-ray muons has been used in many application to investigate the internal structure and composition of large material. The muon attenuation based on multiple Coulomb scattering. This study was aimed to investigate the effect of massive shielding material composition in muon tomography. Muon with various energy between 1 MeV to 100 MeV was used as source located directly above the shielding material with different density and composition. The output of scattered muon was scored in 2 and 5 km after the material. The simulation was performed using particle and heavy ion transport system (PHITS) software developed by Japan Atomic Energy Agency. The attenuation and scattering of the muon depends predominantly on the shielding material density. The muon energy and flux was decreased with increasing of depth of muon detector. This muon tomography can be applied in investigating the structure and internal composition of unknown materials such as volcanic structures in Indonesia

Keywords: Muon, muon tomography, muon scattering, PHITS, shielding

STUDY OF SEISMIC VULNERABILITY IN KERINCI AREA NEAR STRIKE-SLIP SIULAK-KERINCI SEGMENTS USING SEISMIC METHOD

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Abstract.

The Sumatran Fault System (SFS) and Kerinci Volcano are located near Kerinci Regency. With the presence of SFS especially Dikit and Siulak segments, and Kerinci volcano around Kerinci Regency, this area becomes very vulnerable to earthquakes. In order to reduce the impact of disaster risk due to earthquakes, in this study, we aim to study seismic microzonation around the Kerinci area through ambient noise measurements at 34 sites either a 30-minute data acquisition. We carried out field surveys with seismic broadband seismometer PASI Gemini-2 triaxial geophone with natural freq. 2 Hz $\pm$ 10%. Seismic data collections were acquired with a sampling rate of 5 ms (200 Hz). We analysed the characteristics of the dominant frequency ($f0$), amplification factor ($A0$) to determine the vulnerability of seismic potential in the region. Using the Horizontal to Vertical Spectral Ratios (HVSR) analysis, we found that the $f0$ ranges from 0.5-6.6 Hz, and the $A0$ ranges from 3.09-6.69. We observed that the distributions of high amplification factor areas are located in the Pondok Muara Jernik, Siulak Deras and Jujun areas while high amplification factor are placed in the Selai, Sungai Penuh and Pondok Danau Lawas. We found high dominant frequencies of ~ 6.6 Hz at in the Pondok Muara Jernik and Sungai Galampei areas. Further study will be conducted in order to understand seismic vulnerability index as well as potential ground acceleration associated with anticipated earthquakes in the region.

Keywords: Kerinci Volcano, PASI Gemini-2, Microtremor, HVSR, Seismic Potential Vulnerability.

C. CHEMISTRY AND ENVIRONMENTAL SCIENCES

C – 01

MUCOR sp. (Fungal Philospheric) Of GAMBIR LEAF SURFACE (Uncaria) As A Biosynthetic Mg-doped ZnO Nanorods Media For ANTIBACTERIAL APPLCATIONS

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Abstract

The antibacterial activity of ZnO-NRs compounds has been tested for its ability to inhibit the cells of pathogenic bacteria such as Staphylococcus aureus and Salmonella sp. Therefore, thisstudy aims to increase the antibacterial activity through the modification of ZnO morphology with doped Mg^{2+}ions under sol-gel-hydrothermal synthesis conditions at pH 10-12. The mechanism of biosynthetic reactions was followed using enzymatic grooves of the cell phyllosphere isolate of gambir leaves (Uncaria) as a reducing compound and capping agent. The XRD analysis showed ZnO and Mg-doped ZnO products were wurtzite structures based on intensities 2θ = 31.78°, 34.43°, 36.27°, hkl (100), (002), (101), consisting of hexagonal geometry (ICSD standard -157724). Mg-doped ZnO has the same intensity as the control and no impurity intensity is obtained. SEM-EDX analysis gives nanospheric morphological patterns, whilenanorods have a more dominant size distribution in the range of 125-175 nm. FT-IR analysis at wave numbers 401-584 $cm^{-1}$is a Zn-O stretch. Furthermore, UV-DRS analysis indicated optical properties based on the uptake on blue-shift regions with $\lambda max \leq 400$ nm and had a change in the bandgap (E_g) value, namely ZnO: 3.37 eV after conversion on Tuoc-Plot. The greater the concentration of Mg^{+2}ions, the smaller the bandgap value of 3.13, eV, 3.10, eV, 3.11eV, and 3.12 eV. Based on the antibacterial activity against bacteria Gram (+) Staphylococcus aureus and Gram (-) Salmonella sp., the largest inhibitory zone is in Gram (-) bacteria at 24 mm.

Keywords: Philospheric, Uncaria Gambir, Biosynthesis Mg-doped ZnO, Nanorods, Anti Bacterial

MERCURY BINDING ANTIOXIDANT ENZYMES OF OREOCHROMIS NILOTICUS: IN SILICO EVALUATION

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Abstract.

Mercury enters aquatic organisms through the food chain. Fish are animals that are most likely to be exposed to mercury. Mercury in the fish causes the formation of Reactive Oxygen Species (ROS) and affects the activity of antioxidant enzymes in fish, such as Superoxide dismutase (SOD), Catalase (CAT) and Glutathione Peroxidase (GPX). This study aimed to determine the interaction of Hg(II) with amino acid residues in the antioxidant enzyme of tilapia (Oreochromis niloticus). This in silico study utilizes the protein sequence database on Uniprot. Enzyme modeling using SWISS-MODEL. The interaction of Hg(II) with the enzyme model was obtained from the results of docking using MIB (Metal Ion-Binding site prediction and docking server). The results showed that some residues of Ala, Arg, Asp, Cys, Glu, Gly, Leu, and Tyr had coordination metal bonds with Hg(II). The residues of His and Phe interact cationic phi with Hg(II). Residues Ala, Arg, Asp, Cys, Leu, Gln, Glu, Gly, His, Met, Pro, Ser, Thr, Trp , Tyr and Val showed hydrophobic interactions with Hg(II). Residues that interact with Hg(II) are residues with nucleophilic groups: sulfhydryl groups, carbonyl groups, aromatic groups and cyclic groups. These results can be used to evaluate interactions between mercury and amino acid residues in other proteins

Keywords: *metal binding, docking molecular, protein modeling, antioxidant enzyme, Oreochromis niloticus, Catalase*

ANALYSIS Of THE BALANGAN RIVER POLLUTION In BALANGAN REGENCY BASED On THE STORET METHOD AND POLLUTION INDEX (PI)

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Abstract

Balangan Regency has a main river, namely the Balangan River which flows through 8 Districts. The Balangan River is used by the community in addition to their daily needs, it is also used for agricultural, plantation and farm purposes. In addition, the Balangan River also receives waste discharges from various domestic activities and industrial activities. This activity is suspected to be the main cause of the decline in the water quality of the Balangan River in terms of physical, chemical and biological parameters. Therefore, for better mitigation and management of the quality of the Balangan River, this research needs to be carried out. The purpose of this study was to determine the pollution status of the Balangan River using the STORET method and the Pollution Index based on the measured physical, chemical and biological parameters. Water quality measurements were carried out from the 1st quarter of 2015 to the 3rd quarter of 2022. The measurement results were compared with the quality standards according to South Kalimantan Governor Regulation Number 05 of 2007 and Government Regulation of the Republic of Indonesia Number 22 of 2021. Based on calculations using the STORET method, the water quality status of the Upper Balangan River is -54 (heavily polluted) and -38 (heavily polluted) for the Balangan Downstream. While using the Pollution Index method, the average value for the Upper Balangan River is 1.38 (moderately polluted) and the Balangan Downstream River is 1.24 (moderately polluted). Further analysis of the behavior of the people around the river in their activities of utilizing river water, the behavior of waste and domestic waste management on the effect on river water quality, so that it is hoped that the people around the river can pay more attention to and maintain the environmental quality of the Balangan River and its surroundings for sustainable use.

Keywords: Balangan River, Pollution index, STORET method, Water quality

MICROPLASTIC POLLUTION In SURFACE WATER AND SEDIMENT Of MANINJAU LAKE In AGAM, INDONESIA

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Abstract

The use of plastic materials in everyday life has led to the introduction of microplastics (MP) into the aquatic environment, namely plastics less than 5 mm in size. MPs have received great attention in recent years due to their impact on humans and organisms as they absorb organic and pathogenic contaminants from the surrounding media. The purpose of this study was to analyze MP abundance, shape, color, size, and polymer characteristics at five water and sediment sampling stations in Maninjau Lake. Water and sediment samples were subjected to an extraction process to obtain MP, then analyzed using a microscope and ATR-FTIR. The MP abundance in the Maninjau Lake water samples ranged between 180 and 335 particle L-1, and in the sediment samples ranged between 2300 and 5750 particle kg-1.The most dominant shapes, colors, and sizes found in water are fragments (12.5%), black (68,37%), and sizes 101-300 μm (49%), and in sediments are fragments (40.4%), black (76,90%), and size 101-300 μm (51.34%). Based on the results of the characterization and interpretation of the functional groups in the FTIR spectrum, the polymer types are PA Polyamides (PA), Polypropylene (PP), Polyvinyl chloride (PVC) and, Polyethylene terephthalate (PET). The results of this study can be used as information to help develop effective plastic waste pollution control.

Keywords: Microplastics, surface water, sediment, MP abundance

ANTIOXIDANT ACTIVITY, DETERMINATION OF SPF VALUE AND SCREENING PHYTOCHEMICAL OF EXTRACT ETHANOL LEAF SURIAN (*Toona sinensis*) IN VITRO

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Abstract

Antioxidants can be produced by the body itself in inhibiting free radicals through cell oxidation reactions, but the body is more dependent on antioxidants from outside. one of them is an antioxidant that comes from nature, where its availability is abundant in nature without side effects. Surian leaves (*Tonna sinensis)* is a plant that has the potential as a source of natural antioxidants which are widely used as traditional medicines and cosmetics. The many bioactive compounds contained in it include gallic acid, methyl gallate, kaempferol, quercetin, rutin, quercitrin, palmitic acid and linoleic acid. This study aims to determine the phytochemical screening of the ethanol extract of surian (*Toona sinensis*) leaves, determine the antioxidant activity in vitro and determine the SPF value of the ethanol extract of surian (*Toona sinensis*) leaves. The phytochemical screening was carried out using the qualitative TLC method. Testing the antioxidant activity using the DPPH method while determining the SPF value with the Mansur method. The results showed that the ethanol extract contained polyphenolic compounds, tannins, flavonoids, monoterpenoids, quinones and saponins with Rf values of 0.670 (terpenoids) and Rf 0.543 (flavonoids). The antioxidant activity test of the ethanol extract of surian leaves (*Toona sinensis*) resulted in an IC50 value of 12.351 ppm which is close to the IC50 value of the comparator vitamin C control of 7.805 ppm while an SPF value of 29. From the results of the study it can be concluded that the ethanol extract of surian leaves (*Toona sinensis*) contains flavonoid compounds with very strong antioxidant activity as well as ultra protection against ultraviolet rays.

Keywords: antioxidants, surian leaves, SPF

Calotropis gigantea DERIVED CARBON DOTS FOR BREAST CANCER BIOIMAGING

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Abstract:

We aim to study the synthesis and application of carbon dots derived from dried latex of *C. gigantea* (G-CDs) for cancer related therapy and diagnosis. Previously, we established that carbon dots prepared from biologically active sources often tend to possess similar to better activity compared to the starting material. *C. gigantea* is a shrub whose latex is rich in constituents with anticancer biological application. Thus, this could be an invaluable source for carbon dots with application in cancer diagnosis. The carbon dots were synthesized by pyrolysis at 300°C for 2hrs in a furnace. Then the CDs were further characterized by UV/vis and FTIR spectroscopy; PL spectroscopy and DLS. Furthermore, confocal microscopy was used for imaging breast cancer cell lines (MDA-MB-231). G-CDs showed excellent stability at different conditions of pH, temperature and ionic strength. Furthermore, CLSM was used to image the fluorescent carbon dots in breast cancer cell lines MDA-MB-231. DLS indicated that the CDs have a size around 8nm. PL confirmed fluorescence property with QY of 19.23%. FTIR indicates the presence of various functional groups that include hydroxyl ($3268cm^{-1}$) and carbonyl groups ($1661cm^{-1}$). CLSM showed that CDs successfully entered into MDA-MB-231 cell lines and fluorescence as they were excited with laser light. In summary, latex sourced fluorescent carbon dots with potential application in breast cancer diagnosis were synthesized.

Keyword: Carbon dots, fluorescence, Quantum Yield, Confocal Microscopy, Bioimaging, Diagnosis

MINERALOGICAL STUDY OF OCHER AS A PIGMENT MATERIAL FROM ROCK ART OF THE MUNA SITE USING A SYNCHROTRON-BASED X-ray RADIATION TECHNIQUE

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Abstract.

Ocher is an iron-rich natural mineral commonly used as a pigment to produce red, yellow, and purple colors in prehistoric rock art. This study uses an accelerating energy-based (synchrotron) X-ray radiation characterization technique to identify the mineral component of pigment material from rock art at the Muna site, Southeast Sulawesi. Crystal phase analysis using SR-XRD showed the presence of crystalline phases from goethite, hematite, and quartz in the pigment samples. Chemical species analysis using XANES also showed that the components of iron compounds with a valence of 3+, namely goethite and hematite, are octahedrally coordinated. The mineral components of goethite, hematite, and quartz given in the SR-XRD and XANES analysis results, identify natural ocher minerals as pigment materials in rock art at the Muna site, Southeast Sulawesi.

Keywords: Synchrotron, XRD, XANES, goethite, hematite, Muna site

VARIATION OF SINTERING TEMPERATURE IN THE SYNTHESIS OF FLUORAPATITE MADE FROM SNAIL SHELLS (Achatina fulica) USING THE SOL-GEL METHOD

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Abstract

Dental caries can cause cavities and porous and even broken teeth. There is a need to treat dental caries by extracting and replacing natural teeth with implants. Fluorapatite can be used as a dental implant material. Fluorapatite can be synthesized from snail shells. A snail shell contains 98% calcium carbonate. This study aims to identify the characteristics of fluorapatite and determine the effect of variations in sintering temperature on the synthesis of fluorapatite made from snail shells using the sol gel method. Variation of sintering temperature used is 700, 900, and 1100 °C. The results showed that fluorapatite synthesized with the sintering temperature of 900 °C had the highest crystallinity based on the results of the XRD spectrum of 83% with the apatite phase at an angle of 31.81%, crystal size of 79 nm, and particle size of 0.5 µm. FTIR analysis on the sample showed the presence of OH, OH-F, and PO_4^{3-} functional groups. The sample showed a spongy surface morphology with hexagonal-shaped flowers. A Ca/P molarity ratio of 1.67.

Keywords : crystallinity, dental implants, fluorapatite, snail shells, sol-gel

CONVERSION OF PP AND LDPE TYPE OF PLASTICS INTO LIQUID FUEL USING PYROLYSIS METHOD

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Abstract

The use of plastic waste as an ingredient to produce fuel oil is an alternative that can increase economic value, and also can solve environmental problems. This study discusses the effect of the mixture of PP and LDPE plastic ratios on the quality and characteristics of the oil produced by the plastic pyrolysis. Plastic pyrolysis is a thermal cracking process of high molecular mass polymers without oxygen and produces low molecular mass compounds. The results showed that pyrolysis oil obtained can be classified into diesel fuel which has C12-C24. The quality of the oil produced by pyrolysis includes heating value, viscosity and density having similarities to the standard gasoline.

Keywords: Plastic, waste, pyrolysis, diesel fuel, cracking

UTILIZATION OF LOW COST ADSORBENT HCL ACTIVATED FLY ASH FOR THE REMOVAL OF REMAZOL BRILLIANT BLUE

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Abstract.

The use of synthetic dyes can have a negative impact on the environment. Waste water containing synthetic dyes can be toxic and damage the environmental ecosystem. Remazol Brilliant Blue is an azo dye that is widely used in textile dyeing. Fly ash activated by HCl and hydrothermally at 400-500 °C has been used to reduce the concentration of Remazol Brilliant Blue dye in synthetic solutions. Activated fly ash adsorbents were characterized by physic chemical analysis like as porosity, surface area, XRF, SEM and FTIR. The results of the FTIR characterization analysis showed the presence of Si-O, and -OH groups, the analysis of SEM showed that the surface has pores that are evenly distributed on the surface of the fly ash, while the XRF analysis showed the presence of CaO, SiO_2, Fe_2O_3 and Al_2O_3. In the SAA analysis, the surface area of the adsorbent was 13.6153 m^2/g and the pore volume was 0.134 cm^3/g. The activated fly ash by HCl and hydrothermal were used adsorption of Remazol Brilliant Blue dye. The adsorption was obtained at pH 3, contact time 60 minutes, concentration of Remazol Brilliant Blue absorbed was 200 mg/L with an adsorption capacity of 69.08 mg/g. Adsorption equilibrium data were carried out using the Langmuir and Freundlich isotherm models

Keywords: Adsorption, Fly ash, Remazol Brilliant Blue, Isotherm Langmuir and Freundlich

CORROSION INHIBITION EFFICIENCY OF MILD STEEL BY COFFEE BEAN HUSKS EXTRACT IN SULFURIC ACID SOLUTION ON THE EFFECT OF TEMPERATURE

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Abstract.

Coffee bean husk is a waste in the coffee industry and has not been used optimally. Coffee bean husk contains tannins and flavonoids. Inhibition of steel against corrosion was carried out at temperatures of 303, 313, 323, and 333K with various concentrations of coffee bean husk extract 0.5; 1.0; 1.5; 2.0; and 2.5 g/L. The results of FT-IR and SEM characterization show that a thin layer has been formed on the steel surface. The efficiency of steel corrosion inhibition increases with increasing concentration of coffee bean husk and decreases with increase. Coffee bean husk has the potential as a corrosion inhibitor.

Keywords: Corrosion, coffee bean husk, inhibitor, mild, efficiency

THE SYNTHESIS AND CHARACTERIZATION OF CaO CATALYST FROM *Anadara Granosa* IMPREGNATED SiO₂ FROM COCONUT HUSK WASTE AS HETEROGENEOUS CATALYSTS FOR BIODIESEL PRODUCTION.

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Abstract.

Biodiesel production using blood clam shell CaO catalyst with CPO as raw material has been carried out and the yield reaches 86% through the transesterification reaction, but the purity of the biodiesel was still low due to the formation of emulsions or saponification during the reaction. Modification of the CaO catalyst with silica (SiO_2) is expected to increase the total surface area and biodiesel yield. The aim of this study was to synthesize and characterize CaO-SiO_2 heterogeneous catalysts and their application in biodiesel production through the transesterification reaction of crude palm oil (CPO). In this study the CaO catalyst was derived from blood clam shells which were calcined at 900°C for 5 hours, while silica (SiO_2) was derived from coconut husk waste. Synthesis of CaO-SiO2 catalyst was carried out by impregnation method with the variation of Silica content (3,5 and 7 % w/w SiO_2). The results of XRD analysis showed that the addition of Silica on the CaO catalyst decreases the crystallinity and crystal size, and the maximum reduction was at 5% silica. The BET surface area showed that the more silica added to the CaO catalyst the total surface area increases and the optimum was at 5% SiO2. CaO-SiO_2 catalyst was applied to biodiesel production through a transesterification reaction of crude palm oil (CPO) with variations in reaction temperature, and silica content. The results showed that the maximum biodiesel production occurred at 60°C and there was a relationship between the surface area and the biodiesel yield produced.

Keywords: CaO, anadara granosa, silica, coconut husk waste, biodiesel.

SYNTHESIS OF SCHIFF'S BASE FROM BREADFRUIT STARCH (*ARTOCARPUS ALTILIS*) DIALDEHYDE-ANILINE AND ANTIBACTERIAL ACTIVITY TESTS

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Abstarct

The Schiff based on synthesized through a condensation reaction between dialdehyde starch (PDA) and aniline, where PDA is obtained from starch oxidation using a periodic sodium oxidizer. The formation of dialdehyde starch is qualitatively supported by the formation of brick red sediment with the addition of Fehling reagents as well as increasing its solubility in water and the results of FT-IR analysis provide a spectrum with vibrational peaks at wave number 1635.64 cm-1 which shows the C=O aldehyde group. The resulting dialdehyde starch has an oxidation degree of 80.9% with a carbonyl level of 10.36%. The schiff based on synthesized through the PDA condensation reaction with anillin. The formation of the Schiff based on supported by the results of the FT-IR analysis giving a spectrum with a vibration peak at the 1635 wave number, 64 cm-1,1604.77 cm-1 which shows the formation of amine bonds (-C = N-) and at wave number 871.82 cm-1 indicates the aromatic ring. The condensation results between the amine group of aniline and the aldehyde group of the PDA. Antibacterial activity test on the Schiff base was carried out using the disk diffusion method, for the Schiff base resulting from a PDA condensation reaction with aniline against S. aureus giving a clear zone diameter of 11.5mm; Thus the Schiff base PDA condensation results with aniline has a fairly good antibacterial properties against S. aureus bacteria.

Keywords: Antibacterial, Schiff base, Aniline, *Oxidation, starch*

BIOFLOC-BASED CATFISH CULTIVATION IN FISHPOND AND ITS EFFECT ON DYNAMICS OF WATER QUALITY

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Abstract

This study aims to monitor and maintain the dynamics and fluctuations of water quality so that it is within the optimal range and to ensure the good growth and health of catfish based on biofloc. For this reason, treatment A (100 mL biofloc + 2 kg carbonization + 50 pieces bio balls) was used; B (150 mL biofloc + 2 kg carbonization + 50 pieces bio balls); C (200 mL biofloc + 2 kg carbonization + 50 pieces bio balls), and D (250 mL biofloc + 2 kg carbonization + 50 pieces bio balls). Except for the BOD/COD ratio, the water quality concentrations of DO, BOD, COD, ammonia, nitrite, and nitrate in water that were examined were below acceptable limits. It is suggested that there was a need for continuous water quality analysis in catfish ponds based on biofloc. Water quality is always dynamic and fluctuating due to human activities, natural processes, and the interaction between water and the surrounding environment. Therefore, monitoring water quality dynamics was important to ensure that water quality standards were met, and necessary action could be taken if problems were found. These findings suggest that regular monitoring of water quality was necessary to guard against the long-term effects of their presence in water, affecting fish and human uptake.

Keywords: Biofloc, dynamic and fluctuating, bio balls, carbonization

SYNTHESIS Of Ni/H-Analcime FROM SUGARCANE BAGASSE ASH SILICA AS A CATALYST FOR ISOMERIZATION GLUCOSE

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Abstract.

Biomass waste which is quite abundant in Lampung Province such as bagasse has not been widely used as a more valuable product, especially in the industrial sector. In this study, the H-ANA hierarchically zeolite synthesis was carried out using modified silica based on bagasse ash (Sugarcane Bagasse Ash/SCBA) which is modified with Ni metal and studied its catalytic activity in the glucose isomerization reaction. The steps carried out in this research were the extraction of silica SCBA as the main precursor in the synthesis of zeolite, then the synthesis of hierarchical ANA zeolite zeolite at 170 °C for 120 hours using the Steam-Assisted Crystallization (SAC) method with the addition of starch as a mesoporogen and the ANA zeolite catalytic test. synthesized in glucose isomerization reactions. Based on XRD analysis, the extracted silica (SCBA silica) has an amorphous phase with a Si/Al ratio of 1.42 and is confirmed to have silanol (Si-OH) and siloxane (Si-O-Si) groups. ANA zeolites synthesized with and without the addition of mesoporogen have also been successfully synthesized with a diffraction pattern that is very similar to the standard ANA diffraction pattern and has good crystallinity, respectively 76.08% and 74.53%. The hierarchical pore zeolite H-ANA synthesized with the addition of mesoporogen has a surface area of 61.635 m^2g^{-1}, a pore volume of 0.04 cm^3g^{-1} and an additional pore of 2.30 nm. The optimum condition for the catalytic test for the isomerization of glucose to produce fructose was at 80 °C for 30 minutes with a catalyst amount of 0.03 g. The highest glucose conversion was obtained using a Ni/H-ANA catalyst with the addition of starch which was 38.14%.

Keywords: zeolite, analcime, hierarchically, catalyst, glucose, isomerization reaction

RUTHENIUM COMPLEX AND METYL DENDRIMER COMPOUNDS AS ARTIFICIAL PHOTOSYNTHESIS. FIRTS PRINCIPLE STUDY FOR RENEWABLE ENERGY

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Abstract.

A calculation of the potential application of a metyl dendrimer as a light-absorbing molecule in an artificial photosynthetic system using density functional theory method was completed. The objectives of this research were to determine the ability of polyphenylene dendrimer molecules in the electron transfer and to study a chlorophyll-like polyphenylene metyl dendrimer in terms of its ability to harvest light. For a ruthenium complex after a stable structure was obtained, its UV-Vis absorbance was tested. Absorption was found at wavelengths of 1445.54, 1188.49, 943.09, 71.20, and 67.48 nm. Based on its HOMO and LUMO positions, the ruthenium complex was also suggested to be capable of electron transfers. For the optimized polyphenylene metyl dendrimer structure was found to have -8390.9026 J of energy with RMS value of 0.0002 J. Electron transfer activity occurs around where HOMOs and LUMOs are found in the polyphenylene dendrimer at $-1.0453 \times 10^{-7}/-1.9022$ nm with 10^{-18} J of energy and wavelength absorption within UV spectrum range, suggesting the ability to harvest light similar to that of chlorophyll. **Objective and Research Questions:** The purpose of the study about computational chemistry. **Relevance and Context:** The phenomenon the study is trying to address and how it is relevant. Artificial photosynthetics study. **Theoretical Framework:** The energy of HOMO-LUMO level molecules. **Data Analysis:** The Firts principle methods and two molecule artificial photosynthetics. **Findings/Observations/Arguments:** Renewable energy study. **Potential Contributions:** The alternative of renewable energy strategy

Keywords: Artificial photosynthetic, Energy of molecules, Ruthenium complex, Metyl dendrimer

CHARACTERIZATION Of BIOSURFACTANTS From LOCAL INDIGENOUS MICROBES In THE SEDIMENTS Of PANJANG PORT WATERS, LAMPUNG

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Abstract.

Biosurfactants are surface-active compounds produced by microbes. This compound has hydrophilic and hydrophobic groups so that it can reduce the surface tension of the liquid and the interfacial tension between the two different phases and increase the stability of the emulsion. Biosurfactants have several advantages compared to synthetic surfactants, including low toxicity, biodegradability, and high activity at extreme temperatures, pH, and salinity. Biosurfactants can be applied in various fields such as bioremediation, pharmaceutical, and food industries. This study aims to determine the type of biosurfactant produced by local indigenous microbes from the sediments of the waters of Panjang Port, Lampung The methods used include biosurfactant production, biosurfactant extraction using acid precipitation method, and biosurfactant characterization using TLC and FTIR. Biosurfactant testing was carried out by measuring the emulsion index, oil spread, and drop collapse. Production of biosurfactant under optimum conditions of 3% glycerol, 0.6% sodium nitrate, pH 7, and 0.3% saline produced biosurfactant with 75% emulsification index, 3 cm oil spread, and positive drop collapse test. The extraction stage obtained a brownish-yellow biosurfactant of 0.1087 g/L. TLC analysis revealed the presence of a characteristic pink stain of lipopeptide biosurfactant. This result is supported by FTIR data, namely the presence of absorption at 3280 cm-1 which is a typical N-H bond area and shows characteristics for peptides. Based on the results, it was concluded that biosurfactan produces by local indigenous microbes in the sediments of Panjang Port waters, Lampung belong to lipopeptide group.

Keywords: Biosurfactan, lipopeptide, sediment, Panjang Port Lampung

PHYSICOCHEMICAL ANALYSIS OF COMPOST FROM VEGETABLE AND FRUIT WASTE AND ITS APPLICATION TO HYDROPONIC *IPOMOEA REPTANA* PLANT

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Abstract:

Compost is the result of the decomposition of various organic materials by microbes which can be used as a source of nutrition for plants. Can it be used as a hydroponic medium?. This study aims to use vegetable and fruit waste as compost to be applied as hydroponic planting media of *Ipomoea reptana* plants. Compost was made for 30 days using the Takakura method with some compositions of 270 g of vegetable and fruit waste: 90 g of compost starter: EM-4 activator [0 mL(C1), 25 mL (C2), 50 mL (C3), 75 mL (C4), and 100 mL (C5)] : 100 mL of water, stirring is done 1x2 days. The physicochemical analysis of the compost showed that the C5 compost has already fulfilled the compost standard according to SNI 19-7030-2004. Compost has a blackish brown color, crumbly texture, has an earthy smell, contains nitrogen 1.15±0.10%, phosphorus 1.85±0.44%, potassium 0.93±0.05%, Corganic 22.38 ±0.06%, Fe 0.09±0.01%, Zn 0.02±0.04%, pH 7.46±0.03 and C/N 20.44±1.38%. The use of 1.5% compost as a hydroponic planting media of *Ipomoea reptana* using the floating raft method also showed the best growth of *Ipomoea reptana* grown in C5 planting media which was almost close to the growth of *Ipomoea reptana* grown on AB mix media as a positive control and better than planted in aqueous media as a negative control. It can be concluded that the compost produced from vegetable and fruit waste can be used as an alternative to change AB mix fertilizer in hydroponic *Ipomoea reptana* plants.

Keywords: Compost, EM-4, Hydroponics, Ipomoea reptana, Organic waste

GASOIL RANGE HYDROCARBONS PRODUCT From HYDROCRACKING RUBBER SEED OIL (*Hevea brasilliensis*) OVER Co-Ni/HZSM-5 Catalyst

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Abstract.

The activity of Co-Ni/HZSM-5 catalyst has been studied during the hydrocracking of rubber seed oil at various reaction times. The Co-Ni (5%)/HZSM-5 with ratio Co/Ni of 1:2 was prepared by incipient wetness impregnation. The addition of transition metals Co and Ni which are distributed in the pores of HZSM-5 is expected to improve the performance of the HZSM-5 catalyst system to lead to the hydrogenation reaction of the triglyceride double bond and then followed by the occurrence of cracking and decarboxylation reactions to produce paraffins, cycloparaffins and aromatics. The hydrocracking process was carried out under initial hydrogen pressure in a batch reactor equipped with a mechanical stirrer. The reaction was carried out at a temperature of $375^{o}C$ at a reaction time of 30-120 min. After flowing hydrogen, the reactor pressure reached 20 ± 5 bar. Furthermore, the resulting liquid product was analyzed for the composition of the hydrocarbons with GC-MS. It was identified in liquid products i.e. pentadecane, heptadecane and a small amount of cycloalkanes and aromatics. However, n-hexadecanoic acid of 16.07 area% and a number of oxygenated compounds were still found. This shows that the Ni/Co ratio needs to be increased to direct the hydrogenation reaction to occur first. Based on the GC-MS results, the paraffin product increased with increasing reaction time. It was also found that gasoil range hydrocarbons products were mostly found in liquid products at a reaction time of 120 min. The properties of this liquid hydrocarbon product are close to the physical properties of petroleum diesel.

Keywords: hydrocracking; rubber seed oil; HZSM-5; Co-Ni; diesel

PHENOLIC, FLAVONOID CONTENT, ANTIOXIDANT ACTIVITY OF *Peronema canescens* LEAF ETHANOL EXTRACT AND ITS CORRELATION WITH FTIR SPECTRUM CHEMOMETRICALLY

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Abstract

Sungkai leaf (*Peronema canescens* Jack) is one part of the plant that is widely used by the community as herbal medicine. This plant contains many bioactive compounds One of the biological activities of this plant is as an antioxidant. The phenolic, flavonoid, and antioxidant activity of this plant extract were identified in this study. Furthermore, chemometric analysis was carried out using PCA and PLS. Extraction was carried out by maceration method using water, 30%, 50%, 70%, and 96% ethanol. $AlCl_3$, Folin-Ciocalteu, DPPH methods were used for the determination of flavonoids, phenolics, and antioxidant activity, respectively. The highest total flavonoid and phenolic contents obtained were 49.341 mg QE/g DW, and 53.087 mg GAE/g DW. An IC50 value of 8.852 mg/L was achieved, which indicated a very strong antioxidant. The 30%, 50%, and 70% ethanol extracts all fell into the same quadrant after PCA analysis, indicating that the isolated metabolite components had a comparable composition. FTIR spectra of extracts with various percentages of ethanol showed similar spectrum patterns. PLS analysis showed that the -OH and C-O functional groups are thought to be the groups that contribute most to the antioxidant activity of sungkai leaf extract.

Keywords: Flavonoids, Phenolic, Antioxidant, FTIR, PCA, PLS

ALKALOID-PRODUCING BACTERIAL ISOLATE DEMONSTRATED ANTIMICROBIAL ACTIVITY AGAINST PATHOGENIC PSEUDOMONAS AERUGINOSA AND STAPHYLOCOCCUS AUREUS FROM LAMPUNG AREA

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Abstract

Mangrove sediment-associated bacteria are crucial in medicine and pharmaceuticals as new promising sources of biologically active pharmacophores due to extreme conditions, such as high salt concentration and soil anoxia. This study was intended to obtain bacterial isolates producing bioactive compounds from mangrove areas that can inhibit pathogens. Forty-six sediment bacterial isolates associated with mangroves from Sriminosari, East Lampung, and Wahyuni Mandira Ogan Komering Ilir were successfully obtained using the Mueller Hinton medium. Five out of 46 extracellular extracts of bacterial isolates showed the capability to suppress the growth of pathogenic Pseudomonas aeruginosa. Further investigation, only ethyl acetate fraction from MHLM3-P3-B1 isolate demonstrated antibacterial activity by inhibiting both pathogenic Pseudomonas aeruginosa and Staphylococcus aureus with 20 and 25 mm in diameter, respectively. The ethyl acetate extract from the isolate exhibited a significant alkaloid based on thin layer chromatography and Fourier transforms infrared spectroscopy spectrum. The isolate was basil and gram-negative under a microscope and Scanning Electron Microscopy and Gram staining. The isolates and the produced compounds are being further investigated and will be reported in the near future.

Keywords: *antimicrobial, pathogen, alkaloid, mangrove, bioactive compounds*

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING KETAPANG LEAF EXTRACT (Terminalia Catappa L.) AS BIOREDUCTOR

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Abstract

Green synthesis of silver nanoparticles using plant has been interested in recent years. In the present study the silver nanoparticles were synthesized using a bioreductor from with ketapang leaf extract (Terminalia catappa L.) using sonochemical methods. Initially, different concentrations of $AgNO_3$ precursors (0.5; 1.0 and 1.5 mM) reacted with ketapang leaf extract with PVA 1% solution as stabilizers that are sonicated for 30 minutes. Silver nanoparticles colloidal solution were characterized using UV-Vis spectrophotometers, Particle Size Analyzers (PSA) and Transmission Electron Microscopes (TEM). Maximum absorption of AgNPs was obtained at wavelength 420-450 nm. Based on stability data, the silver nanoparticle can show stability for up to 3 weeks. The XRD indicated that the (111) crystallographic plane is more predominant than other planes. The average size of silver nanoparticle was 79.7 nm from PSA result. TEM imaged showed that the nanoparticles was spherical in shape. This green synthesis provides an economic, eco-friendly, and clean synthesis route tosilver nanoparticles.

Keywords: Silver nanoparticles, Green synthesis, Ketapang leaf extract

Fe-TiO2/SiO2 AS A PHOTOCATALYST FOR THE PRODUCTION OF FATTY ACID METHYL ESTER (FAME) FROM USED COOKING OIL

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Abstract.

The Fe-TiO$_2$/SiO$_2$ photocatalyst in this study has been successfully synthesized using the sol-gel method and applied for the conversion of waste cooking oil into Fatty Acid Methyl Ester (FAME) compounds. The Fe-TiO$_2$/SiO$_2$ photocatalyst has a particle size of 26.5728 nm with a surface area of 225.7946 m^2/g. Characterization using XRD showed that the TiO$_2$ and Fe-TiO$_2$ photocatalysts had an anatase crystal phase structure with crystal sizes of 129.46 and 125.62 nm, respectively, calculated from 2 theta (2θ) angles of 25.26° and 25.21°. The TiO$_2$/SiO$_2$ and Fe-TiO$_2$/SiO$_2$ photocatalysts have an amorphous structure. Fe-TiO$_2$/SiO$_2$ photocatalytic activity was tested on the esterification reaction between waste cooking oil and methanol at 60°C for 3 hours. The concentration of the photocatalyst used was 0.5% by weight of the waste cooking oil. The results of the activity of the photocatalysts showed that the Fe-TiO$_2$/SiO$_2$ photocatalyst had the effectiveness of reducing concentration of FFA by 90% and the total yield of FAME produced is 94.81%. The identification of the final product in this study was carried out using GC-MS and the results showed that the final product formed was a methyl ester compound.

Keywords: Photocatalyst, waste cooking oil, esterification reaction

SELECTIVE CONVERSION OF FURFURYL ALCOHOL TO 1,5-PENTANEDIOL USING BIMETALLIC Ru-Sn/TiO$_2$ (R)-ZrO$_2$ CATALYST

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Abstract.

Bimetallic ruthenium-tin supported on TiO$_2$ rutile-ZrO$_2$ (denoted as Ru-Sn/TiO$_2$ (R)-ZrO$_2$) catalyst was synthesized by the copprecipitation-hydrothermal method at 150°C for 24 hours followed by the activation process with H$_2$ gas at 400°C for 2 h. The catalytic performance of the synthesized catalysts was tested in the selective conversion of furfuryl alcohol to 1,5-pentanediol (1,5-PeD) in a stainless-steel batch reaction system (TAIATSU Techno Japan). Results of X-ray diffraction (XRD) characterization showed the typical peaks of $2\theta = 27^o$, 36°, 55° which are corresponding to the structure of TiO$_2$ rutile [110], [101], [211] (JCPDS # 21-1276) respectively. The diffraction peaks at $2\theta = 28,2^o$, $31,4^o$, $38,5^o$, $50,1^o$, and $59,9^o$ corresponding to the monoclinic structure of ZrO$_2$[-111], [111], [120], [022], and [131] (ICDD # 37-1484) respectively.Ru-Sn/TiO$_2$ (R)-ZrO$_2$ (66%) catalyst (Ru = 4 wt%, Sn= 1,2 wt%, and 66 wt% is the amount of ZrO$_2$ to TiO$_2$ rutile) resulted the highest yield of 1,5-pentanediol (86%) at 100% conversion of furfuryl alcohol (160° C, 1 MPa of H$_2$ gas, 3 mL H$_2$O solvent for 3 h.). A study of interaction between the reactant and possible intermediate and solid surface of catalyst was carried out by using attenuated total reflectant-infrared spectroscopy (ATR-IR) to the reaction mixture. The results showed that a sharp peak at 1630 cm-1 which can be attributed to the substituted C=C band of (4,5-dihydrofuran-2yl) methanol is clearly observed, therefore a possible reaction route of 1,5-pentanediol formation is proposed.

Keywords: bimetallic Ru-Sn, TiO2 rutile-ZrO2, furfuryl alcohol, 1,5-pentanediol, (4,5-dihydrofuran-2yl)methanol

TESTING THE ACTIVITY OF GLUCOSE UPTAKE BY YEAST CELLS FROM ETHANOL EXTRACT OF RANGOON CREEPER (*Combretum indicum* L.)

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Abstract

The rangoon creeper (Combretum indicum L.) has 2 different variations according to its shape, namely the rounded type and the elongated type which have anti-diabetic activity. The purpose of this study was to determine the glucose uptake activity of yeast cells from the ethanol extract of rangoon creeper of rounded and elongated types (C.indicum). This research was started by preparing ethanol extract of rangoon creeper with rounded and elongated types using the maceration method and continued by testing the glucose uptake activity using yeast cells. Glucose uptake activity test by yeast cells begins with maximum wave reading at 501 nm and operating time at 30 minutes using UV-VIS spectrophotometry. Based on the results obtained, the highest percentage of glucose uptake of the elongated type is with the glucose concentration of 5 mM and the sample weight used was 50 mg, and for the rounded type the highest was at the glucose concentration of 25 mM with the sample weight used was 50 mg. The conclusions for this study that the ethanol extract of the rounded type and elongated types of rangoon creeper has ati-diabetic activity by looking at the increase in the percentage of glucose uptake.

Keywords: Rangoon Creeper, Yeast Cells, Glucose Uptake

CORN AND TAPIOCA STARCH AS NATURAL COAGULANT IN WATER TREATMENT

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Abstract.

Coagulation-flocculation processes represent an important role in water treatment. Aluminum and ferric salt are chemical coagulants commonly used. The new oncoming way in water treatment using natural coagulant is informed. This study investigated the capacity of corn and tapioca extract to reduce turbidity and TSS of artificial raw water. FTIR analysis was conducted to determine the active compounds of each natural coagulants. The coagulant dose and pH were investigated using a jar test experiment to assign the optimum condition. Rapid mixing (1 min at 200 rpm) was catched up by slow mixing (10 min 60 rpm) and attended by 20 min of settling time. At an initial turbidity of 150 NTU, the optimum condition were reached at pH 5 with a coagulant dose of 40 ppm_v and 20 ppm_v for tapioca extract and corn extract, respectively. Additionally, the removal efficiency of turbidity and TSS were 88.98% and 67.92%, respectively for tapioca extract. Meanwhile, the use of corn extract provide removal efficiency of turbidity and TSS were 81.6% and 72.6% respectively. These results shows that natural coagulants derived from corn and tapioca starch have high capability in water treatment.

Keywords: corn starch, tapioca starch, natural coagulant, water treatment, turbidity

BARCODE DNA ON MAMAN (*CLEOME GYNANDRA*) FROM RIAU PROVINCE

DNA BARKODES PADA MAMAN (*CLEOME GYNANDRA*) ASAL PROVINSI RIAU

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Abstract.

Maman (*Cleome gynandra* L.) is a traditional plant that frequently used a food by people in Melayu Rokan of Riau Province. The objective this study is to confirm the taxonomic status of maman from Riau based on *matK* and *trnL-trnL-trnF intergenic spacer* (IGS) sequences. Methods include sampling, DNA extraction, PCR, electrophoresis, sequencing, and data analysis. The fresh leaves of maman were picked up from Desa Serombau Indah, Kecamatan Rambah Hilir, KabupatenRokan Hulu, Provinsi Riau. In this study has been obtained the DNA sequences of *matK* dan *trnL- trnL-trnF IGS* of maman with the length of 754 bp and 938 bp, respectively. The BLASTn analysis based on both sequences showed that maman had 100% similarity to *Gynandropsis gynandra*. *Gynandropsis gynandra* was synonym of *C. gynandra*. The *matK* sequence analysis showed that there were 49 nucleotide variations, 16 critical nucleotides, and there were no indels. Meanwhile, the *trnL-trnL-trnF IGS* analysis showed that there were 181 nucleotide variations, 13 critical nucleotides, and61 indels. Conclusion, this study is success to confirm the taxonomic status of maman from Riau as *C. gynandra* syn. *G. gynandra* based on DNA barcodes of *matK* and *trnL-trnL-trnF IGS*.

Keywords: Cleome gynandra, Gynandropsis gynandra, maman from Riau, matK, trnL-trnL-trnFintergenic spacer.

ANALYSIS OF TWO DNA BARCODES IN PUCUK SEMINYAK FROM RIAU

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Abstract.

Pucuk seminyak is a plant whose scientific name is not yet known, due to the lack of scientific literature on this plant. The fruit of this plant is similar to the melinjo fruit which is a member of the Gnetaceae family. DNA barcoding analysis using the *trnL-trnL-trnF Intergenic Spacer* (IGS) and *matK* sequences can be performed to determine the validity of the scientific name from pucuk seminyak plant. The *trnL-trnL-trnF IGS* and *matK* sequences are DNA barcodes that are widely used to identify plants molecularly. This study aims to analyze the *trnL-trnL-trnF IGS* and *matK* sequences from the pucuk seminyak plants from Riau Province. Leaf samples from three individuals were taken from the Kampar Regency, Riau Province, then the total DNA was extracted using the Genomic DNA Mini Kit Plant (Geneaid). After that, total DNA were electrophoresed, then the total DNA was amplified using the Polymerase Chain Reaction (PCR) technique. The PCR results were electrophoresed, then sequenced at First Base Laboratories, Malaysia. The sequencing results were analyzed using the BioEdit application 7.0 version, BLASTn and the MEGA application 6.0 version. The results of the analysis showed that the *trnL-trnL-trnF IGS* DNA sequences from three samples of pucuk seminyak were obtained 937 bp length, while the matK had a size of 775 bp. These sequences have been registered in GenBank with registration numbers OQ174512, OQ174513 and OQ174514 for *trnL-trnL-trnF IGS*, and OQ174525, OQ174526 and OQ174527 for *matK*. The highest similarity was found in between pucuk seminyak and *Champereia manillana* with identify value was 99.67% based on *trnL-trnL-trnF IGS* and 99.74% based on *matK*. *Champereia manillana* is a member of the Opiliaceae family. Therefore, pucuk seminyak is a member of the Opiliaceae family, not to the Gnetaceae family. Pucuk seminyak was suspected include in the *Champereia* genus, but the species name is still in doubt.

Keywords: DNA sequences, matK gene, pucuk seminyak, Riau, trnL-trnL-trnF intergenic spacer

MICROHABITAT PROFILE AND PHYTOCHEMICAL CONTENT OF RAMBAI (*Baccaurea motleyana* Mull. Arg.)

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Abstract.

This study aims to reveal the profile of the microhabitat at the growing site of *B. motleyana* and the class of compounds contained in the leaves of *B. motleyana*. This study used a purposive sampling method by exploring the area where *B. motleyana* commonly found. Environmental factors including air temperature, humidity, light intensity, soil temperature, soil moisture, soil pH, and altitude were analyzed by cluster hierarchical analysis and principal component analysis using Minitab 16 software. The phytochemical content of *B. motleyana* leaves was analyzed by phytochemical screening. The nutrient content of the soil at the growing site of *B. motleyana* were analyzed to determine the levels of N using the Kjeldahl method, P and K with the HCl 25% extraction method, Fe with the NH4OAc 1M pH 4,8 extraction method and Mg using the NH4OAc 1M pH 7 extraction method. The results showed that environmental profile of *B. motleyana* that $27,3^0$C-30^0C for air temperature, 54%-89,9% for humidity, 772,2 lux – 3207 lux for light intensity, $25,6^0$C-29^0C for soil temperature, 70%-79% for soil moisture, soil pH at6,0-6,5, and 60 mdpl -194 m asl. *B. motleyana* growing in Kandang Halang and Wayau had the closest level with a similarity value of 78.04. The levels of N, P, K, Fe, and Mg at the growing sites of *B. motleyana* varied from low to very high, namely: N (0.19-0.22%); P (27.49-54.10 mg/100 mg); K (24.25-99.11 mg/100mg); Fe (98.40-123.71 ppm); and Mg (5.54-25.84 cmol(+)/kg). The results of the analysis of the phytochemical content showed that the leaves of *B. motleyana* contain flavonoid compounds, tannins, and steroids.

Keywords: B. motleyana, microhabitat, phytochemical, environmental factor, nutrient

DIVERSITY OF BACTERIA AND FUNGI FROM RHIZOSPHERE FROM SIAM CITRUS (*CITRUS NOBILIS* VAR. MICROCARPA) PLANTATIONS IN WEST KALIMANTAN

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Abstract.

The purpose of this study are to isolate and identify bacteria and fungi from the rhizosphere of the Siam citrus plantation. The rhizosphere is an ideal area for the development of soil microbes. The research was conducted at the Microbiology Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Tanjungpura, Pontianak. Microbes present in the rhizosphere can protect plants against pathogens and promote plant growth. Sampling using purposive sampling method in the Singkawang City Plantation. Isolation of bacteria and fungi in this study using the stratified dilution method. Observation of bacterial characters based on colony morphology, morphology and cell properties as well as physiological characteristics based on the results of biochemical tests. Observations of fungal morphological characters were carried out by observing the color of the upper surface of the fungal colony, the color of the lower surface of the fungal colony, the character of hyphae, and spores. The results obtained bacteria and fungi with each member of the genus, which is suspected to be a member of the genus in the bacteria obtained, namely *Bacillus* and *Paenibacillus*, while the fungus is suspected to be a member of the genus *Chrysosporium, Trichoderma, Gliocladium*. Based on capabilities and roles, rhizosphere bacteria and fungi need to be explored, so that known groups of rhizosphere bacteria and fungi can be utilized optimally.

Keywords: Isolation-Characterization- Rhizosphere- Bacteria- Fungi

PRESENCE OF WATER POLLUTION SOURCES ON PHYTOPLANKTON ABUNDANCE AND WATER QUALITY IN TAMIYANG LAKE OF BANJAR REGENCY

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Abstract.

This study aims to describe the pollution sources from anthropogenic activity that affect the phytoplankton abundance and water quality in Tamiyang Lake, Banjar District, South Kalimantan. Collection of pollution sources using the transect method along the edge of the lake as far as 600 meters and calculated based on the area covered by anthropogenic activities. Water quality (pH, temperature, Dissolved Oxygen (DO), Nitrate, Phosphate and Biological Oxygen Demand (BOD)) is measured at three sources of water pollution (gold mining, floating net cages and tourism zones). The results showed there are eleven main sources of water pollution in Lake Tamiyang, i.e : floating net cages, rice fields, gold mining, tourism area, fish pond, crumb rubber, broiler chickens and floating latrines. The biggest contribution to changes in water quality comes from floating net cages (71.2%), then gold mining (6.7%) and tourist areas (5%). The highest abundance of phytoplankton came from sand mining (31,524 Cells/L), and the lowest was from floating net cages (24,939 Cells/L). The values of temperature, pH, nitrate and phosphate are still below the permissible water quality threshold. The value of pH about 6.1 – 6.21, temperature about 29.51 - 30.1 Celsius, DO about 2.21-3.34 mg/l, Nitrate levels about 0.01 mg/l, Phosphate about 0.13-0.18 mg/l and BOD about 14.21-66.27 mg/l. Based on Chi-Square Test, there is no difference between pH, temperature, DO, Nitrate, and Phosphate, except for BOD at a value of = 000. Contribution : there is no source of pollution dominates changes in water quality.

Keywords : *anthropogenic, phytoplankton, pollution, source, water quality*

SCREENING OF ACTIVE COMPOUNDS *PIPER ADUNCUM* POTENTIALLY AS ANTICANCER BY TARGETING IN APOPTOSIS

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Abstract.

Background: Cancer is one of the most various disease with abnormal of cells to growth and this condition can lead to death. Cancer cells may suppress apoptosis by exposing antiapoptotic proteins or decreasing proapoptotic protein. *Piper aduncum* is a herb with high potential as anticancer agent. **Objective:** The goal of this research is to document the information active compounds of *Piper aduncum* and also analyze active compounds with proteins that related in apoptosis. **Materials and Methods:** The information of active compound of *Piper aduncum* was collected from KNApSAcK database. Druglikeness, Pa and Toxicity class was analyzed by using ADMET, Way2Drug and Protox II. The analysis of network active compounds-protein using cytoscape 3.9.0. **Results**: The results described that there were four compounds have high class toxicity, seven compounds have good Pa value and three compounds had direct interaction with protein related apoptosis. **Conclusion**: The active compounds target proteins involved in the apoptosis and it can be indicated that these compounds treat stability in the patient body. *Piper aduncum* may be a candidate to make a formulation for cancer therapy and should be conducted in a real experiment

Keywords: Apoptosis, Cancer, Cytoscape, Network, Piper aduncum

ETHNOPHYTOMEDICAL STUDY IN TRADITIONAL MEDICINE SYSTEMS IN CERENTI, KUANTAN SINGINGI, RIAU PROVINCE, INDONESIA

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Abstract

Rantau Kuantan has a unique traditional medicine system resulting from the acculturation of the Malay and Minangkabau tribes. Traditional medicine is the local wisdom of the community that has existed since immemorial, inherited by ancestors and is still maintained. This study aims to inventory, identify, and assess the use of plants as medicine by traditional medicine practitioners (TMP). An ethnophytomedic survey was conducted to collect information from TMPs. The research methods used were an ethnobotanical survey method, observation and personal interview with five informants who know the utilization of medicinal plants. The results showed that there were 123 species of medicinal plants from 51 families used to treat 45 diseases. Fever is the disease category most widely treated using medicinal plants with an ICF value = 0.92. While the special disease category is the category with the lowest ICF score of 0.60. The medicinal plants with the highest percentage of accuracy used by traditional healers are *Averrhoa bilimbii* and *Zingiber montanum*, with an FL value of 100%. The findings of these potentially medicinal plant species can be used to support their development into phytopharmaceutical standardized herbal medicines.

*Keywords: Cerenti, Ethnobotany, **Medicinal plants**, Indigeneous Knowledge, Riau*

CLARITY LEVEL OF PLANT TISSUE PREPARATIONS USE NATURAL DYE: *VITIS VINIFERA* L. *CURCUMA LONGA* LINN, AND *DRACAENA ANGUSTIFOLIA* ROXB

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Abstract.

Observation of tissue using a microscope often produces unclear and non-contrasting results, so staining is required. Dyes that are often used are synthetic dyes such as safranin and metelin blue. The use of dyes in learning activities, especially for practicum observing cells or tissues, in schools is still limited because synthetic dyes are quite expensive, have negative effects on health and the environment and the materials cannot be stored for too long. The solution is to use natural dyes that are easy to get and many around us safe. This research is an experimental qualitative descriptive study using natural dyes from *Vitis vinifera* L. which are red-purplish, tubers *Curcuma longa* Linn. are yellow, and leaves *Dracaena angustifolia* Roxb are green. Safranin stain as control dye. Staining treatment using stem tissue of *Amaranthus spinosus* L. soaked in the dye for 5 minutes. The results of the stained tissue were observed using a microscope and then documented in the form of photographs. Then assess the level of contrast by biologists and laboratory assistants. Data analysis techniques in this study were presented using descriptive qualitative non-statistical data processing. Data is presented in the form of tables and figures. The results of this study showed that the contrast level of plant tissue preparations using dyes from *Vitis vinifera* L. was 4.3 with a feasibility value of 83%. *Curcuma longa* Linn has a value of 3.2 with a feasibility value of 63% and *Dracaena angustifolia* Roxb. has a value of 3.9 with a feasibility value of 72%. So that the highest levels of clarity and contrast are dyes from *Vitis vinifera* L. with clear and contrast criteria and are suitable for use as learning media preparations.

Keywords: clarity levels, Natural Dyes, Plant Tissues, Preparations

EFFECT *HIBISCUS SABDARIFFA* CALYCES ON QUALITY QUAIL EGG PHYSICAL (*COTURNIX COTURNIX JAPONICA*)

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Abstract.

This study aims to increase the physical productivity of quail eggs *(Coturnix coturnix japonica)*. Study area: this research was conducted at the Sawitsari Research Station Laboratory, Faculty of Biology Universitas Gadjah Mada. This is an experimental study with Completely Randomized Design (CRD). The test animals used in this study were 60 female Japanese quail (*Coturnix coturnix japonica*). The selected quails were divided into 5 experimental groups. P0: control; P1: treatment given 50 g of roslea petal flour; P2: treatment given 70 g of roslea petal flour; P3: treatment given 90 g of roslea petal flour. P4: treatment given 110 g of roslea petal flour. Each experimental group consisted of 4 replicates. Each replicate consisted of 3 female Japanese quails. The data obtained were analyzed using Analysis of Variance (ANOVA), and significant difference data will then continued analysed with Duncan's test to find the difference between the 4 treatment trials. Analysis using SPSS software version 25. The results of statistical analysis showed that yolk weight, albumen weight, shell weight, albumen index, yolk index, albumen percentage, shell percentage were not significantly different. Yolk percentage consistently shows significantly different results. The conclusion of giving roselle flour to the physical productivity of quail eggs significantly increases the percentage of yolk.

Keywords: Hibiscus sabdariffa , calyces, physical quality, quail egg, percentage of yolk.

PROTECTIVE EFFECT OF *CAYRATIA TRIFOLIA* L. DOMIN. FRUIT EXTRACT ON OXIDATIVE STRESS AND HISTOLOGICAL CHANGE IN PHYSICAL STRESS-INDUCED MICE

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Abstract.

Lakum fruit (*Cayratia trifolia* L. Domin) contains secondary metabolite compounds that have antioxidant properties. *C trifolia* belongs to the Vitaceae family, known as tropical grapes that have a sweet and itchy taste. The purpose of this study was to determine the potential of *C. trifolia* fruit methanol fraction as an antioxidant based on the parameters of malondialdehyde levels, superoxide dismutase enzymes, SGOT enzymes, SGPT enzymes, kidney and liver histology. The study used 24 male Swiss mice which were divided into 6 treatments, namely normal control, negative control, positive control, and *C. trifolia* fraction 115; 230; 460 mg/kg BW. Physical stress induction is given in the form of fasting and swimming for 5 days. Data were analyzed by one way ANOVA and descriptive analysis for histological parameters. The results showed that the methanol fraction of 115 mg/kg decreased the best levels of malondialdehyde serum (38 µM), SGOT (34.7 U/L) and SGPT (34.6 U/L) compared to other doses. Doses of 115 mg/kg also provide the best levels of the superoxide dismutase enzymes (1.73 U/L) almost equal to vitamin E. Observations of kidney and liver histology showed a decrease in damage to hepatocytes and renal glomerolus in the 115 mg/kg treatment. This research contributes to the development of *C. trifolia* as a natural antioxidant.

Keywords: Cayratia trifolia L. Domin, antioxidant, enzyme, kidney, liver

DESIGN INTEGRATION BIOTECHNOLOGY AND NANOTECNOLOGY APPROACH FOR WASTE MANAGEMENT IN PADANG CITY: ANTICIPATION OF DISASTER BEHAVIOR

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Abstract.

This artcle have few ideas for solve waste problems. Few ideas are application Simple Biotechnology and synergy with integrated approach like 3 R, zero waste, and waste bank. There are ideas a sequencing process to handling waste management for society and government in Padang Beloved City. Until, waste from peoples achieved 600 ton per day, especialy after holy month Ramadhan and Idul fitri ceremonial. We give solution for solved waste problems with application Simple Biotechnology and synergized with integrated approach. For reduce waste organics can be and realictic solved the waste problems, but higher waste production per days Need everyone in Padang City contribute. We have concepts to solve waste problems by follower everyone in this City. As a result we design integrated approach concepts as sinergy Triple R principle, zero waste and waste bank management and application Simple Biotechnology and Nanotechnology for recylce organic waste to new product. Conclusion this article this approach and application are realistic solving and have economy advantage for peoples and goerment in Padang City.

Keywords: Simple biotechnology, Integrated approach, organic waste management, Nanotechnology.

BIOMETRIC ASPECTS AND SEX RATIO OF THE GANGES RIVER SPRAT (*CORICA SOBORNA* HAMILTON, 1822) FROM DOWNSTREAM MAHAKAM RIVER, EAST KALIMANTAN

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Abstract.

The *biometric aspects and* sex ratio of the Ganges River Sprat (*Corica soborna* Hamilton, 1822) from downstream Mahakam River Samarinda, East Kalimantan, are not yet known. These studies aimed to investigate fish's length and body weight, length-bodyweight relationships, growth patterns, condition factors, and sex ratio. Fish samples were collected every 15 days, from December 2022 to February 2023. Fish were collected using a simple random method from the catches of fishermen who landed their fish at Kampung Nelayan Maju, Palaran District, in Samarinda City. The results of this study obtained a total of 812 individual fish, consisting of 303 males and 509 females. Male fish have a length range of 42.48–61.33 mm and a weight range of 0.70–2.11 g, while female fish have a body length range of 44.83–63.89 mm and a body weight range of 0.79–2.56 g. The regression model of the length-body weight relationships calculated was $W=5\times10^{-6}L^{3.176}$ for total samples, $W=1\times10^{-5}L^{2.949}$ for males, and $W=8\times10^{-6}L^{3.057}$ for females. The length-body weight relationship was strong in all samples and sexes, with the regression coefficient (r) ranging from 0.927-0.975. All the fish's growth patterns were isometric. The average condition factor was 0.942±0.065, which reflected good growth. The sex ratio between males and females was 1:1.68. *This study provides information on the biometric aspects and* sex ratio of the Ganges River Sprat and *the* Mahakam River downstream*, which can be used for population health assessment and management strategies.*

Keywords: Condition factors, growth pattern, sex ratio, the Ganges River Sprat

INTRAMOLECULAR PROFILING OF CHROMATE REDUCTASE IN CHROMIUM-RESISTANT BACTERIA FROM SOUTH BORNEO'S SERPENTINE SOIL: ASSESSING BIOREMEDIATION EFFECTIVENESS

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Absract

Hexavalent chromium is soluble in water, highly toxic, and recognized as a dangerous environmental pollutant. Some former mining sites with serpentine soil in South Kalimantan contain Cr levels ranging from 1,800 mg kg^{-1}, with 1.35% of total chromium in the Cr(VI) form (Saidy & Badruzsaufari, 2009a). Chromate reductase, found in chromium-resistant bacteria, is known to catalyze the reduction of Cr(VI) to Cr(III). This study aims to investigate the structural and intramolecular properties of chromate reductase enzymes in chromium-resistant bacteria isolated from serpentine soil in South Borneo, Indonesia. The method used was PCR amplification with a designed primer based on the ChrR chromate reductase gene from *Bacillus thuringiensis*. Sequencing results revealed that isolates had the highest similarity with *Bacillus tropicus* strain MCCC 1A01406 and *Acinetobacter radioresistens* strain NRBC. A comparative docking study of two bacterial chromate reductase-related enzymes was conducted, revealing that Nitroreductase from *Bacillus tropicus* exhibited the lowest binding affinity for FMN with a calculated energy of -8.1 kcal/mol and has potential for use in biotechnology applications. Furthermore, the physicochemical parameter analysis showed that the protein isolates had favorable values for each parameter. The proteins under investigation using molecular dynamics remained structurally stable throughout the simulation period, as demonstrated by the consistent RMSD, RMSF, and Rg values observed. The findings highlight the potential use of these enzymes and extend the current theory on bioremediation. Further research is needed to explore the long-term effects of these enzymes and to develop effective implementation strategies for bioremediation applications.

Keywords: Bioremediation, Chromate Reductase, Molecular docking, Nitroreductase, Protein dynamism

ANALYSIS OF COVERAGE AND DISTRIBUTION OF MELASTOMA MALABATHRICUM INVASION IN WAY KAMBAS NATIONAL PARK

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Abstract

Way Kambas National Park (WKNP) is a important habitat for various protected species, including the Sumatran tiger, Sumatran rhinoceros, and Sumatran elephant. This conservation area faces the threat of invasion by *Melastoma malabathricum*, which has the ability to transform wetlands into dry land. This study aims to map and quantify changes in the coverage of *M. malabathricum* in WKNP from 1993 to 2019. Spatial analysis was conducted based on Landsat imagery from 1993, 1998, 2003, 2008, 2013, and 2019. The results showed changes in *M. malabathricum* coverage from 1993 to 2019, with the largest increase occurring between 1993 and 1998, reaching 15,961.23 hectares. The majority of the invasion occurred in open areas.

Keywords: invasive species, conservation area, land coverage.

COMPOSITION AND DIVERSITY OF DRAGONFLIES IN THE RIAU UNIVERSITY CAMPUS AREA

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Abstract

Dragonflies have an important role in the habitat, maintaining the balance of the ecosystem and as predators of small insects such as moths, mosquitoes and plant pests. The purpose of this study was to determine the composition and diversity of dragonflies in five habitat types within the Riau University Campus area. This research was conducted in March 2022 using a purposive sampling method. Data collection used LTC (Linear Transect Count) on five habitat types namely Butterfly Lake, Science Park, Faperika Reservoir, Arboretum and Faperta Land. A 100 m transect was made for sampling and observation along a 10 m length to the right and left of the transect. The results of the study in five habitat types found two families namely Libellulidae and Coenagrionidae with a total number of 12 species and a total of 282 individuals. The species that are easy and widely found are *Brachythemis contaminata* and *Orthetrum sabina.* The results of this study concluded that from the four locations, the species diversity index (H') was obtained in the medium category, ranging from 1.68 to 1.86 and in the Faperta area, the species diversity index (H') was obtained in the low category, namely 0.86.

Keywords: Dragonflies, Habitat, University of Riau, Species, Diversity

THE HERPETOFAUNA DIVERSITY IN BINA WIDYA CAMPUS OF RIAU UNIVERSITY

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Abstract

Herpetofauna is a bioindicator of environmental change, which is characterized by changes in diversity and changes in the number of species that make up the community. This study aims to inventory the herpetofauna diversity at the Bina Widya campus, Unri, Panam. Observations were made at the arboretum, remaining forest near the mini stadium, remaining forest around Unri Hospital, FMIPA lecture building, Eco edu park, oil palm plantation, vegetable garden, Muchtar Lutfi's campground, Science Park, Faperika reservoir, and rectorate reservoir. Data collection uses the Visual Encountered Survey (VES) method combined with a random walk design and glue trap. The herpetofauna findings were described and their conservation status determined. Results based on the survey found 34 species of herpetofauna consisting of 16 amphibians and 18 reptiles. All species found together are not protected by Decree No. P20/MENLHK/SETJEN/KUM.1/6/2018 and are at least concern by the IUCN. There are two species that are included in CITES Appendix II while the rest have not been included in the CITES Appendix list.

Keywords: appendix II, environmental change bioindicator, inventory, least concerned, not protected,

ASSESSMENT OF DAMAGE AND VULNERABILITY OF MANGROVE FORESTS IN SUNGAI APIT, SIAK, RIAU

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Abstract

This research aims to determine the level of damage and vulnerability of mangroves in various conditions of mangrove forests in Sungai Apit, Siak. Mangrove forests in Sungai Apit include the largest mangrove forests in Siak, Riau, including those in the villages of Rawa Mekar Jaya, Sungai Rawa and Mengkapan. The current condition of mangrove forests is important to find out the potential or problems that exist in order to determine the right mangrove management strategy. The current condition of mangrove forests can be determined by assessing the level of damage and vulnerability of mangrove forests. The level of damage and vulnerability of mangroves was determined based on field observations to obtain data on tree density, canopy cover, basal area and species recruitment values. The area of mangrove forest at various density levels is determined using the NDVI (Normalized Difference Vegetation Index) method. The level of damage to natural mangrove forests was quite good, very dense with very low vulnerability. Rehabilitated forest was classified as good, medium density and low vulnerability. Degraded forest in Sungai Rawa and Mengkapan is classified as damaged with moderate vulnerability, while the degraded forest in Rawa Mekar Jaya is classified as good, moderate density and high vulnerability. The most extensive mangrove forest (592.27 ha; 95.16% of the total area) is found in mangrove forest with high density. This shows that the mangrove forests in Sungai Apit are mostly in good condition, very dense, with very low vulnerability. Therefore, the mangrove forest in Sungai Apit must be preserved from the various threats that exist.

Keywords: damage, degraded forest, mangrove, natural forest, rehabilitated forest, Sungai Apit, vulnerability.

SOMATIC EMBRYOS INDUCTION OF *DENDROBIUM DISCOLOR* ADDED WITH 2,4-DICHLOROPHENOXYACETIC ACID (2.4 D)THROUGH THIN CELL LAYER (TCL) TECHNIQUE

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Abstract

Somatic Embryos are efficient ways to propagate orchids through in vitro culture. SE forms embryos from somatic cells to develop into a new plant with the same characteristics as its parents (true-to-type). The thin Cell Layer (TCL) technique in inducing SE has been widely carried out and has given good results. One of the advantages of using thin-sized explants is that they are effective in nutrient absorption. The study aims to evaluate the effectivity of the TCL technique on ES induction added with 2,4-Dichlorophenoxyacetic Acid (2,4-D). The study used a Factorial Completed Randomized Design (FCRD) consisting of 2 factors and four replications. Factor A (Technique) consists of a1. Non-TCL and a2.TCL. Factor B (2,4-D) consists of b1. 1 mg/L, b2. 2 mg/L, b3. 3 mg/L, and b4. 4 mg/L. The parameters were the survival rate, embryogenic callus formation percentage, and callus formation time requirements. All parameters were analyzed descriptively. The result showed that TCL was better than the Non-TCL technique for the induction of somatic embryos.

Keywords: 2,4-D, callus, Dendrobium discolor, somatic embryo, TCL

EFFECT OF NANO EXTRACT *PADINA MINOR* AS BIOSTIMULANT ON VEGETATIVE GROWTH OFSOYBEANS (*Glycine max* (L.) *Merr.*)

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Abstract

Applying biostimulants to plants can improve their physiological functions, promoting growth and decreasing the impacts of stress factors. Frequency and concentration affect the biostimulant formula's efficiency. This study examined the effects of *Padina minor* extract concentration and frequency on the vegetative growth of soybeans (*Glycine max* (L.) *Merr.*). Thisstudy used a Randomized, Completely Factorial Design (CRFD) consisting of two factors and fourreplications. Factor A (concentration) was: without extract (control), 0.4% crude extract, 0.6%, 0.5%, 0.4%, 0.3%, and 0.2% nano extract. Factor B (frequency) was 1x, 2x, and 3x application. The statistical analysis result showed that the nano extract of *Padina minor* had a significant effectcompared to crude extract and without extract on vegetative growth (leaf number increment and branch number) and chlorophyll content (chlorophyll a, b, and total). In contrast, the interaction of0.3% nano extract with 1x application was the best formula for the chlorophyll content of soybeans.

Keywords: Biostimulant, formula, nano, Padina minor, soybean.

IMMUNOHISTOCHEMICAL ANALYSIS OF LAMININ IN THE GONADS OF HAWKSBILL SEA TURTLES (*Eretmochelys imbricata* Linn) DURING SEX DIFFERENTIATION

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Abstract.

Our research titled "Immunohistochemical Analysis of Laminin in the Gonads of Hawksbill Sea Turtles (Eretmochelys imbricata Linn) during Sex Differentiation" was conducted at the Animal Structure and Developmental Laboratory in the Biology Department, Faculty of Mathematics and Natural Sciences, Andalas University. The study employed a descriptive method to analyze the localization of laminin in the gonads of hawksbill sea turtles. In the immunohistochemical technique, monoclonal Anti-Laminin was used as the primary antibody, anti-Mouse IgG Biotin was used as the secondary antibody, and Haematoxylin Mayer's was used as a counterstain (Modified ABC Kits Vector Lab). The results revealed distinct differences in laminin localization between the gonads of embryos incubated at 31°C and those incubated at 25°C. During the indifferent stage, laminin was observed in the basement membrane and among cells in the medulla of the gonads in both 31°C and 25°C incubated embryos. In the early differentiation stage of the gonads from 25°C incubated embryos, laminin was localized in the basement membrane and as a boundary of sex cords. In the late differentiation and differentiated stages, laminin was found in the basement membrane, among epithelial cells, and around the rete tubule. In the gonads of 31°C incubated embryos, laminin was localized among epithelial cells, in the basement membrane, and in the connective tissues during both early and late differentiation stages.

Keywords: *Sex Differentiation, Sea Turtles, Eretmochelys imbricata Linn*
Immunohistochemical, Laminin

MYOMETRIUM STRUCTURE OF POSTPARTUM RATS DUE TO ADMINISTRATION OF ETHYL ACETATE FRACTION OF PELAWAN (*Tristaniopsis obovata* Benn.)

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Abstract

Pelawan leafs contain flavonoid, alkaloid and steroid that can affect the involution process of female post partum females. This leaf has empirically been used by the Talak Mamak tribe of Siak Regency, Riau to treat women after giving birth. This study aims to determine the effectiveness of the extract of the Pelawan ethyl acetate fraction on the myometrial condition of rats after delivery based on changes in the size of the myometrial diameter. The treatment consisted of control without Pelawan extract, maternal rats administered orally with Pelawan extract at doses of 50 mg/kg BW, 100 mg/kg BW, and 150 mg/kg BW. The results showed that histologically there was no difference in myometrial tissue both control and extract treatment in smooth muscle cells and their connective tissue. However, the myometrial diameter in the control was smaller than the 100 mg dose. The differences in the size of myometrial diameter, it is suspected that the content of flavonoids and steroids in Pelawan extract affects the development of myometrial tissue before pregnancy and during pregnancy.

Keywords : *myometrium, Pelawan, Ethyl acetate fraction*

HEMATOLOGY OF WHITE RATS (*Rattus norvegicus* Berkenhout, 1769) AFTER GIVINGTRADITIONAL HERB, COMMUNITIES OF THE MELAYU LINGGA

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Abstract

The use of traditional herb has long been carried out by the Melayu Lingga, they usually refer to "bitter medicinal herbs" which function as "stamina guard" drinks (immunomodulators and antioxidants). The herb is trusted by the community as a youthful herb and maintaining stamina. The bitter medicinal herbs used by each group of traditional herb are different in number and type of plants. These plants are known to contain phytochemical compounds that have th e potential as antioxidants. Consumption of bitter medicinal herbs for a long time is thought to have a good effect on the condition of the blood. The use of Melayu Lingga bitter medicinal herbs with a certain dose can provide different properties or indications for blood. This study is a preclinical test of the use of the Melayu Lingga bitter medicine. In this study, a hematologic   al examination of mice due to the administration of infusion of bitter medicinal herbs in various doses. Research will be conducted in 8 months. The target to be achieved is to get the hematological value of white rats. The research method used a randomized block design consisting of 15 treatment groups and 3 replications. The treatment group consisted of 3 controls (Stimuno, aquades, and CMC Na 1%) and 3 types of bitter medicinal decoction (Kalan, SP4, Linau) with 4 different doses. Blood samples of white rats were taken from the caudal vein. The variables observed included the number of leukocytes, the number of erythrocytes, uric acid and glucose levels. The lowest leukocyte count was 1,000 cells, that is, from the eusinofil type at a dose of 0.09 mL / 200 g BB in the Kalan bitter herb, which was significant for control. The highest number of leukocytes is the type of lymphocytes at the dose of 0.18 mL / 200 g BB in the Linau herb, which is as much as 22,000 cells with significant control. Lingga bitter medicine extract increases the total erythrocytes and vice versa does not affect total leukocytes. The lowest uric acid level in the Linau herb dose 1 was 6.0 mg / dl and the highest at dose 4 (17.3 mg / dl). The lowest glucose level in the Kalan herb dose 2 (41.0 mg / dl), the highest in positive control (243 mg / dl). The lowest leukocyte count is 1,000 cells, that is, from the eusinofil type at a dose of 0.09 mL / 200 g BB in the Kalan bitter medicinal herb that is significant for the control. The highest number of leukocytes is the type of lymphocytes at a dose of 0.18 mL / 200 g BB in the Linau herb, which is as much as 22,000 cells with significant control Lingga bitter medicinal extract increases the total erythrocytes and vice versa does not affect total leukocytes The lowest uric acid level in the Linau herb dose 0.09 mL / 200 g BB which is 6.0 mg / dl and the highest at a dose of 0.36 mL / 200 g BB (17.3 mg / dl). The lowest glucose level in the Kalan concoction was 0.18 mL / 200 g BB (41.0 mg / dl), the highest was in positive control (243 mg / dl)

Keyword: Hematology, Traditional herb, Lingga, Rattus norvegicus B.

THE POTENTIAL OF *TELOSCHISTES FLAVICANS* GROWING IN BENGKULU AS AN ANTIBACTERIAL AGAINST *STAPHYLOCOCCUS EPIDERMIDIS*

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Abstract

Teloschistes flavicans (Sw) Norman was a unique plant that has various activities such as antioxidant, anticancer, antibacterial, and fungicidal activities. In this study, we investigated the antibacterial activity of crude methanol extract, its fractions (n-hexane, ethyl acetate, methanol-H2O), and isolated compounds of *T. flavicans* against *Staphylococcus epidermidis*. Agar well diffusion method with 5 concentrations tested of 5, 10, 15, 20, and 25% crude methanol and its fractions, and isolated compounds at a concentration of 0,2% has been carried out. Clindamycin was used as a positive control, while the negative was DMSO. The results showed that the ethyl acetate fraction was found the largest diameter of the inhibition zone (21.52 ± 0.01 mm) among all fractions and crude methanol extract at a concentration of 25%. The secondary metabolite contents of *T. flavicans* might be responsible for this activity and appear to have a synergistic effect. Furthermore, Parietin and Vicanicin were isolated from the ethyl acetate fraction by guided bioassay and demonstrated antibacterial activity against *S. epidermidis*

Keywords: *Antibacterial, Lichen, Staphylococcus epidermidis. Teloschistes flavicans*

THE ISOLATION OF *KLEBSIELLA VARIICOLA*'S CELLULASE FROM *MACROTERMES GILVUS* GUT IN INDRALAYA PEATLANDS, INDONESIA

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Abstract.

Termites are organisms that can inflict damage on agricultural, forest, and furniture materials. Furthermore, they can positively affect the ecosystem due to their ability to break down lignocellulose-containing materials. Termites are capable of decomposing the substance of dead plants, primarily cellulose, and reintroducing nutrients into the environment. Mutualistic symbionts of several bacteria in the digestive tract increased termites' ability to digest cellulose. Cellulases are enzymes that hydrolyze lignocellulose to produce glucose. According to previous findings, the cellulolytic bacteria from the termite *Macrotermes gilvus* gut obtained in Indralaya Peatlands showed activity and hydrolyzed cellulose in a CMC agar medium treated by Congo red assay. In this study, the cellulase enzymes of *Klebsiella variicola* isolated from *Macrotermes gilvus* gut showed higher cellulolytic indexes after staining with Congo red. The optimum time for cellulase enzyme production was determined by measuring incubation time on bacterial growth culture media. Furthermore, ammonium sulphate precipitation and dialysis were used to purify and characterize the enzyme. The optimum incubation time for culture growth media was obtained at 24 hours, with cellulase enzyme activity of 0.002212 U/mL. SDS PAGE and zymogram analysis reported a molecular mass of 20 kDa, with optimum activity at pH of 6 and temperature of 50°C. The properties of the cellulase enzymes from these bacteria may profit be applied as industrial catalysts.

Keywords: Cellulase, cellulose, enzyme, lignocellulose, termite.

THE POTENTIAL OF BLACK SOLDIER FLY PREPUPA OIL (*Hermetia Illucens* L.) ONWOUND HEALING IN MICE (*Mus musculus* L.)

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Abstract

The wound is a local response of a tissue caused by contact with a heat source, sharp object, or microbes. Some pathogens have developed resistance to several topical antibiotics and cause adverse side effects. Therefore, the search for natural anti-inflammatory drugs that are effective but have few side effects is urgently needed. One of the natural ingredients that have the potential as anti-inflammatory is black soldier fly prepupa oil. This study aims to reveal the potential of black soldier fly prepupa oil in accelerating burn wound healing and explain the content of chemical compounds in black soldier fly prepupa oil as an anti-inflammatory using chromatography-mass spectrophotometry (GCMS) analysis. This study used a completely randomized experimental design adult male mice suffering of burned woundas animal model. The mice were assigned to four different groups namely control group (without any treatment), bioplacenton treated group, BSF prepupae oil-treated groups with once a day or two times aday applications. The results showed that administering 20 µl prepupae oil twice a day had a considerable anti-inflammatory effect on burn wound healing, as indicated by morphological changes in scab detachment and a significant decrease in woundarea on day 7. However, it did not affect the number of leukocyte components in mice. In addition, GC-MS analysis revealed several anti-inflammatory solid compounds, namely acetic acid, ethenyl benzene, lauric acid, propionic acid, stearic acid, palmitate acid, and linoleic acid.

Keywords: Anti-inflammatory; burns; hematology; Limphocytes; B.S.F. maggot.

ANALYSIS OF NUCLEOTIDE BINDING SITE-LEUCINE RICH REPEAT SEQUENCE OF LIBERICA COFFEE FROM RIAU

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Abstract.

Coffee leaf rust (CLR) disease is one of notorious diseases in coffee plants caused by pathogenic fungus *Hemileia vastatrix*. Lim 1 and Lim 2 cultivars are Liberica coffee mainly grown in peatland area in Kepulauan Meranti Riau and resistant to CLR disease. NBS-LRR is the largest class of R gene family involved in resistance mechanism. This study aimed to analyze NBS-LRR sequence of Liberica coffee from Kepulauan Meranti Riau. Result of the study showed that Lim 1 and Lim 2 were amplified by RGA (resistance gene analog) primers. In addition, PCR products contain conserved domain of NB-ARC and several conserved motifs as well. The result indicates a new insight into molecular aspect of Liberica coffee resistant against fungal pathogen. The sequences can be used for further analysis or developed as molecular markers in breeding programme.

Keywords: CLR, Liberica, Lim 1, Lim 2, NBS-LRR, peatland

ANALYSIS OF COVERAGE AND DISTRIBUTION OF *MELASTOMA MALABATHRICUM* INVASION IN WAY KAMBAS NATIONAL PARK

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Abstract

Way Kambas National Park (WKNP) is a important habitat for various protected species, including the Sumatran tiger, Sumatran rhinoceros, and Sumatran elephant. This conservation area faces the threat of invasion by *Melastoma malabathricum*, which has the ability to transform wetlands into dry land. This study aims to map and quantify changes in the coverage of *M. malabathricum* in WKNP from 1993 to 2019. Spatial analysis was conducted based on Landsat imagery from 1993, 1998, 2003, 2008, 2013, and 2019. The results showed changes in *M. malabathricum* coverage from 1993 to 2019, with the largest increase occurring between 1993 and 1998, reaching 15,961.23 hectares. The majority of the invasion occurred in open areas.

Keywords: invasive species, conservation area, land coverage.

EFFECT OF THE METHANOL EXTRACT OF DRAGON SCALES LEAVES (Drymoglossum piloselloides [L.] Presl.) ONMALONDYALDEHIDE AND CATALASE LEVEL IN BLOOD SERUM OF LEAD-EXPOSED ALBINO RATS

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Abstract

There is massive amount of lead contaminating environment, especially at industrial areas, which is oxidative in its nature. It physiologically effects to the increase of Malondyaldehide and decrease catalase levels in blood serum. To reduce lead poisoning, natural ingredients containing antioxidants are used. Therefore, a study has been carried out regarding antioxidant protective effects of the methanol extract of dragon scales leaves (Drymoglossum piloselloides [L] Presl.) on malondyaldehide and catalase level in blood serum of albino rats exposed to lead. This study used a completely randomized design (CRD) with 5 treatments and 5 replications each with lead concentration of 0.4% and a dose level of dragon scales leaf extract of 48.51 mg / Kg BW 97.02 mg / Kg BW 194.04 mg/kg BW for 6 weeks. From the treatment results it can be seen that the application of dragon scales leaf methanol extract (Drymoglossum piloselloides L) Presl. can reduce blood serum creatinine and urea levels in lead-exposed albino rats.

Keywords : Lead, Malondyaldehide, Catalase Leaf of Dragon Scales (Drymoglossum piloselloides L) Presl. Antioxidant

THE ADDITION OF BENZYL AMINO PURINE IN THE FORMATION OF FIELDS FROM TEMBESU SEED EXPLANTS (Fagraea fragrans Roxb) ON MURASHIGE SKOOG MEDIA

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Abstract

Tembesu seeds (*Fagraea fragrans* Roxb) are very small in size and the seed coat is relatively hard. Tembesu seeds have high dormancy, which makes it difficult for tembesu seeds to germinate. One way to overcome this problem is to use *in vitro* techniques. The purpose of this study was to form shoots from tembesu seeds by adding *Benzyl Amino Purin* (BAP) *in vitro* to the media. This research was conducted at the Tissue Culture Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, University of Riau. The study used a completely randomized design (CRD) with the addition of BAP with concentrations (0; 0.5; 1; 1.5; 2; 2.5; 3; 3.5; 4 mg/l) with 5 replications. Observations were made for 120 days. The results of this study showed that the fastest shoots formed were in the control (18.04 day after plant). The highest number of shoots resulted from the 1 mg/l BAP treatment of 5.93 shoots. The average number of leaves was highest in the control treatment 7.20 strands. The results of the study showed that the higher the BAP given could inhibit the formation of shoots.

Keywords: *Fagraea fragrans*, *Benzyl Amino Purin*, seed, dormancy, shoots.

THE DISTRIBUTION, DENSITY AND GROWTH PATTERNS OF GREEN SHELLFISH (*Perna viridis*) IN PUTRA DELI BEACH AT DELI SERDANG REGENCY, NORTH SUMATERA

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Abstract

Green mussel (*Perna viridis*) is a mollusk that lives in coastal waters, especially in the intertidal area. Many green mussels are found in the coastal at Putra Deli, Deli Serdang Regency. Many fishermen and the community use green mussels as a source of livelihood because they have high economic value and good nutritional content. It was concerned that the high activity of the fishing community on Putra Deli Beach and the continuous harvesting will cause a decrease in the population and resources of green mussels in the beach of Putra Deli. This study aims to determine the density, distribution patterns, and growth of green mussels using pearson correlation analysis. This study used "Purposive Sampling" method, which was a sampling technique was conduct by determining three station points based on human activities around the stations. Station 1 was an estuary area where there is no human activities, station 2 is a natural area of mangrove forest and station 3 is an area for tourisms. Density analysis was conducted based on number of individual green mussels per square meter, whereas distribution analysis using the morphic index formula, analysis of growth patterns were determined by calculating length and total weight of individual mussels and the relationship between physico-chemical factors in the waters and green mussel density were analyzed using SPSS version 25 correlation. Results showed, the high density at station 1 was 0.94 ind/m² and the lowest was at station 3 which was 0.33 ind/m². The growth pattern of green mussels from each station was negative allometric or $b < 3$, which means that the increase in length is more dominant than that the increase in body weight. The green mussel distribution pattern from each station was clustered. The correlation analysis showed that the pH, water salinity and organic content of the substrate, light intensity, temperature and dissolved oxygen (DO) had very strong effect on the density of green mussels.

Keywords: Green Mussel (Perna viridis), Purposive sampling, Density, Distribution Pattern, Growth Pattern, Correlation Analysis

SCREENING OF PHOSPHATE-SOLUBILIZING FUNGI FROM OIL PALM RHIZOSPHERE

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Abstract.

The phosphate in soil fixed by soil minerals and become available to plant when solubilized by microorganisms such as fungi. The objective of the research was to screening and examine activities of phosphate solubilizing fungi that isolated from rhizosphere of oil palm. The rhizospher of oil palm for fungal isolated location were in four oil palm plantation near Medan city, North Sumatera Province, Indonesia, i.e. two plantation in University properties, two community owned and one government plantation. Phosphate solubilizing fungi was isolated by Pikovskaya medium that contain Calcium phosphate. Activity of phosphate solubilizing fungi analyzed qualitatively and quanttatively in Pikovskaya medium solid and broth, respectively. The results showed that twenty two fungalisolates obtained were able to solubilizing phosphate that marked by clearing zone near of fungal colony. All of fungi were able to solubilizing phosphate qualitatively with solubilizingindex varied from 0,73 until 1,68. Three isolates (TBG06, TBG09 and RIS10) had highest solubilizing index and solubilizing phosphate qualitatively in ten days incubation. Measured of pH in fermented medium was showed that activity of phosphate solubilizing was effectedby acid condition due to decreasing of pH medium from control in pH 7.

Keywords: oil palm plantation, phosphate solubilizing, fungi, rhizosphere, Pikovkayamedium

ADAPTATION OF SEED GERMINATION AND GROWTH OF PUTAT (*Barringtonia acutangula* L. Gaertn) iN RIPARIAN LAKE HABITAT

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Abstract.

Putat (*Barringtonia acutangula*) is a plant that can adapt well to flooded and dry conditions (tides and ebb). The mechanism of putat adaptation to tidal and low tide conditions, especially in germination and growth of putat tillers is still unknown. Therefore, research was carried out on seed germination and morphological growth of putat seedlings as one of the conservation steps of putat trees. The research was conducted in the Tangkas Lake area, one of the riparian lakes in Muaro Jambi Regency, Jambi Province. We made observations on 50 putat trees. In addition, we observed in more detail the morphological aspects of 25 individual putat sprouts (seedlings) taken from trees germinating in their natural habitat. The results showed that putat performed an unusual and unique germination process. Shoots and roots grow on different seed axes. When the seeds grow into saplings, the seed coat does not come off but is modified into a taproot. Conservation and propagation programs for the putat should consider its unique germination characteristics.

Keywords: Barringtonia acutangula, putat, germination, seedling growth, conservation area, land coverage.

IDENTIFIKASI PROTEIN TOKSIN *Bacillus Thuringiensis* ASAL KEBUN RAYA LIWA KABUPATEN LAPUNG BARAT MENGGUNAKAN METODE SDS PAGE

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Abstract

Bacillus thuringiensis is known to have the ability to produce toxins for insect pests. The toxin produced has been widely used as a good pesticide raw material agent in agriculture and is safe for health and environmentally friendly. The toxin is produced when Bacillus thuringiensis speculates. Bacillus thuringiensis is a cosmopolitan microbe that is widely distributed in nature. The general habitat of Bacillus thuringiensis is soil. The soil ecosystem in Liwa Botanical Garden as one of the conservation areas in Lampung Province has a lot of potential life for Bacillus thuringiensis which is very strategic to be explored further. Therefore, this study aims to explore toxin proteins derived from Bacillus thuringiensis isolates from Liwa Botanical Garden based on their molecular weights. Proteins will be quantified using the Lowry method and protein profiling using SDS PAGE electrophoresis. The results showed that the two isolates, Bt 3 and Bt 5, had relatively close protein concentrations, Bt 3 with 0.679 mg/ml and Bt 5 with 1.313 mg/ml. Both Bacillus thuringiensis isolates have different molecular weights. Bt3 isolate has a molecular weight of 110.59 kDa, assumed that the protein is Cry 1A while Bt 5 has a molecular weight of 76.97 kDa, assumed that the protein is Cry 22.

Keywords: Protein crystal; Bt; Liwa Botanical Garden; molecular weights

TOXICITY OF METHANOL EXTRACT FROM KITOLOD (*Hippobroma longiflora* (L.) G. Don) LEAVES AND STEMS TO MORTALITY RATE OF COCOA MEALYBUG (*Planococcus minor* Maskell., Hemiptera: Pseudococcidae)

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Abstract.

The cocoa mealybug (*Planococcus minor* Maskell.) is one of the causes of decreased cocoa production in Indonesia. Utilization of bio-insecticides to overcome cocoa mealybugs is one of the strategies to reduce the negative impact of using chemical insecticides. Kitolod (*Hippobroma longiflora* (L.) G. Don) is known to contain secondary metabolites which have the potential as a source of bio-insecticides. The aim of this study was to determine the toxicity of methanol extract of leaves and stems of kitolod on the mortality rate of cocoa mealybugs. The toxicity test of the leaves and stems of kitolod was carried out separately, using a 2-factor factorial study in a randomized block design (RBD) with 5 replications. Each replicate uses 10 mealybugs. The first factor was the methanol extract concentration of kitolod consisting of 1%, 2%, 3%, 4%, negative control (aquadest), and positive control (25% methomyl, a chemical insecticide). The second factor is the observation time consisting of 12, 24, 48 and 72 hours after treatment. The data obtained were analyzed by EXE probit to determine the LC_{50} and LT_{50} values, ANOVA using the SPSS 25 application, followed by the Tukey test at $\alpha = 0.05$. The results showed that for both leaf and stem extracts, a concentration of 3% is the most effective concentration as a bio-insecticide, characterized by the number of fleas that died compared to other concentrations. The kitolod leaf extract has higher toxicity than the stem extract.

Keywords: cocoa mealybug, bio-insecticide, kitolod, and toxicity

CHANGES IN RHIZOSPHERE BACTERIA COMMUNITY PROFILES WITHIN DEGRADED FOREST, BERAMBAI, EAST KALIMANTAN

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Abstract

Soil bacteria community influences the cycle of nutrients and ecosystem function. However, the change of rhizosphere bacteria community profile was affected by land conversion from virgin forest to secondary forest and palm oil plantation remain uncertain. This study compared the characteristic of rhizosphere bacterial communities associated with oil palm plantations (KS) and planted secondary forests (HS) in Berambai, East Kalimantan. Both soil samples were evaluated using high-throughput bacterial 16S ribosomal RNA gene sequencing. Each soil sample was performed using Illumina Hiseq to read the DNA sequence. The result recognized that bacteria communities were slightly different. The observed species performed abundantly and more diversely in palm oil plantation soil than in the secondary forest land. Meanwhile, both vegetation rhizospheres had a similar proportion of phylum taxa such as Proteobacteria, Acidibacteriota, Firmicutes, Actinobacteria, Verrucomicrobiota, Myxococcota, and Bacteroidota. Several species comprised the most abundant taxa, such as *Bacillus thuringiensis, Burkholderia lata, Dyella sp., and Cupriavidus metallidurans,* were plenty in palm oil soil. Otherwise, only one bacteria species that were more abundant in secondary forest soil was *Rhodospirillaceae bacterium. Bradyrhizobium elkanii* was the most dominant species in secondary forest and palm oil soil. According to species discovery, the palm oil soil was marked as contaminated by heavy metals and pesticides due to the bacteria's presence of degrading contaminants. In contrast, forest soil species bacteria mainly contributed to nutrient cycling, organic carbon decomposition, and plant growth. This invention can describe the rhizosphere bacteria resident in Berambai that was degraded by soil contaminants and agricultural practices.

Keywords: Berambai, Elaeis guineensis, Metagenomic, Nitrogen-fixing, Rhizobacteria

ANTIFUNGAL ACTIVITY TEST OF FRESH EXTRACT AND SIMPLISIA KITOLOD LEAVES *(Laurentia Longiflora* (L.) Peterm.) ON THE GROWTH OF *FUSARIUM OXYSPORUM* IN VITRO

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Abstract

The purpose of this study was to determine the antifungal activity of fresh and simplified extracts of kitolod (*Laurentia longiflora* (L.) Peterm.) leaves in inhibiting the growth of the *Fusarium oxysporum*. Fusarium wilt disease found in various types of agricultural crops is caused by the pathogenic fungus, *Fusarium oxysporum*. Kitolod plant (*Laurentia longiflora* (L.) Peterm.) is known to contain alkaloid, flavonoid, polyphenol, tannin, and saponin compounds. These compounds have several antimicrobial activities, one of which is antifungal. This research was conducted using a completely randomized design with 2 levels of treatment and 8 replicates. The antimicrobial test method used was the Kirby-Bauer disc diffusion method with the parameter of the diameter of the clear zone around the disc paper as an indicator of the antifungal activity of the extract. The data obtained were analyzed by one-way variance (ANOVA) and followed by Duncan's test. The results showed that fresh extract and simplisia of kitolod leaves can inhibit the growth of *Fusarium oxysporum*. The most optimal extract treatment in inhibiting the growth of *Fusarium oxysporum* fungi is freshextract of kitolod leaves with an average clear zone diameter of 18.37 mm which is not significantly different from the positive control dithane M-45.

Keywords: Fusarium oxysporum, fresh and simplified extracts, Kitolod, antifungal

FUZZY LOGIC OF FORMATION EARLY OF LANGUAGE: Specstroscopy-Pneumatics Hb and *H. sapiens* of Psychis in Cave LB1

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Abstract

This paper was preliminary research related to the origins of the Austronesian languages at the Bukit Liang Bangkai 1 (LB1) site, Meratus Mountains, Southeast Kalimantan. On cave LB1, there was a gallery of ancient artifacts where rock art with "checkers and lines" features around 5,000 years ago. The parent Austronesian languages were thought to have appeared 5,000 years ago in Borneo. Meanwhile, the molecular evolution of *Homo sapiens* (*H. sapiens*) began 300,000-250,000 years ago. Anatomically, it had been regenerations up to the present. Here, cave LB1 wass rather dark, a meeting place between rock art and sound as an early form of language symbolization. The artifacts had been heard and/or seen by *H. sapiens* at that time. It was assumed that past and current perceptions of *H. sapiens* were not significantly different, such as adaptive to knowledge (cognitive), anxiety and happiness. Those were all ancient behavior and psychis/mind. The specstroscopy-pneumatics hemoglobin (Hb) method was used to measure as physical data, involving 58 millennial respondents. The Structural Equation Method (SEM) was used to measure behavior and mind. The results shown that an 80 percent increase in oxygen saturation and blood pressure (physic) was connected to cognitive, anxiety and happiness or phychis. Empirically, this data shown the hypothesis that the beginning of language could be traced through cave dimention and existing rock art.

Keywords: Specstroscopy-pneumatics, Physic, Physicis, Rock art

STUDY OF MORPHOMETRIC AND MERISTIC CHARACTERS OF PAPUYU FISH (*Anabastestudineus* Bloch 1972) IN SOUTH KALIMANTAN

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Abstract

One species of the Anabantidae family, climbing perch or papuyu fish (*Anabas testudineus* Bloch 1972), is a freshwater fish classified as having high tolerance to the environment with acidic water conditions. Papuyu fish can be found in rivers and swamps in South Kalimantan.The rivers and swamps in South Kalimantan are known to have low pH levels. Therefore, information about morphological characters is needed to manage papuyu fish resources. The information can be used to identify population units present in South Kalimantan waters. In this study, an analysis of the genetic relationship of papuyu fish based on morphometric and meristic characters was also carried out using the Main Component Analysis. Phenetic relationships were tested by clustering method with data obtained from 33 morphometric characters and 12 meristic characters. The study was conducted from February to May 2023. Sampling was conducted at five locations in South Kalimantan: Danau Panggang, Margasari, Sungai Tabuk, Batakan and Kurau. The total sample used in this study was 65 fish. Regardingobservable size, papuyu fish from Danau Panggang have the highest average length, 17.28 cm.The results of the Main Component Analysis show that the largest amount of information is onthe first two main components, with a cumulative variety of 65.54%. Analysis of the main components also showed a large correlation that papuyu fish at five sites in South Kalimantandid not show any clustering. The results of the analysis showed that the observed fish were onespecies.

Keyword: papuyu, clustering, phenetic, morphometric, meristic

THE TOXICITY TEST OF *Sargassum duplicatum* ETHANOL EXTRACT AND TAURINE AGAINST *Artemia salina*

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Abstract.

One of brown macroalgae widely distributed along the sea waters of Lampung Province is *Sargassum duplicatum.* The macroalgae is very important to be explored as an anticancer agent since the *Sargassum duplicatum* is one of the largest marine product sources of active secondary metabolite chemical compounds. Another compound that is suspected as an anticancer is taurine, which is known to help prevent damage to cells and tissues due to the oxidation process. This research was conducted to determine the toxicity test of *Sargassum duplicatum* ethanol extract and taurine on *Artemia salina* leach using the *Brine Shrimp Lethality Test* (BSLT) method. This method used as an initial method for searching new anticancer compounds. This experimental study used 6 concentration series, 62.5 ppm. 125 ppm, 250 ppm, 500 ppm, 1000 ppm, and 2000 ppm with 2 types of materials, *Sargassum duplicatum of* ethanol extract and taurine with 3 replications. The result showed that phytochemical screening of *Sargassum duplicatum* ethanol extract contain saponins, terpenoid, tannins, alkaloids, and flavonoids. In addition, the toxicity test showed that the LC_{50} value for the *Sargassum duplicatum* ethanol extract was 116 ppm and for t h e taurine was 201 ppm. This result indicated that *Sargassum duplicatum* ethanol extract and taurine are included in the toxic category with an LC_{50} value of <1000 ppm, therefore i t has the potential as an anticancer compound.

Keywords: *Artemia salina, Brine Shrimp Lethality Test, Sargassum duplicatum, taurine*

DETERMINATION OF ANTIFUNGAL MECHANISMS FROM RICE PHYLLOSPHERE BACTERIA AGAINTS *Pyricularia oryzae* RACE 173

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Abstract

From the previous study, the antifungal activities of 7 rice phyllosphere bacterial isolates toward *Pyricularia oryzae* race 173 have been analysed both in vitro and in planta by using the bacterial culture as well as their secondary metabolites. In addition to secondary metabolites, other antifungal mechanisms from the bacterial isolates have not been reported before. Therefore, this study aims to determine the antifungal mechanisms through enzymatic and HCN assay as well as phytochemical analysis of their secondary metabolites. According to the enzymatic analysis, 6 rice phyllosphere bacteria (STGG 3, STGG 7, STGG 8, STGG 14, SKBV 1 and SKBG 78) showed cellulolytic and glucanolytic activities where the highest glucanolytic index was resulted by isolate SKBG 78 i.e. 3,521. Furthermore, according to the HCN assay, the mentioned bacterial isolates also displayed the ability to produce HCN. Among 7 rice phyllosphere bacterial isolates, STGV 8 was not displayed enzymatic activity as well as HCN production. According to the phytochemical analysis, all secondary metabolites from 7 bacterial isolates contained flavonoid compounds but no saponin compounds. Flavonoid compounds were proven having antimicrobial activity included fungi through microbial cell wall degradation. In addition, alkaloid and terpenoid compounds that were contained in secondary metabolites from isolate STGG 3 (alkaloid and terpenoid), SKBG 78 (alkaloid), SKBV 1 and STGV 8 (terpenoid) also displayed antifungal activities.

Keywords: *antifungal mechanisms, rice phyllosphere bacteria, enzymatic assay, HCN assay, Pyricularia oryzae*

VARIETY OF FERNS IN THE GRAND FOREST PARK SULTAN ADAM MANDIANGIN

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Abstract

Sultan Adam forest park is located in the East Mandiangin Village area, Karang Intan District, Banjar Regency, South Kalimantan. Overall, this village is a humid hilly area, that is making a good habitat for ferns. This stydy aims to describe the types of ferns found in the Sultan Adam Mandiangin grand forest park area. The data were obtained using the total roaming method, then the morphological characteristics of each sample of ferns found were determined. Data analysis was carried out descriptively and identifying species with reference to the literature.The results of the study found 11 species of ferns, both epiphytes and terrestrial, belonging to 8 families, namely: *Pteris vittata* L., *Pithyrogramma calomelanos*, *Lygodium circinatum*, *Lygodium flexuosum*, *Sellaginela ornata*, *Christella dentata*, *Nephrolepis exaltata*, *Pteridium aquilinum*, *Pyrrosia adnascens*, *Drynaria sparsisora* , and *Asplenium nidus*. The results of this study are expected to provide information about the biodiversity of ferns in South Kalimantan.

Keywords: Variety of Ferns, Ferns, Sultan Adam Mandiangin Grand Forest Park, Terrestrial Ferns, Epiphytes Ferns

TYPES OF MOSS IN SULTAN ADAM MANDIANGIN GRAND FOREST PARK AREA

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Abstract

Moss plants can live well in areas that have high humidity. The Dutch Guesthouse which is located in the Sultan Adam Mandiangin Forest Park area has quite high humidity because the area has lots of dense plants, so it is a suitable habitat for the living nature of moss plants. This study aims to describe and identify the types of moss found. Data collection was carried out using the total roaming method, which was then followed by determining and identifying each sample of the moss plants found. Data analysis was carried out descriptively and identifying species with reference to the literature. The results of the study found 12 species of mosses belonging to 8 different families, both found in tree, rock and soil habitats. The species found were: *Calymperes tenerum, Calymperes afzelii, Hyophila apiculata, Hyophila involuta* (Hook.) A. Jaeger, *Ectropothecium falciforme, Octoblepharum albidum, Philonotis hastata, Acroporium secundum* (Reinw. & Hornsch.) M. Fleisch., *Lejeunea lamacerina* (Steph.) Schiffn, *Trocholejeunea sandvicensis* (Gottsche) Mizut., *Thysananthus* sp. and *Anthoceros* sp. The results of this study are expected to provide information about the variety and biodiversity of mosses in South Kalimantan.

Keywords: Moss plants, Habitat of moss plants, Determination of moss plants, Various types of moss plants, Forest Park Sultan Adam Mandiangin

WATER QUALITY ANALYSIS OF THE BALANGAN RIVER IN BALANGAN DISTRICT BASED ON BIOLOGICAL PARAMETERS (Benthos and Microbiology)

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Abstract

Objective and Research Questions: The aim of the study was to find out information about the water quality status of the Balangan River for evaluation and recommendations to related parties as an effort to improve the water quality of the Balangan River properly. **Relevance and Context:** This study identified the water quality of the Balangan River based on biological parameters, namely monitoring and calculating Benthos, Total Coliform and Escherichia coli which can respond to a little or a lot of contaminants entering the waters **Theoretical Framework:** This study identified the water quality of the Balangan River based on biological parameters, namely monitoring and calculating Benthos, Total Coliform and Escherichia coli which can respond to a little or a lot of contaminants entering the waters. **Data Analysis:** Benthos (Macroinvertebrate sampling can be done by taking samples of silt?sedimentat the bottom of the river using a tool, namely the eagman grab and preserving and storing in a container using 4-10% formalin solution. **Findings/Observations/Arguments:** Government Regulation of the Republic of Indonesia Nuber 22 of 2021 concerning implementation of Enviromental Protection and Management **Potential Contributions:** Sampling and examination of the Balangan River was carried out in two locations, namely the upstream and downstream. Based on the dominance index, uniformity index, Shannon Wiener diversity index, number of taxa and abundance in Benthos is showed moderate pollution, the results of examination of Total Coliform and Escherichia coli still met the required quality standards.

Keywords: Balangan River, Benthos, Escherichia coli, Water Quality

E. COMPUTATION AND SIMULATION

THE CONTENT OF LENGKUAS (*Alpinia galanga L.*) 'S ACTIVE COMPOUND AS AN INHIBITOR OF ER: A MOLECULAR DOCKING APPROACH.

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Abstract

Breast cancer is a disease with malignant tumor tissue in the breast, either one or both sides. One of the causes of breast cancer is overexpression of the ER gene. Galangal (*Alpinia galanga L.*) can be an alternative in breast cancer treatment because there are compounds in galangal that are predicted to block the overexpression of genes that trigger breast cancer. This study aimed to determine the chemical compounds from galangal (*Alpinia galanga L.*) rhizome that have the potential as anti-breast cancer and explain the interaction mechanism of the tested compounds as ligands with receptors. Compounds from Galangal (*Alpinia galanga L.*) that have potential as anticancer drugs with parameters in the form of ΔG data, interaction residues on ER receptors (PDB ID: 5TOA) and using molecular docking methods and pharmacophore studies using pkCSM and SwissADME filters. Molecular docking simulation results show that test compound 46 has the lowest ΔG value at the ER receptor of -8.75 kcal/mol. Compound 46 or Bisdemethoxycurcumin has the potential as a breast anticancer drug at the ER receptor and has an interaction with the LEU298 residue; LEU301; MET336; LEU298; MET295; ALA302; LEU339; MET340; LEU343; PHE356; LEU380; GLU305; LEU490; HIS475; GLY472; LEU476 ARG346; and ILE376. Compound 46 has potential as a breast anticancer drug on the ER receptor. Bisdemethoxycurcumin has the potential as an anticancer drug at ER receptors with an LD50 value of 2.09; LOAEL value of 1.616; the GHS V toxicity group has a bioavailability value of 0.55; it does not have hepatotoxicity and skin sensitization properties.

Keywords: *Galangal, Breast Cancer, Estrogen Receptor, In Silico, ADMET*

EFFECT OF KELAKAI (*Stenochlaena Palutris*) EXTRACT ON ORGANOPHOSPHATEPESTICIDE EXPOSURE: IN SILICO AND IN OVO CYTOTOXIC STUDIES

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Abstract

Vegetable farmers in South Kalimantan use pesticides to protect crops from pest attacks. The active ingredients of pesticides have a widespread toxicity effect on both target and non-target organisms. Continuous exposure to pesticides causes cancer. Kelakai (*Stenochlaena palustris*) is thought to have potential cytotoxic activity against cancer cell growth. This study aims to examine the potential activity of chemical compounds in AnaplasticLymphoma Kinase (ALK) proteins exposed to organophosphate pesticides with in silico and in ovo studies. In *silico* studies using *molecular docking* and *virtual screening* methods. Methanol extract of kelakai is obtained by maceration method. In ovo studies were conducted by injecting pesticide compounds and methanol extracts of kelakai at doses of 0.5 and 1 ppm against native chicken eggs. The results of in silico analysis showed that ethion and neophytodiene had the most negative ΔG values of -8.62 kcal/mol and -8.39 kcal/mol, respectively, while the natural ligand 8 LY A 500 was -9.19 kcal/mol. The similarity in the type and number of residues in the bond complex between ethion and neophytadiene ligands with ALK proteins indicates the potential for competition between ethion and neophytadiene when binding to ALK proteins. Neophytodiene is thought to be a compound that has potentialas an anti-cancer by inhibiting the growth of ALK. Kelakai extract is considered capable of slowing the rate of cell damage in chicken embryos caused by ethion with its inhibitory abilityso that the cell surface is not damaged quickly.

Keywords: *Anaplastic Lymphoma Kinase, molecular docking, virtual screening, ethion, neophytodiene, in ovo.*

COMPUTATION ANALYSIS OF FLOW IN A ROUND PIPE WITH NAVIER-STOKES EQUATIONS

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Abstract.

Objective and Research Questions: The objective of the study is to enhance our understanding of fluid dynamics within the pipe by employing numerical methods and simulations. Through these approaches, the research aims to delve into various aspects such as velocity profiles, pressure distribution, and turbulent behaviour occurring within the pipe. The study focuses on analyzing the fluid velocity within circular pipes under various operational scenarios. It is crucial to examine how the pressure distribution changes along the pipe's length and cross-sectional area. Additionally, investigating the transition from laminar to turbulent flow as the Reynolds number increases is important for optimizing the impact of different fluid properties, such as viscosity and density, on the flow behaviour within the pipe. **Relevance and Context:** The computational analysis of flow in a round pipe using the Navier-Stokes equations holds significant relevance in various engineering and scientific disciplines. The Navier-Stokes equations are a system of mathematical equations that characterize the movement of fluid. These equations serve as a valuable tool for studying and analyzing fluid dynamics in various fields of science and engineering. **Theoretical Framework:** The Finite Element Method (FEM) is an computational approach employed to address the Navier-Stokes equations, which govern the characteristics of fluid motion. FEM provides a numerical solution for analyzing and understanding fluid flow behavior in a wide range of applications. **Data Analysis:** Experimental data is typically collected by measuring various parameters related to the flow within the round pipe. This may include velocity profiles, pressure readings, temperature measurements, or other relevant quantities. The data can be acquired through techniques such as flow rate measurements, pressure sensors, or velocity probes. **Findings/Observations/Arguments:** The Finite Element Method offers flexibility in handling complex geometries, unstructured meshes, and adaptive refinement. Overall, the Finite Element Method enables the accurate and efficient numerical simulation of fluid flow governed by the Navier-Stokes equations, thereby aiding in the understanding and analysis of a wide range of fluid dynamics problems.

Keywords: Navier-Stokes Equations, Numerical Methods, Finite Element, Differential Equations, Laminar Flow, Round Pipe

DESIGN A FOUR FLOORS ELEVATOR SIMULATOR USING DELPHI

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Abstract

This research uses the Delphi program to design a four floors elevator simulator with a single car. This simulator is an extension development of a three floors miniature elevator system in a physical form. The simulator shows several logic circuits to control the position of the car and its direction of motion. The simulator design can show the digital electronics part in a boolean logic form working on an elevator system. The elevator system comprises several digital combinatorial blocks in the form of boolean equations in the programming language that work together so that the simulator visually shows the elevator motion running well. The simulator test results show the results of boolean logic designs that control the elevator position and compare the results by calculating the total waiting time that occurs. This simulator system will facilitate learning because each student can work with one system. Moreover, modification of the digital control circuit is also easily done. The elevator simulator can be used as teaching material for several digital engineering and microcontroller systems courses. This simulator will be developed for elevator systems with more floors and more than one car working simultaneously.

Keywords: simulator, elevator, Delphi, control position, boolean logic

DEVELOPMENT OF A CLIMATE PREDICTION MODEL IN ASEAN BASED ON ARTIFICIALNEURAL NETWORK (ANN) WITH BACKPROPAGATION ALGORITHM

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Abstract.

Climate change is an inherent natural phenomenon stemming from global warming. Its ramifications encompass the potential for numerous natural disasters, thereby necessitating multidisciplinary investigations to facilitate early detection and prevention. Recognizing the significance of climate change, the United Nations has incorporated it as a key component within the Sustainable Development Goals (SDGs), specifically addressing it as goal number 13. This research delves into an examination of climate change data spanning from 1990 to 2020 across 11 ASEAN countries, employing the Artificial Neural Network methodology coupled with the backpropagation algorithm. The study incorporates total greenhouse gas emissions as well as 38 independent variables influencing them. In instances of missing data, the mean imputation method was employed. Subsequently, the dataset was partitioned into training and testing data sets, utilizing an 80:20% ratio. Data normalization was executed via amin-max scaler, while the optimal parameter values were determined through a grid search. Results of this study indicate the model's exceptional predictive capability for total greenhousegas emissions, as evidenced by the performance evaluation models of Mean Absolute Error (MAE) = 0,0287 and Mean Squared Error (MSE) = 0,0017.

Keywords: Artificial Neural Network, Backpropagation, Climate Change, Greenhouse GasEffect, Mean Imputation

F. BIOMATERIALS AND NATURAL PRODUCTS

THE EFFECT OF SITE ON PHYSICAL PROPERTIES OF GELAM WOOD
(*Melaleuca Cajuputy*)

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Abstract

The place where the tree grows (site) can affect the quality of the tree. This study aimsto determine the quality of wood, namely the physical properties of gelam wood, which growsin peatswamps and not peatswamps. The method used refers to British standards. The parameters measured were specific gravity, moisture content, and radial and tangential shrinkage. Statistical analysis using the t test The results obtained showed that the density of gelam wood in swamps was lower than gelam from non-peatswamps, and it was significantly different. Specific gravity ranges from 0.45-0.70 (based), 0.47–0.72 (air dry), and 0.51-0.85 (oven dry). Moisture content is higher in wood in peat swamps. Tangential and radial shrinkagewere not significantly different between wood grown on peat and non-peat. Dimensional stability was indicated by the average shrinkage ratio (tangential/radial) of 1.44.

Keywords: melaleuca cajuputy, physical properties, peatswamp, site.

STUDY IN SILICO OF ANTI-SARS-CoV-2 AND ANTI-HIV POTENTIAL NEW CANDIDATES FROM ALPHITONIA SPECIESUSING PLANTS APPLICATION

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Abstract

Viruses are known as "poisons" because of their ability to generate various diseases and the leading main causes of global pandemics in the world, including Human Immunodeficiency Virus (HIV) and Corona Virus Dissease-19 (COVID-19). HIV is the virus that causes Acquired Immunodeficiency Syndrome (AIDS), which is able to damage the body's immunity by attacking white blood cells. COVID-19 is a disease acquired by the SARS-CoV-2 virus, a viral infection of the respiratory and digestive tract. The purpose of this study is to determine the antiviral potential of Alphitonia species compounds against HIV and SARS-CoV-2 proteins. The method used is explorative with a computational experiment of marker compounds and selected 30 3D structures compounds of Alphitonia species with in silico method to inhibit 3CL-Protease and HIV-1 target proteins using PLANTs docking application. The compounds that have the best results in docking proses to against SARS-CoV-2 protein (PDB ID: 6M2N) are Rutin (-97.3385), Kaempferol-3-rutinoside (-95.3685), and Quercetin 3-O-α-L-rhamnopyranosyl(1→2)-α-L-arabinopyranosyl(1→2)-α-L-rhamnopyranoside (-96.0528). However, none of the Alphitonia species compounds has the potential to inhibit HIV-1 protein (PDB ID: 1IKW). Based on ligand-receptor interactions, the compounds which have similar amino acid residues to native ligands are rutin (80%) and Kaempferol-3-rutinoside (80%) for SARS-CoV-2 and Audotein X (80%) for HIV-1. The conclusion of this study is that there are 3 compounds of Alphitonia species that have potential as a new Anti-SARS-CoV-2 candidates.

Keywords: Molecular Docking, HIV, SARS-CoV-2, Alphitonia, PLANTs

A RAPID IDENTIFICATION OF BIOACTIVE METABOLITES IN WATER FRACTION OF THE SPONGE *AAPTOS* SP. USING LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY

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Abstract.

The sponge *Aaptos* sp. has been found to contain a wide range of bioactive compounds. Aaptamine is one of the alkaloid that has been frequently reported in *Aaptos* sp. The dereplication tools must be used to avoid the rediscovery of previously known compounds. In this study, we used liquid chromatography-mass spectrometry (LC-MS/MS) to quickly identify bioactive metabolites in the water fraction of the sponge *Aaptos* sp. collected from Bunaken Island, Indonesia, while minimizing dereplication efforts. In the present study, water fraction was identified for simple bioautographic assays for screening antibacterial constituents against clinical bacteria-resistant *Staphylococcus aureus*. Based on the LC-MS/MS analysis, alkaloids were detected in the water fraction at RT 4.02, 4.42, and 4.62. These peaks were identified as Aaptamine ($C_{13}H_{12}N_2O_2$) at m/z 229.0977 [M + H+]. These findings show that the water fraction derived from *Aaptos* sp. from Bunaken Island, contained aaptamine and showed antibacterial activity against clinical bacteria-resistant *Staphylococcus aureus*. The results of this study are important to be used as the main information for further research in the discovery of additional polar compounds in the other fraction. This research contributed to demonstrates the importance of the discovery of bioactive compounds and holds promise for future drug development.

Keywords: Aaptos sp., Bunaken, aaptamine, resistant Staphylococcus aureus, bioautography, LC-MS/MS, dereplication

IN-SITU GENERATED CuO/SiO2 FROM OIL PALM LEAVES AS A SILICA SOURCE ANDCOPPER NITRATE

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Abstract

A copper oxide-silica (CuO/SiO2) composite was obtained easily by annealing a mixture of copper nitrate and oil palm leaf powder at 500 °C. The presence of CuO in the composite was judged by the X-ray diffraction (XRD) analysis, with some specific peaks for CuO at $2\theta = 32.7°, 35.7°, 38.9°, 48.9°, 58.5°, 61.8°, 66.3°, 68.3°$ assigned as CuO monoclinic phase, and$2\theta = 22.1°, 26.8°$ revealed the quartz phase of silica. The results of observations using scanning electron microscopy (SEM) analysis for CuO/SiO2 show an irregular surface appearance thatis almost flower-shaped. Fourier transform infrared (FTIR) analysis shows strong absorption bands for stretching vibration and agrees well with the SiO2 bond structure.

Keywords: Oil Palm Leaves, Copper Oxide, Silica, Composite, Copper Nitrate

ANALYSIS OF LIMAU KUIT LEAVES VOLATILE COMPOUNDS OBTAINED BY SOXHLETN-HEXANE EXTRACTION WITH GCMS

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Abstract

This study aims to investigate the content of volatile compounds from the *n*-hexane extract oflimau kuit leaves. Limau kuit is considered to be a typical citrus from South Kalimantan. The extraction was carried out using the soxhlet solvent extraction method, and then volatile compounds were determined using GC-MS. Limau kuit leaves were divided into four samples,each pre-treated before extractions conducted at 69°C. Those were fresh leaves with and without withering (by splashing of water); dried leaves passed a 20-mesh sieve, and dried leaves passed a 60-mesh sieve. The observations comprised the yield of each extraction, refractive index, and optical rotation values. The results are as follows: fresh leaves with withering (1.58%, 1.377, -0.21); fresh leaves without withering (0.23%, 1.373, -0.4); dried leaves passed 20-mesh (4.21%, 1.429, -); dried leaves passed 60-mesh (3.84%, 1.434, -), respectively. The results of GC-MS analysis with the same order as the previous sample showed that there were 29 compounds (the five major compounds were g-terpinene, *o*-cymene,thymol, spathulenol, and aromadendrene): 48 compounds (*o*-cymene, g-terpinene, thymol, 7- methyl-5-octen-4-one, and limonen-4-ol), 64 compounds (g-terpinene, (-)-spathulenol, *o*- cymene, caryophyllene, and germacrene D), and 70 compounds ((+)-spathulenol, germacrene D, caryophyllene, *o*-cymen-5-ol, and germacrene B). Overall indicated that g-terpinene, *o*- cymene, spathulenol, thymol, and germacrene isomer were the predominant compoundscompared with the others.

Keywords: limau kuit, volatile compound, solvent extraction, n-hexane, Soxhlet, GCMS

CHARACTERIZATION OF CALCIUM CARBONAT (CaCO₃) FROM PEARL SHELL (Pinctada Maxima) OF LOMBOK AS RAW MATERIAL FOR THERMOCHEMICAL ENERGY STORAGE (TCES)

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Abstract.

Preparation and characterization of Calcium Carbonat (CaCO₃) ftom the shells of pearl oysters (Pinctada Maxima) Lombok has been carried out. The manufacture of CaCO₃ was carried out to identify the potential of Lombok pearl oyster shells as raw material for Thermochemical Energy Storage (TCES). The results of XRD (X-Ray Diffraction) showed that samples from pearl oyster shells sintered at 600℃ (CKM 1), pearl oyster sintered at 700℃ (CKM 2) and pearl oyster shells sintered at 800℃ (CKM 3) contains CaCO₃ with calcite phase and Rhombohedral crystal system (R-3C). the crystalline sizes for CKM 1, CKM 2 and CKM 3 were 53.70 nm, 57.05 nm, and 40.07 nm, respectively. In addition, samples of pearl oyster shells were also mixed with Ludox. XRD results for pearl oyster shells samples with filtering treatment (CKM 4), and heating treatment and stirrer on hotplate (CKM 5 and CKM 6) resulted in samples containing CaCO₃. The crystalline size of CKM 4, CKM 5 and CKM 6 were 55.50 nm, 55.51 nm and 55.51 nm, respectively. The pearl oyster shells after being prepared and mixed with Ludox contain CaCO₃ which can be used as a base material for the TCES system.

Keywords: CaCO₃, pearl oyster shells, Pinctada Maxima, TCES, XRD

SYNTHESIS AND CHARACTERIZATION OF CHICKEN EGGSHELLS BASED-FLUORAPATITEUSING SOL-GEL METHOD

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Abstract

Fluorapatite (FA, $Ca_{10}(PO_4)_6F_2$) is one of the main components of the apatite family that can be found in human enamel. Of the beneficial component of fluorapatite is fluoride, playing an important role therapeutically in preventing caries. Substitution of hydroxyl ion withfluoride in the apatite molecule increases the mineral's resistance to acid dissolution, increasingmineral structure stability. This study synthesized FA from chicken eggshells as a calcium source using the sol-gel method. The crystallographic structure and degree of purity were evaluated by treating with various sintering temperatures (600^oC, 700^oC, 800^oC). The x-ray diffraction pattern showed the presence of fluorapatite in all samples, with the optimum resultobtained at 600^oC sintering temperature. The higher sintering temperature shows a phase transition from FA to fluor-hydroxyapatite, indicated by the hydroxyapatite peak. The XRD results were supported with FTIR spectra detecting the presence of the liberation mode of hydroxyl as a distinct functional group of FA. Furthermore, this study indicated that chicken eggshells based-fluorapatite had a high potency to be developed as dental materials.

Keywords: Dental Caries, Human Enamel, Fourier Transform Infrared Spectroscopy, X-RayDiffraction

ANTIDEPRESSANT ACTIVITY OF OLD ARECA NUT N-HEXANE EXTRACT USING FORCED SWIM TEST METHOD IN MALE MICE (*Mus musculus*) TESTED SIMULTANEOUSLY

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Abstract

Depression is a mental disorder caused by an imbalance of neurotransmitters which can be treated with antidepressants. The method commonly used for antidepressant screening which is validated by animal behaviour is the Forced Swim Test (FST). It has not been clarified the antidepressant activity of old areca nut n-hexane extract through FST using a single test animal and multiple test animals simultaneously. Therefore, this study aimed to perform FST on two mice simultaneously to see how the presence of a demonstrator affected the test subject's behaviour, which had been injected acutely and sub-chronically with old areca nut n-hexane extract. The old areca nut n-hexane extract was injected intraperitoneally 1 hour before FST to mice (test subject) at doses of 10, 50, and 100 mg/kg, while the demonstrator was only injected 0.9% saline. The lowest immobility time was caused by a dose of 50 mg/kg with a percentage of reduction immobility time of 24.88%. The best dose of n-hexane extract can still reduce immobility time though test subjects tested simultaneously. It was indicated that there was no decline in the reduction of immobility time in the FST of multiple test animals. The results of the phytochemical analysis stated that the saponins and steroids present in the old areca nut n-hexane extract may be the active constituents that act as antidepressants.

Keywords: antidepressant, old areca nut, forced swim test, n-hexane extract*, simultaneously*

ISOLATION OF PHENOLIC COMPOUNDS FROM BISBUL LEAVES *(Diospyros discolor* **Willd.***)*

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Abtract

Phenolic compounds have been isolated from leaves of Bisbul (*Diospyros discolor* Willd.). Extraction was carried out with maceration, fractionation and chromatography methods. The structural determination was carried out using spectroscopy techniques UV-Vis, FT-IR and ^{1}H-NMR which determined that the isolated compound is methyl gallate.

Keywords : Bisbul (Diospyros discolor Willd.), maceration, fractionation, chromatography, Spectroscophy, Phenolic

PEDAGOGICAL GUIDANCE PROVIDED IN A TEACHER GUIDE ACCOMPANYING A GRADE 8 MATHEMATICS TEXTBOOK PUBLISHED FOR SUPPORTING THE INDONESIAN INDEPENDENT CURRICULUM

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Abstract.

To support the implementation of the independent curriculum, The Ministry of Education, Culture, Research and Technology of the Republic of Indonesia published mathematics school textbooks accompanied by teacher guides. This research study analysed how pedagogical guidance is provided in a teacher guide accompanying a Ministry-published mathematics junior high school grade 8 textbook. The Independent curriculum requires student-centred learning. It is important to know how the teacher guide helps teachers to do it in classrooms. This study is qualitative research applying textual analysis and coding method. This research study found that only one of *Let Us Explore* sections of the textbook has pedagogical guidance for handling students' errors in the teacher guide, while pedagogical guidance for handling students' difficulties is not provided. In terms of explanation of how to use sections of the textbook, most of *Let Us Think Critically*, *Let Us Think Creatively*, and *Let Us Use Technology* sections of the textbook do not have such information in the teacher guide, while for *Let Us Explore*, *Let Us Work Together*, and *Let Us Communicate* sections of the textbook, such information is dominated by teaching scenarios to use these sections. Most of *Let Us Think Creatively*, *Let Us Use Technology*, *Let Us Work Together*, and *Let Us Communicate* sections of the textbook do not have answer keys or examples of solution in the teacher guide. Conversely, most of *Let Us Explore* and *Let Us Think Critically* sections have these. The findings of this research study contribute to the development of the teacher guide.

Keywords: Pedagogical guidance, Teacher guide, Mathematics textbook.

THE EFFECT OF HIGHER EDUCATION GROSS ENROLMENT RATE ON HUMANDEVELOPMENT INDEX IN INDONESIA USING REGRESSION ANALYSIS

Abstract

Education is an important factor for achieving sustainable development and is recognized as an important factor in overcoming social problems and ensuring human welfare. The gross enrolment rate is an indicator of education in Indonesia. The gross enrolment rate isused as a benchmark for the success of educational programs launched by the government an effort to provide wider opportunities for residents to receive education. The purpose of this research is to explain the influence of the gross enrolment rate of higher education on the human development index (HDI) in Indonesia and to analyze the short-run and long-run effects between the gross enrolment rate of higher education and the human development index. This study uses the dependent variable (y), namely the human development index and the independent variable (x), namely the gross enrolment rate for tertiary education. The data used in this research is secondary data obtained from the Central Bureau of Statistics (BPS). The method used is regression analysis. The results of this study indicate that the gross enrolment rate for tertiary education is found to have a positive and significant effect on HDI in the long and short term. Based on these findings, this study concludes that higher education affects social development, namely the human development index.

Keywords: Gross Enrolment Rate, Higher Education, Human Development Index

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