Book of Abstracts

2022

The 4th International Conference on Applied Sciences, Mathematics, and Informatics (ICASMI)

F. MIPA

"The Role of Natural Sciences, Mathematics, and Informatics for the Development of Advanced Material based on Natural Resources"

8 - 9 September 2022
Bandar Lampung

Faculty of Mathematics and Natural Sciences
University of Lampung

The 4ᵗʰ International Conference on Applied Sciences, Mathematics, and Informatics (ICASMI)

"The Role of Natural Sciences, Mathematics, and Informatics for the Development of Advanced Material based on Natural Resources"

8 – 9 September 2022
Bandar Lampung, Indonesia

Scope of Conference:
Biology
Chemistry
Mathematics
Informatics
Physics

Organized by:

Welcome speech by Rector of University of Lampung
(Opening Ceremony, September 8th, 2022)

Assalaamu 'alaikum wr.wb.
May the peace, mercy, and blessings of Allah be upon you.
Distinguished guests, speakers, participants, ladies and gentleman,

Praise and gratitude to Allah SWT, the Almighty God, because of His grace and guidance we can attend the opening ceremony of the International Conference on Applied Sciences Mathematics and Informatics (ICASMI) 2022.

The theme of ICASMI 2022 is "the Role of Natural Sciences, Mathematics, and Informatics for the Development of Advanced Materials based on Natural Resources". It aims to highlight the role of sciences in tackling problems and creating synergies with other fields on the sustainable valorization of natural resources. This is one of clear evidences that University of Lampung has a strong commitment to contribute positively to the development of advanced materials based on natural resources especially in Lampung Province.

Ladies and gentlemen, advanced materials are known to have the most improved popularity more in modern civilizations and considered as crucial element toward the economic growth and wellbeing of the society. Advanced materials have the probability to contribute to the Sustainable Development Goals in different ways. The fabrication of advanced materials has a particular ecological and social importance. Their use in moderntech applications, healthcare, energy sector, environmental importance, etc., reveals their important role for economic and sustainable development towards society well-being.

Through this event, the University of Lampung, which is located in the southern tip of Sumatera Island Indonesia, takes the initiative to facilitate this by organizing the 4t h ICASMI, and it will provide an opportunity to the researchers, scientists, and students from sciences, mathematics and informatics, also from various application areas such as life sciences, agriculture, and engineering to share their work, thoughts, ideas, learn from and lean on each other in this challenging time.

Ladies and gentlemen, before we begin this conference, I would like to express my gratitude to the Organizing Committee who sincerely

committed to this event to make it a success, also to all Keynote Speakers who are willing to present and share their expertise in this conference.

Finally, as the Rector of University of Lampung, I hereby declare the conference officially open.

Have a great conference to all of you, and hopefully, our participation in this event can be our contributions to the community, and may Allah bless all our noble efforts.

Billahi taufiq wal hidayah
Wassalaamu'alaikum wr.wb.

Rector,
Dr. Mohammad Sofwan Effendi, M.Ed.

Speech from the Dean of Faculty of Mathematics and Natural Sciences

Assalamu'alaikum Wr. Wb.
In the Name of Allah, The Most Beneficent, the Most Merciful. Tabik pun It is my great honor on behalf of the Faculty of Mathematics and Natural Science, to welcome all participants to the 4th International Conference on Applied Science, Mathematics, and Informatics (ICASMI). The theme of the conference is "The Role of Natural Sciences, Mathematics, and Informatics for the Development of Advanced Material based on Natural Resources". Even though in the post-pandemic Covid19 pandemic, we are still able to organize this Conference.

We hope this conference can be a platform to gather and disseminate new innovations and research in science, in particular natural science, applied science, mathematics, and also computer science/ informatics. Researchers, academicians, and students are able to share and discuss new findings and applications of science. The aim is to initiate collaborations between academics, researchers, and industries, both national and international. As stated in the conference theme we encourage innovations and research for the Development of Advanced materials based on Natural Resources. Ladies and Gentlemen, the Faculty of Mathematics and Natural Sciences are one of the popular Faculty at the University of Lampung. Currently, our faculty has more than 3,000 students, spread across 12 study programs. We have 1 Diploma program, 6 Undergraduate programs, 4 Master's programs, and 1 Doctoral program. Our faculty member also includes 15 Professors and more than 60 Assistant and Associate Professors, therefore with these resources, there are many opportunities to conduct collaborations with our faculty. Besides, International Conference, our faculty also periodically organizes a national conference that we call SNSMIAP. We have held this conference regularly also.

Thank you to the Rector of the University of Lampung, the Head of LPPM, the Head of LP3M, and all the keynote speakers, invited speakers, and all participants. I would also like to give my gratitude to the organizing committee for their hard efforts in organizing this conference. *Wassalamu'alaykum Wr. Wb.*

Dr. Eng. Suripto Dwi Yuwono, M.T
Dean of the Faculty of Mathematics and Natural Sciences

Speech from the Conference Chairman ICASMI 2022

Excellences, Distinguished Participants, Ladies, and Gentlemen,
Honorable Rector of the University of Lampung Dr. Mohammad Sofwan Effendi, M.Ed.,
Dean of Faculty of Mathematics and Natural Sciences, Dr. Eng. Suripto Dwi Yuwono, M.T,
Head of LPPM and LP3M, the University of Lampung,
Good morning, Tabik pun, …

I am honored and delighted on behalf of the conference committee to welcome you to the 4th International Conference on Applied Science, Mathematics, and Informatics (ICASMI) 2022 of the Faculty of Mathematics and Natural Sciences, University of Lampung. The theme of the conference is "The Role of Natural Sciences, Mathematics, and Informatics for the Development of Advanced Material based on Natural Resources" to highlight the role of sciences in tackling problems and creating synergies with other fields on the sustainable valorization of natural resources.

Even in the post-pandemic of Covid-19, the ICASMI is held virtually on September 8-9, 2022 in Bandar Lampung, Indonesia. The ICASMI allows researchers, scientists, and students concerning all fields of sciences, mathematics, informatics, and their applications, and also allows representatives of industry, government employers, and postgraduate students to have an opportunity to share their work, thoughts, and ideas, and learn from and lean on each other in this challenging time. We wish to take this opportunity to welcome all the participants, the keynotes, and our invited speakers for coming to our campus the University of Lampung virtually.

The conference consisted of three sessions: plenary, parallel session, and panel presentation. The plenary session has four keynote speakers who are competent in their field of study and come from different countries, such as Pakistan, Malaysia, Thailand, and Russia, that will deliver their talk. The parallel sessions will be divided into five parallel sessions in different fields, such as Biology, Chemistry, Mathematics, Informatics, and Physics and every session will have 2 invited speakers. Finally, the panel presentation session will have all of the oral presenters who will talk for 10 minutes in each class.

The number of registered participants is 236 participants consisting of 183 oral presenters and 53 non-presenters, who come from more than 20 universities and research institutions in Indonesia, and also some participants from abroad universities, such as Universiti Malaysia Terengganu, and the Graz University of Technology, Austria representing the students, lecturers, and researchers.

Ladies and Gentlemen,
Our technical program is rich and varied, with four keynote speeches, ten invited talks, and seven parallel sessions. On this occasion, I also wish to thank our **keynote speakers**:
- Assoc. Prof. Chatchawan Jantasuriyarat (Kasetsart University, Thailand),
- Assoc. Prof. Muhammad Moazzam Nasser (Quaid-Azam University, Pakistan)
- Assoc. Prof. Adibah Shuib (Universiti Teknologi MARA, Malaysia), and
- Prof. A. A. Bryazgin (Budker Institute of Nuclear, Russia) and also our **invited speakers:**
- Prof. Agoes Soegianto (Airlanggga University) and Ni Luh Watiniasih, Ph.D. (Udayana University),
- Prof. Dr. Hermansyah (Sriwijaya University) and Prof. Dr. Rudy Situmeang (University of Lampung),
- Prof. I Nengah Suparta (Ganesha University of Education) and Prof. Dr. La Zakaria (University of Lampung),
- Prof. Dr. Hoga Saragih (Bakrie University) and Samsuryadi, Ph.D. (Sriwijaya University), and
- Dr. Eng. Idris Mandang (Mulawarman University) and Dwi Asmi, Ph.D. (University of Lampung).

Ladies and Gentlemen,
I would like to report that the selected papers presented at this conference will be published in the American Institute of Physics (AIP) Conference Proceedings, indexed in leading databases, such as Web of Science, Scopus, Inspec, Chemical Abstracts Service (CAS), and Astrophysics Data System (ADS).

Finally, as the chairman of ICASMI 2022, I know that the conference's success depends ultimately on the many people who have worked with us to plan and organize both the technical program and supporting arrangements. I thank the Organizing Committee members who have all

worked extremely hard to detail essential aspects of the conference programs, including the Rector of the University of Lampung and the Dean of the Faculty of Mathematics and Natural Sciences.

I hope this Conference is able to inspire and deliver benefits to all participants, in which together we are able to contribute to science and research.

Thank you very much for your attention and I hope you will enjoy this conference.

Dr. G. Nugroho Susanto, M.Sc.
Chairman of the 4th ICASMI

SCHEDULE OF PROGRAMS

DAY 1: SEPTEMBER 8th, 2022

TIME (JAKARTA TIME)	AGENDA	PIC
	Preparation & Registration	EO, IT Team, Secretariat
07.00 – 08.00 AM	• Video Profile of FMIPA University of Lampung and Previous ICASMI • Registration	IT Team Secretariat
	Opening ceremony	IT Team, EO
08.00 – 08.10 AM	Opening by MC	MC: Ryan Hidayat & Dyandra
08.10 – 08.15 AM	Indonesian National Anthem	IT Team
08.15 – 08.25 AM	Traditional Dance	UKM Minat Bakat Dancers
08.25 – 08.35 AM	Report by 4th ICASMI Chairman	Dr. G. Nugroho Susanto, M.Sc.
08.35 – 08.40 AM	Welcome speech by Dean of Faculty of Mathematics and Natural Sciences, University of Lampung	Dr. Eng. Suripto Dwi Yuwono, M.T.
08.40 – 08.45 AM	Official opening by Rector of University of Lampung	Dr. Mohammad Sofwan Effendi, M.Ed.
08.45 – 08.50 AM	Du'a / Prayer	Dr. Si. Syaiful Bahri, M. Si.
08.50 – 08.55 AM	Closing Remarks & Photo Session	MC
	Keynote Session 1	Moderator: Endang L. Widiastuti, Ph.D.
08.55 – 09.00 AM	MC -- > Moderator	Displaying Moderator's CV on screen: IT Team
09.00 – 09-20 AM	Keynote Speaker 1 : Assoc. Prof. Chatchawan Jantasuriyarat (Kasetsart University, Thailand)	Displaying Keynote Speaker's CV on screen: IT Team

TIME (JAKARTA TIME)	AGENDA	PIC
09.20 – 09.40 AM	Keynote Speaker 2 : Assoc. Prof. Muhammad Moazzam Nasser (Quaid-Azam University, Pakistan)	Displaying Keynote Speaker's CV on screen: IT Team
09.40 – 10.20 AM	QA & discussion	Moderator
10.20 – 10.25 AM	Closing Remarks	Moderator
10.25 – 10.30 AM	Photo Session	MC
	Keynote Session 2	Moderator: Dr. rer. nat. Roniyus Marjunus
10.30 – 10.35 AM	MC -- > Moderator	Displaying Moderator's CV on screen: IT Team
10.40 – 11.00 AM	Keynote Speaker 3: Assoc. Prof. Adibah Shuib (Universiti Teknologi MARA, Malaysia)	Displaying Keynote Speaker's CV on screen: IT Team
11.00 – 11.20 AM	Keynote Speaker 4: Prof. A. A. Bryazgin (Budker Institute of Nuclear, Russia)	Displaying Keynote Speaker's CV on screen: IT Team
11.20 – 12.00 AM	QA & discussion	Moderator
12.00 – 12.05 AM	Closing Remarks	Moderator
12.05 – 12.10 AM	Photo Session	MC
12.10 – 13.00 PM	**Break (Video ICASMI)**	**IT Team**
	Parallel Session	EO, IT Team, Secretariat, Operators
	Room 1 – 7 Oral presentation	

TIME (JAKARTA TIME)	AGENDA	PIC
13.00 -14.00 PM	**Invited Speakers:** **Room 1 (Biology):** Prof. Agoes Soegianto (Airlanggga University) **Room 2 (Biology):** Ni Luh Watiniasih, Ph.D (Udayana University) **Room 3 (Chemistry):** Prof. Dr. Rudy Situmeang (University of Lampung) **Room 4 (Chemistry):** Prof. Dr. Hermansyah (Sriwijaya University) **Room 5 (Mathematics):** Prof. I. Nengah Suparta (Ganesha University of Education) Prof. Dr. La Zakaria (University of Lampung) **Room 6 (Informatics & Mathematics):** Prof. Dr. Hoga Saragih (Bakrie University) Samsuryadi, Ph.D. (Sriwijaya University) **Room 7 (Physics, Applied Sciences & Education):** Dr. Eng. Idris Mandang (Mulawarman University) Dwi Asmi, Ph.D. (University of Lampung)	Room Chairs & Co-Chairs
14.00 -15.00 PM	Room 1 – 7 Oral presentation	Room Chairs & Co-Chairs
15.00 -16.00 PM	Room 1 – 7 Oral presentation	Room Chairs & Co-Chairs
16.00 -17.10 PM	Room 1 – 7 Oral presentation	Room Chairs & Co-Chairs

x

DAY 2: SEPTEMBER 9th, 2022

TIME (JAKARTA TIME)	AGENDA	PIC
	Preparation & Registration	EO, IT Team, Secretariat
08.00 – 08.20 AM	• Video Profile FMIPA Universitas Lampung and Previous ICASMI Events • Registration	IT Team Secretariat
	Opening Session	EO, IT Team
08.20 – 08.30 AM	Opening by MC	MC: Ryan Hidayat & Dyandra
	Parallel Session	EO, IT Team, Secretariat, Operators
08.30 – 09-30 AM	Room 1 – 6 Oral presentation	Room Chairs & Co-Chairs
09.30 – 10.15 PM	**Break (Video 4th ICASMI)**	**IT Team**
	Closing Ceremony	EO, IT Team, Secretariat
10.15 – 10.30 AM	Awards Announcement (Best Presenters)	Dr. G. Nugroho Susanto, M.Sc.
10.30 – 10.40 AM	Closing speech by Dean of Faculty of Mathematics and Natural Sciences, University of Lampung	Dr. Eng. Suripto Dwi Yuwono, M.T.
10.40 – 10.45 AM	Photo session & Closing remark	MC

SCHEDULE FOR ORAL PRESENTATION

ROOM 1
(TOPIC: BIOLOGY)

ROOM 1 (DAY 1, SEPTEMBER 8th, 2022) TOPIC : BIOLOGY			
Chair: Dr. Bambang Irawan, M.Sc. Co-chair: Dr. Mahfut, M.Sc.			
Session/ Time	**Presenter**	**Institution**	**Title**
Session 1 13.00-14.00 PM (invited speaker+ 1 panel)	**Invited Speakers : Prof. Agoes Soegianto (Airlangga University)**		
	Sarah Asih Faulina	BRIN	Agarwood-inducing microbial inoculant in powder formula
	Suliasih	BRIN	Phosphate Solubilizing Bacteria associated with the Rhizosphere of Sandalwood (Santalum album L.) and their phosphate solubilizing abilities
	Yati Sudaryati Soeka	BRIN	Physicochemical and Phytochemical Characteristics of Fermented Sorghum Flour Using Bacillus amyloliquefaciens, Saccharomyces cerevisiae and consortium B. amyloliquefaciens and S. cerevisiae
	Debora Christin Purbani, M.Si.	BRIN	Antioxidant Activity and Total Phenolic Contents of Several Marine Microalgae Isolated from Jakarta Bay
Chair: Dr. Mahfut, M.Sc. Co-chair: Gina D. Pratami, M.Si.			

Session/ Time	Presenter	Institution	Title
Session 2 14.00-15.00 PM (2 panels)	Tirta Kumala Dewi	BRIN	Potential Activity of Plant Growth Promoting Rhizobacteria from Coal Mining Area in South Kalimantan
	drh. Risqa Novita, M.KM	BRIN	Knowing the Coronavirus, including SARSCoV-2 in Animals, and Its Threats to Public Health
	Heddy Julistiono	BRIN	Bacterial Contaminants and Antibacterial Activity of Honeys from Bunut Hilir and Jongkong Districts, Kapuas Hulu Regency, West Borneo, Indonesia
	Muhammad Rifqi Hariri	BRIN	DNA Barcoding of the Endemic Balikpapan Ginger, Etlingera balikpapanensis A.D. Poulsen
	Reni Setyo Wahyuningtyas	BRIN	The Exploration of Ficus variegata seeds at Sungai Pinang, Banjar Regency, South Kalimantan
	Fauzi Akbar	UIN Walisongo Semarang	Genetic conservation of hantap (sterculia oblongata R. Br.) through DNA barcoding
Chair: Lili Chrisnawati, M.Pd. Co-chair: Gina D. Pratami, M.Si.			
Session/ Time	Presenter	Institution	Title
Session 3 15.00-16.00 PM (2 panels)	Muhammad Rifqi Hariri	BRIN	Genetic Fingerprinting of Indigofera tinctoria L. using ISSR Molecular Markers
	Nilam Fadmaulidha Wulandari	BRIN	Abundance of Bacillus sp. phage and its plaque morphology from various water sources around Toba Lake, North Sumatra, Indonesia
	Nina Herlina	BRIN	Protein Analysis of Friesian Holstein and Jersey Cattle Frozen Semen

Session/Time	Presenter	Institution	Title
	Rizmoon Nurul Zulkarnaen	BRIN	Palm Conservation in Bogor Botanic Gardens
	Suciatmih	BRIN	Selection of pigment production by Fusarium and their application in cotton cloth painting
	Solikin	BRIN	Severity of Mistletoes Infestation on Living Plants Collection Cultivated in Purwodadi Botanic Garden
Chair: Dzul. F. Mumtazah, M.Si. Co-chair: Lili Chrisnawati, M.Pd.		
Session/Time	**Presenter**	**Institution**	**Title**
Session 4 16.00-17.00 PM (2 panels)	Jeverson Renyaan	BRIN	Seagrass Soil Carbon at Two Different Designation Zones in Karimunjawa National Park
	Karyanti	BRIN	Identification Of Morphology, Endogenous Hormones And Nutrient Fe, Mg, N Of Palm Oil Plant (Elaeis Guineensis Jacq.) Off-Type Post-Acclimatization
	Nova Dilla Yanthi	BRIN	Expression of Cytokine and Chemokine Gene Families from The Blood of Dairy Cattle Infected With Mastitis
	Prof. Rosma Hasibuan	UNILA	Insecticidal Activity of Lantana Camara Extract Against Spodoptera litura (F.) (Lepidoptera: Noctuidae)
	Bambang Irawan	UNILA	The Combination Use of Fungal Induced Compost Tea and Coco peat Media on the Growth of Brassica oleracea L.
	Endah Setyaningrum	UNILA	Potency of Macroalgae Eucheuma cottonii and Sargassum sp. as an Antimalarial Agent
ROOM 1 (DAY 2, SEPTEMBER 9th, 2022) TOPIC : BIOLOGY		
Chair: Gina D. Pratami, M.Si. Co-chair: Dr. Mahfut, M.Sc.		

Session/ Time	Presenter	Institution	Title
Session 5 08.30- 09.30 AM (2 panels)	G. Nugroho Susanto	UNILA	Comparative male performance of nile tilapia hatchlings (oreochromis sp) through immersion in sea cucumber steroid extract with addition of honey bee
	Rochmah Agustina	UNILA	Quality Improvement Of Tomato (Lycopersicum Esculentum Mill.) Seeds Using A Magnetic Field 0.2 Mt
	Nuning Nurcahyani	UNILA	The Effects Of Nutgrass Rhizome Extracts (Cyperus Rotundus L) On Forelimb And Hindlimb Skeletal Development In Mice Fetuses (Mus Musculus L)
	Eko Pramono	UNILA	Yields Of Fruit, Seeds And Forage Those Harvested From Intercropping Of Sorghum (Sorghum Bicolor [L.] Moench) And Bean (Phaseolus Vulgaris L.)
	Lili Chrisnawati	UNILA	Genetic polymorphism of iron-regulated transporters gene in rice
	Khrisna Lazuardi Budi	UNILA	The Effects of Synbiotics and Various Herbs During Photobacterium Damselae Challenge Test On The Histopathology Of Seabass Internal Organs

ROOM 2
(TOPIC: BIOLOGY)

ROOM 2 (DAY 1, SEPTEMBER 8th, 2022) TOPIC : BIOLOGY			
Chair: Dr. Nuning Nurcahyani, M.Sc. Co-chair: Dzul. F. Mumtazah, M.Si.			
Session/ Time	Presenter	Institution	Title
Session 1			Invited Speakers : Ni Luh Watiniasih, Ph.D (Udayana University)

Session/Time	Presenter	Institution	Title
13.00-14.00 PM (invited speaker+ 1 panel)	Dr. Dwi Ningsih Susilowati, S.Tp, M.Si	BRIN	Characteristics and Potency of Culturable Bacteria from Tidal and Non-Tidal Swamps in South Kalimantan and South Sumatra, Indonesia
	Husen Rifai	BRIN	Seagrass Posidonia australis roots architecture and morphology are not affected by nutrient inputs
	Dr. Siti Roosita Ariati	BRIN	Seed Germination and Seedling Establishment of a Critically Endangered Dipterocarp, Hopea bilitonensis
	Dr. Trisanti Anindyawati	BRIN	Screening of cellulolytic fungi from Trichoderma sp. and Aspergillus sp.
Chair: Dr. Nuning Nurcahyani, M.Sc. Co-chair: Dzul. F. Mumtazah, M.Si.			
Session/Time	**Presenter**	**Institution**	**Title**
Session 2 14.00-15.00 PM (2 panels)	Sri Widawati	BRIN	Population and Potential of Nitrogen Fixing Bacteria from Rhizosphere of Sandalwood (Santalum album L.) as Phytohormones Producer and Stress Resistance Indicators
	Drs. Saefudin M.Pd.	BRIN	Potency of Renewable Natural Pigments for Batik and Other Woven Fabrics from Karimun, Riau Islands
	Donan Satria Yudha	UGM	The Diversity of Lizards and Snakes (Reptilia: Squamata) along Tambakbayan River, Province of Daerah Istimewa Yogyakarta
	Dwi Umi Siswanti	UGM	Response of Slow-Release Organic Fertilizers on Plant Growth and Capsaicin Content of Chili (Capsicum Frutescens)
	Dewi Masithoh	UGM	Diversity of 21 Shallot Cultivars (Allium cepa L. var. ascalonicum) from Indonesia Based on Morphological Characters
	Sidiq Permana Putra, M.Sc.	UGM	The Effects of Fertilization on Yield of Garlic (Allium sativum L.)

	Chair: Rochmah Agustrina, Ph.D. Co-chair: Achmad Arifiyanto, M.Si.		
Session/ Time	**Presenter**	**Institution**	**Title**
Session 3 15.00-16.00 PM (2 panels)	Utaminingsih	UGM	Anther Development of Flower of Red Dragon Fruit (Hylocereus polyrhizus (F.A.C.Weber) Britton & Rose)
	Nurmiyati	UGM	Guide For Sargassum Characterization: Description Of Morphology Characteristics
	Dila Hening Windyaraini, S.Si., M.Sc.	UGM	Transovarial Transmission of DENV and Resistance Status to Cypermethrin Insecticide in Aedes spp. (Diptera: Culicidae) from Prenggan Village, Kotagede District, Yogyakarta City
	Arief Muammar	UGM	Screening of cellulolytic bacteria from sugarcane garden as a step to create cellulo-ethanol strain
	Lisa Maryati	UNILA	Antibacterial activity of bacillus sp. Crude extract from soil in liwa botanical gardens west lampung against dickeya sp.
	Leni Agustin	UNILA	Effects of nannochloropis sp. And haematococcus sp. On the density of the diphanosoma sp. In intermediet scale culture
	Chair: Dr. Rochmah Agustrina, M.Sc. Co-chair: Achmad Arifiyanto, M.Si.		
Session/ Time	**Presenter**	**Institution**	**Title**
Session 4 16.00-17.10 PM (2 panels)	Ulfah Astriani	UNILA	Anticancer potential of ethanol extraction seagrass (enhalus acoroides) in brain tissue mice (mus musculus) induced by benzo(α)pyrene
	Tiffany Nurya Safitri	UNILA	Potential extract of seagrass (enhalus acoroides) as anti-cancer against heart tissue in mice (mus musculus)

Session/ Time	Presenter	Institution	Title
	Zahroini Kholqi Qolbi	UNILA	Pesticide activity of kitolod stem extracts (hippobroma longiflora (l.) G.don) against mealybug (planococcus minor maskell., hemiptera: pseudococcidae) on cocoa plants
	Nurul fadhilla	UNILA	The effect of bandotan (ageratum conyzoides l.) Stem extract on the growth of fusarium oxyporum l. In vitro
	Hanifa Fauzia Utami	UNILA	The potential of moringa leaf (moringa oleifera) flour as anthelmintic against ascaridia galli in laying hens (gallus domesticus)
	Pera Priantini	UNILA	The effectifity of papaya leaf flour (carica papaya l.) As anthelmintic against ascaridia galli eggs
	Indah Fitri Sari	UNILA	The role of the bird community as a bioindicator of environmental quality and the potential birdwatching tourism in Liwa , west lampung

ROOM 2 (DAY 2, SEPTEMBER 9th, 2022)
TOPIC : BIOLOGY

Chair: Achmad Arifiyanto, M.Si.
Co-chair: Dzul. F. Mumtazah, M.Si.

Session/ Time	Presenter	Institution	Title
Session 5 08.30-09.30 AM (2 panels)	Ainun Rohmawati Bareta	UNILA	Toxicity Assays and Phytochemical Compound of Macroalgae and Seagrass Ethanol Extracts from Lampung Coastal Waters
	Argauli Sidabalok	UNILA	Potential Of Seagrass (Enhalus Acoroides) Ethanol Extract As Anticancer Against The Cell Blood Profile Of Mice (Mus Musculus)
	Agung Ardian Syah	UNILA	The Toxicity Test of Leaves Methanol Extract Kitolod (Hippobroma longiflora (L.) G. Don) on Mortality Rate Of Cacao Mealybug (Planococcus minor Maskell., Hemiptera: Pseudococcidae)
	Heni Erlita Sari	UNILA	Habitat identification and phenetic analysis of bryophyta in lampung, indonesia

	Derlian Ella Tamara	UNILA	Resistance of bandotan (ageratum conyzoides l.) Leave extract on the growth of fusarium oxyporum l. In vitro
	Linda Septiani	UNILA	Study on diversity of mosquitoes around livestock cage in hanura village, pesawaran district, lampung

ROOM 3
(TOPIC: CHEMISTRY)

ROOM 3 (DAY 1, SEPTEMBER 8th, 2022) **TOPIC : CHEMISTRY**			
Chair: Dr. Ni Luh Gede Ratna Juliasih. M.Si. Co-chair: Devi Nur Annisa, M.Si.			
Session/ Time	**Presenter**	**Institution**	**Title**
Session 1 13.00-14.00 PM (invited speaker + 1 panel)	**Invited Speakers :** **Prof. Dr. Rudy Situmeang (University of Lampung)**		
	Muhammad Yusuf	UNM (Medan)	The Physical and Thermal Properties of Polypropylene/Poly(e-Caprolactone) Polyblends
	Getari Kasmiarti	UNSRI	Molasses Fermentation With Yeast Isolate From Coconut Water Immobilized On Calcium Alginate For Bioethanol Production
	Samsuar	UTB	Synthesis and Antimalarial Activity of Some Diphenyltin(IV) Dichlorobenzoate Compounds Against Plasmodium falciparum
	Agus. M.H.Putranto	UNIB	The Utilization Of Land Shells For The Manufacturing Of Earthquake-Resistant Concrete
Chair: Dr. Ni Luh Gede Ratna Juliasih. M.Si. Co-chair: Devi Nur Annisa, M.Si.			

Session/ Time	Presenter	Institution	Title
Session 2 14.00-15.00 PM (2 panels)	Tri Widayanti	UNIB	The Effect Of Mbts Additives As An Accelerator On The Quality Of Adhesive In The Manufacture Of Liquid Rubber Compound-Based Adhesives
	Umi Alma Anggraini	UNIB	The Effect Of Caco3 Variation As A Filler Material On Adhesives Quality Of Based Latex
	Teja Dwi Sutanto	UNIB	The Effect Of Cocodust Mass To Physico Chemistry Properties Of Particle Board
	Prof. Noviany	UNILA	Antioxidant Activity of Methanol Extracts of Sesbania grandiflora Roots, Barks and Leaves Using DPPH Method
	Sonny Widiarto	UNILA	Effect of sodium borate as a crosslinking agent on the properties of sago starch – poly(vinyl alcohol) biodegradable films
	Dr. Ilim, M.S.	UNILA	Application of Zeolite-A as Catalyst For Conversion of Coconut Oil Into Nitrogen Compounds As Green Corrosion Inhibitor

Chair: Dr. Nurhasanah, M.Si.
Co-chair: Dr. Agung Abadi Kiswandono, M.Si.

Session/ Time	Presenter	Institution	Title
Session 3 15.00-16.00 PM (2 panels)	Andi Irawan	UNILA	Antidiabetic and Antibacterial Activity of The Flavonoid Compound Artocarpin From The Pudau Plant (Artocarpus kemando Miq.)
	Anisa Rahmawati	UNILA	Effect of Variations of Phenol pH and NaOH Concentration on Phenol Transport Using 8% Co-EDVB Carrier Compound Based on Liquid Membrane
	Antin Sri Prihatin	UNILA	Cycloartobiloxanthone, a Flavonoid with Antidiabetic and Antibacterial Activity from Artocarpus kemando Miq.
	Arya Rifan Syah	UNILA	Synthesis Nano Hollow Graphen Oxide (NHGO) from Graphen Oxide Corn Cobs

Session/ Time	Presenter	Institution	Title
	Della Mita Andini	UNILA	Preparation and Characterization of Graphene Oxides from waste of corn cobs using modified Hummers method
	Fadhilah Rachmawati	UNILA	Biodegradation of Solar Oil by a Consortium of Local Isolates from Long Port of Lampung Seawater
Chair: Dr. Ni Luh Gede Ratna Juliasih. M.Si. Co-chair: Dr. Agung Abadi Kiswandono, M.Si.			
Session/ Time	**Presenter**	**Institution**	**Title**
Session 4 16.00-17.10 PM (2 panels)	Mulyono, Ph.D.	UNILA	Liquid Pineapple Waste as Carbon Source for Production of Bacterial Nanocellulose (BNC) by a Local Isolated Microbes
	Mita Rilyanti	UNILA	Hierarchical ZSM-5 Based on Silica Bagasse and Bio-Mesoporogen Starch as Catalyst for Glucose Production
	Heri Satria	UNILA	Preliminary Study of Hydrogel Microcomposite Production from Cellulose Fraction in Cassava Peel Waste using Grafting Technique
	Dr. Nurhasanah, M.Si.	UNILA	Production of Lipopetide Biosurfactan From Bacillus sp. ALPD1 Using The Carbon Source of Diesel Oil
	Noviany	UNILA	Identification of Anti-Inflammatory Bioactive Fractions from the Stem Bark of White Turi Plant (Sesbania grandiflora (L.) Poir)
	Syaiful Bahri	UNILA	Isolation and Characterization of Alkaloid Compound Fungi Mangrove Sediment and Bioactivity Test Against Staphylococcus aureus and Pseudomonas aeruginosa
	Yuli Ambarwati	UNILA	Synthesis And Antidiabetic Activity Test of Cu(II)-Glycin Complex Compounds
ROOM 3 (DAY 2, SEPTEMBER 9th, 2022)			

TOPIC : CHEMISTRY			
Chair: Dr. Nurhasanah, M.Si. Co-chair: Devi Nur Annisa, M.Si.			
Session/ Time	**Presenter**	**Institution**	**Title**
Session 5 08.30-09.30 AM (2 panels)	Ni Luh Gede Ratna Juliasih	UNILA	Characterization and Antioxidant Activity of Exopolysaccharide from Diatom Cyclotella striata
	Agung Abadi Kiswandono	UNILA	Synthesis Of Copoly Eugenol-Ethylene Glycol Dimethacrylate (Co-Eegdma) 8% Using Copolymerization Method
	Jilda Sofiana Dewi	UNILA	Study Adsorption Of Methylene Blue Dye By Carbon From Rubber Fruit Shell (Hevea Brasiliensis) Modified By Magnetite (Fe3o4) Coating
	Nurul Qomariyah	UNILA	The Study Of Additional Mixture Of Pineapple Peel Extract (Ananas Comosus) And Coconut Shell Liquid Smoke Grade 2 As Calcium Phosphate (Ca3(Po4)2) Scale Inhibitor Using Unseeded Experiment Method
	Hendri Ropingi	UNILA	The Effect of Additional Sorbitol on the Thermal Stability of Protease from Aspergillus fumigatus
	Atika Nisrina	UNILA	Synthesis and Characterization of Cobalt(II) and Manganese(II) Complex Compounds with methyl orange Ligand and their Application as DSSC

ROOM 4
(TOPIC: CHEMISTRY)

ROOM 4 (DAY 1, SEPTEMBER 8th, 2022)   **TOPIC : CHEMISTRY**
Chair: Prof. Wasinton Simanjuntak, Ph.D.   Co-chair: Syaiful Bahri, M.Si.

Session/ Time	Presenter	Institution	Title
Session 1 13.00-14.00 PM (invited speaker + 1 panel)			**Invited Speakers :** **Prof. Dr. Hermansyah (Sriwijaya University)**
	Agustine Susilowati	BRIN	Potency of Microfiltration Membrane in Purifying Fermented of Red Ginger (Zingiber officinale var. rubrum) for Preventive Drink of Natural Oxidation
	Aspiyanto	BRIN	Difference In Performance Of Microfiltration Membrane In Separating Total Phenolic From Fermented Red Ginger (Zingiber officinale var. rubrum) Suspension By Kombucha Culture For Natural Antioxidant
	Nina Artanti	BRIN	Inhibition of α-glucosidase activity and comparison of ABTS and DPPH assays for antioxidant activity of unfermented and kombucha fermented Katuk and Kelor leaves.
	Peni Ahmadi	BRIN	Anti-Dengue Virus (DeNV) from Marine Microorganism

<div align="center">

Chair: Syaiful Bahri, M.Si.
Co-chair: Hafin Afriyani, M.Si.

</div>

Session/ Time	Presenter	Institution	Title
Session 2 14.00-15.00 PM (2 panels)	Prof. Wasinton Simanjuntak	UNILA	Transformation Of Lampung Natural Zeolite Into Zeolite-A And Application As Catalyst For Biomass Pyrolysis
	Prof. Jamalam Lumbanraja	UNILA	Sugarcane Yield, Harvested Potassium (K), and K Exchange Behavior in Soil as Affected by Organic and Inorganic Fertilizers
	Achmad Gus Fahmi	ITERA	Simple Synthesis of Silver Nanoparticles using [Ag(NH3)2]+ Complex from Liquid Waste of Laboratory Experiment

	Annisaa Siti Zulaicha, S.Pd., M.Si.	ITERA	Synthesis Activated Carbon From Shell of Elaeis Guineensis Jacq and Modified with Magnetite (AC-Fe3O4) as Adsorbent for Waste Metal Ion Pb(II) in Waters
	Iwan Syahjoko Saputra	ITERA	Utilization of [Ag(NO3)2]+ from Laboratory Liquid Waste as a Precursor in the Synthesis of Silver Nanoparticles (AgNPs)
	Suryaneta	ITERA	Investigation Knowledge, Attitude, and Practice (KAP) on Laboratory Waste Management in Institut Teknologi Sumatera, Lampung, Indonesia
			Chair: Syaiful Bahri, M.Si. Co-chair: Hafin Afriyani, M.Si.
Session/ Time	**Presenter**	**Institution**	**Title**
Session 3 15.00-16.00 PM (2 panels)	Phirena Aulia Erdanta	UNILA	The Study Of Addition Of Coconut Shell Liquid Smoke Grade 2 And Pineapple Peel Extract (Ananas Comosus) As Inhibitor Of Calcium Sulphate (Caso4) Scale Using Unseeded Experiment Method
	Ninid Widya Sari Lubis	UNILA	Sintesis Senyawa Kompleks Mangan(II) dengan Ligan Congo Red dan Rhodamine B
	Khairunisa	UNILA	Surface Modification of Sargassum sp. Algae Biomass with Na+ Ions as Methylene Blue Adsorbent in Solution
	Laila Hidayah	UNILA	Conversion of Palm Oil into Nitrogen Compounds using Zeolite-A as Catalyst
	Purna Pirdaus	UNILA	Assessment of River Water Quality Status with Pollution Index Method in Lampung Province
	Putri Ayu Anggraini	UNILA	The Study Of Addition Mixed Pineapple Peel Extracts (Ananas Comosus) And Coconut Shell Liquid Smoke As A Scale Inhibitor For Calcium Carbonate Using Unseeded Experiment Method

Session/Time	Presenter	Institution	Title
		Chair: Dr. Ilim, M.S. Co-chair: Devi Nur Annisa, M.Si.		
Session/Time	**Presenter**	**Institution**	**Title**
Session 4 16.00-17.10 PM (2 panels)	Quntum Ramadhina	UNILA	The Effect of MgO to SiO2 Mass Ratios on Catalytic Activity of MgO/SiO2 in Coconut Oil Transesterification
	Nurhudawati Ningsih	UNILA	Study of Phenol Transport Using Copoly-Eugenol Dialyl Phthalate (Co-EDAF) 8% Based on Supported Liquid Membrane (SLM)
	Ridho Nahrowi	UNILA	Thermal and Morphological Characteristics of Chitosan Isolated from Banana Shrimp Shells (Penaeus merguiensis de Man)
	Rinda Harijuliatri	UNILA	Inhibition Test of Several Extract Fractions from Branch Bark Kenangkan (Artocarpus rigida) As Antidiabetic Agent
	Rusydi Iskandar	UNILA	Antidiabetic Activity Test Of Snakehead Fish (Channa Striata) Waste Oil Extract On Mice (Mus Musculus L.)
	Sri Astuti	UNILA	Isolation and Identification of Alcohol-Tolerant Lipase Producing Bacteria from Oily Soil Environment as Catalyst for Transesterification Reactions for Biodiesel Production
	Qori Hikmah Faranida	UNILA	Analysis Of The Physicochemical Content Of Modified Porang (Amorphophallus Oncophyllus) Flour Through Fermentation
		ROOM 4 (DAY 2, SEPTEMBER 9th, 2022) TOPIC : CHEMISTRY		
		Chair: Dr. Ilim M.S. Co-chair: Hafin Afriyani, M.Si.		
Session/Time	**Presenter**	**Institution**	**Title**

	Maulana Arya Nadhief	UNILA	The Effect of Methanol to Oil Ratios on Transesterification of Coconut Oil Using Zeolite-A as Catalyst
	Muhammad Hanif Amrulloh	UNILA	In Vitro Alfa Amilase Inhibitory Activity of Cocoa Pod Husk (Theobroma cacao L.)
Session 5 08.30-09.30 AM (2 panels)	Nafila Khansa Salsabila	UNILA	Determination of Glucosamine from Shrimp Shell Powder Media by Marine Actinomycetes
	Novita Herdiana, S.Pi., M.Si.	UNILA	The Effect of Moringa Leaf (Moringa oleifera Lam) Flour and Tapioca Formulation Toward Physical and Sensory Properties of Corn Tortillas
	Tri Apriyani	UNILA	Kinetics of Adsorption of Crystal Violet Dyes by Algae Sargassum sp. Biomass Adsorbent modified with Na+ ion
	Valenisa Qunifah	UNILA	Characterization And Testing Of Antidiabetic Activity Of Snakehead Fish (Channa Striata) Albumin On Mice (Mus Musculus L.)
	Syaiful Bahri	UNILA	Isolation of Steroid Compounds From Extracts Datuan Root Wood (Ficus vasculosa Wall. Ex Miq) and Bioactive Test Against Cabbage Pests (Plutella xylostella)
	Devi Nur Anisa	UNILA	Sonication-Assisted Synthesis of Curcumin Analogs Catalyzed by NaOH

ROOM 5
(TOPIC: MATHEMATICS)

ROOM 5 (DAY 1, SEPTEMBER 8th, 2022) TOPIC : MATHEMATICS
Chair: Dr. Khoirin Nisa Co-chair: Dina Eka Nurvazly, M.Si.

Session/ Time	Presenter	Institution	Title
Session 1 13.00-14.00 PM (invited speakers+ 1 panel)			**Invited Speaker: Prof. I. Nengah Suparta (Ganesha University of Education) Prof. Dr. La Zakaria (University of Lampung)**
	Auni Aslah Mat Daud	Universiti Malaysia Terengganu	A review of chaotic Galton board models
	Dr. Miftahuddin, S.Si, M.Si	UNSYIAH	Forecasting Relative Humidity by SARIMA Model in the Indian Ocean
	Sri Maryani. Ph.D	UNSOED	Numerical Methods of the quartic B-spline collocation for second order linear hyperbolic of the partial differential equations
Chair: Dr. Khoirin Nisa Co-chair: Dina Eka Nurvazly, M.Si.			
Session/ Time	**Presenter**	**Institution**	**Title**
Session 2 14.00-15.00 PM (2 panels)	Asti Meiza	UIN Sunan Gunung Djati	Multiplicative regression with the moderation of education level on dysfunctional parenting and gratitude for parents of children with special needs
	Rahma Faelasofi	UMPRI	Ordinal Logistic Regression Model at the Level of Job Relevance on College Graduates
	Hilda Venelia	UNILA	Comparison of Spatial Autoregressive (SAR) and Geographically Weighted Regression (GWR) Based on Simulation Study

Session/ Time	Presenter	Institution	Title
	Wardhani Utami Dewi	UNILA	Structural Equation Modeling with Generalized Structured Component Analysis on The Degree of Public Health in Indonesia
	Aulia Melinda	UNILA	Structural Equation Modeling Using Diagonally Weighted Least Square (DWLS) Estimation Method
	Dira Dini Dian Kemala	UNILA	Hierarchical Clustering Method of Lampung Province Human Development Index in 2021
Chair: Dr. Khoirin Nisa Co-chair: Dina Eka Nurvazly, M.Si.			

Session/ Time	Presenter	Institution	Title
Session 3 15.00-16.00 PM (2 panels)	Dorrah Aziz	UNILA	The Development of The Susceptible, Infected, and Recovered (SIR) Model for Covid-19 Outbreak with Vaccination
	Miftahul Irfan	UNILA	Modeling and forecasting data with panel vector autoregressive estimation GMM on economic growth and inflation data in 10 ASEAN countries
	Juanda	UNILA	A Bayesian Approach to Vector Regressive Model in Forecasting the Dynamic Impact of COVID-19 on IDR Exchange to USD and EUR Rates
	Indah Suciati	UNILA	Generalized Space Time Autoregressive (GSTAR) Modeling with Seemingly Unrelated Regression (SUR) for Forecasting Inflation Data in Five Cities on the Island of Sumatra
	Sinta Bimantari	UNILA	Spatial Analysis of the Spread of Coronavirus Disease 2019 (Covid-19) using Getis-Ord Gi* and Local Indicator of Spatial Autocorrelation (LISA)
	Zulfikar Fakhri Bismar	UNILA	Estimating the Parameter Value of the SIR Model for the Spread of Covid- 19 with FIR Filtering: A Case Study of the Spread of Covid-19 with the Omicron Variant in the DKI Jakarta Province
Chair: Dr. Asmiati Co-chair: Siti Laelatul Chasanah, M.Si			

Session/ Time	Presenter	Institution	Title
Session 4 16.00-16.50 AM (2 panels)	Fakhry Asad Agusfrianto	UNJ	On Rough Bimodules
	Tatang Bahtiar	UNILA	The Isomorphism Theorems for (R[S],R'[S])-Module
	Bernadhita Herindri S. Utami	UNILA	Estimating Function in Probability Hilbert Space
	Desiana Putri	UNILA	Enumerating the Number of Order Seven Disconnected Graphs Labeled Vertices Having an Even Number of Loops
	Reni Permata Sari	UNILA	Comparative Analysis of Some Algorithms for the Minimum Routing Cost Spanning Tree Problem
ROOM 5 (DAY 2, SEPTEMBER 9th, 2022) TOPIC : MATHEMATICS			
Chair: Dr. Asmiati Co-chair: Siti Laelatul Chasanah, M.Si			
Session/ Time	Presenter	Institution	Title
Session 5 08.30-09.30 AM (2 panels)	Agus Irawan	STMIK Pringsewu	A Procedure for Determining The Locating-Chromatic Number of An Origami Graphs
	Maharani Damayanti	ITS NU Lampung	The Locating Chromatic Number the Disjoint Union of the Shadow Path
	Siti Rahmatalia	UNILA	The Locating Chromatic Number for Subdivisions of Barbell Split Path Graphs

	Wenty Okzarima	UNILA	The Locating Chromatic Number of Sun Graph and Barbell Operation
	Akika Mega Fadillah	UNILA	The Locating Chromatic Number the Subdivision of Some Modified Path with Cycle
	Jani Suparman	UNILA	The number of Disconnected Graphs Labeled Vertices of Order Six which Contain Odd Number of Pair of Vertices Connected by Parallel Edges

ROOM 6
(TOPIC: INFORMATICS & MATHEMATICS)

ROOM 6 (DAY 1, SEPTEMBER 8th, 2022) TOPIC : INFORMATICS & MATHEMATICS			
Chair: Favorisen R. Lumbanraja, Ph.D. Co-chair: Dewi Asiah Shofiana, M.Kom.			
Session/ Time	**Presenter**	**Institution**	**Title**
Session 1 13.00-14.00 PM (invited speakers+ 1 panel)			**Invited Speaker: Prof. Dr. Hoga Saragih (Bakrie University) Samsuryadi, Ph.D. (Sriwijaya University)**
	Prof. Admi Syarif	UNILA	Performance Evaluation of A Fuzzy-Based Expert System for Diagnosing Various Kidney Diseases
	Ossy Dwi Endah Wulansari	Graz University of Technology	Development Of Virtual Reality Of Lampung Traditional Village By UI/UX Design Approach
	Aristoteles	UNILA	Real Time Human Sperm Identification on Video Using Deep Learning

xxx

Session/ Time	Presenter	Institution	Title
		Chair: Anie Rose Irawati, M.Cs. Co-chair: Dewi Asiah Shofiana, M.Kom.		
Session 2 14.00-15.00 PM (2 panels)	Dodon Turianto Nugrahadi	UNLAM	Detecting Irregular Heartbeat using Deep Forest with Multilevel Discrete Wavelet Transforms
	Debby Alita	UTI	Detecting Sarcasm in Public Opinion about COVID19 Using Random Forest Classifier
	Dedi Darwis	UTI	The Application of Point Minutiae Method for Tapis Lampung Pattern Recognition
	Teddy Azidane	UTI	Application of Accelerated Learning Method In Educational Games Periodic Table of Chemical Elements
	Rusliyawati	UNILA	Expert System Research for Prostate Cancer in Indonesia : from Research Design to Data Analysis – A Review
	Arie Setya Putra	UNILA	Fuzzy Rule based System for Classification of Dendronium Montanum Orchids in Liwa Botanical Garden

Session/ Time	Presenter	Institution	Title
		Chair: Ossy Dwi Endah Wulansari, M.T. Co-chair: Yunda Heningtyas, M.Kom.		
Session 3 15.00-16.00 PM (2 panels)	Tiryono Ruby	UNILA	Determination of 1-Dzulhijjah Date In Hijriah Calendar System Using Angle Method Moon-Earth-Sunset (Mes)
	Agus Sutrisno	UNILA	Dynamic Analysis And Simulation of System Solutions on Goodwin Model Using Heun Method
	Agus Sutrisno	UNILA	A Class of 2D QRT Linear Map For Hidding An Image and Its Histogram Analysis
	Aang Nuryaman	UNILA	Application of the Adomian Decomposition Method in solving the initial value problem of the third-order linear ordinary differential equation with constant coefficients

Session/ Time	Presenter	Institution	Title
	Amanto	UNILA	Counting the Number of Connected Graphs Labelled Vertices of Order Six Containing Odd number of Loops
	Dian Kurniasari	UNILA	Medical Report Classification Using BioWordVec Contained on Deep Learning Method

Chair: Ossy Dwi Endah Wulansari, M.T.
Co-chair: Yunda Heningtyas, M.Kom.

Session/ Time	Presenter	Institution	Title
Session 4 16.00-16.50 PM (2 panels)	Kurnia Muludi	UNILA	Deep Learning Implementation For Human Face Expression Detection
	Rizky Prabowo	UNILA	Implementation High Performance Computing for Medical Plant Classification
	Wahyu Megarani	UNILA	A Numerical Solution for A Fully Fuzzy Nonlinear Systems Based On The Broyden Method
	Elsa Savenia Kili Kili	UNILA	Application of Artificial Neural Network Method to Predict Inflation in Indonesia
	Hilda Lailatul Ramadhania	UNILA	Application of Sillhouette Coefficient Method, Elbow Method and Gap Statistics Method in Determining Optimal K in K-Medoids Analysis

ROOM 6 (DAY 2, SEPTEMBER 9th, 2022)
TOPIC : INFORMATICS & MATHEMATICS

Chair: Anie Rose Irawati, M.Cs.
Co-chair: Dewi Asiah Shofiana, M.Kom.

Session/ Time	Presenter	Institution	Title
Session 5 08.30-09.20 AM (2 panels)	Andhika Kurniawan	UNILA	Development of Language Center University of Lampung using Scrum Framework
	Apri Candra Widyawati	UNILA	A Review - Trend of Breast Cancer Expert System Researches in Indonesia: from Research Design to Data Analysis

	Zuhri Nopriyanto	UNILA	Computer Vision in Image Detection Case Study of Tree Damage Type Using Convolutional Neural Network (CNN) Algorithm
	Rahman Taufik	UNILA	Implementation of Clustering in Analytics Dashboard to Support Teacher in Learning Evaluation
	Egidiah Amalia	UNILA	Implementation Decision Support System Using Profile Matching Approach for Career Improvement of Civil Servant (Case Study : Tulang Bawang Barat's Civil Service and Human Resource Development Agency)
	Dewi Asiah Shofiana	UNILA	SMOTE Oversampling on Imbalanced Dataset of Lampung Handwritten Images for SVM Classification

ROOM 7
(TOPIC: PHYSICS, APPLIED SCIENCES & EDUCATION)

ROOM 7 (DAY 1, SEPTEMBER 8th, 2022) TOPIC : PHYSICS, APPLIED SCIENCES AND EDUCATION			
Chair: Dr. Yanti Yulianti Co-chair: Donni Kis Apriyanto, M.Sc.			
Session/ Time	Presenter	Institution	Title
Session 1 13.00-14.00 PM (invited speakers+ 1 panel)			**Invited Speaker:** **Dr. Eng. Idris Mandang (Mulawarman University)** **Dwi Asmi, Ph.D. (University of Lampung)**
	Ardian Rizaldi	BRIN	Flight Mechanical Model Development of a Conventional Twin-Engine Unmanned Aerial Vehicle
	Lusi Kristiana	BRIN	The Diversity of Indonesian Medicinal Plants as the Main Ingredients for Supporting-physical-fitness Potion

Session/ Time	Presenter	Institution	Title
	M. Bakti Samsu Adi	BRIN	Comparison of Five Accessions of Fennel (Foeniculum vulgare Mill.) from Five Locations with Chemical Parameters

<table>
<tr><td colspan="4" align="center">Chair: Dr. Yanti Yulianti
Co-chair: Donni Kis Apriyanto, M.Sc.</td></tr>
</table>

Session/ Time	Presenter	Institution	Title
Session 2 14.00-15.00 PM (2 panels)	Vera Permatasari	BRIN	Evaluation of Eleven Finger Pulse Oximeter Performance Reading
	Gabriel Jonathan	ITB	Submerged Breakwater Role in Closed Basin's Resonance
	Indriana Marcela	ITB	Numerical Study of Wave Damping by Trapezoidal Breakwater
	Ahmad Mujtahid Anas	UGM	The Photoacoustic Imaging Systems Based on Diode Laser and Condenser Microphone for White Cement Phantoms and Polyvinyl Chloride Phantoms
	Caesarany Maqfiroh	UGM	A Photoacoustic Imaging System for Simulation of Pneumonia Detection
	Selamet Samsugi	UTI	Rat Repellent Prototype Tool Using Ic Ne555

<table>
<tr><td colspan="4" align="center">Chair: Humairoh Ratu Ayu, M.Si.
Co-chair: Donni Kis Apriyanto, M.Sc.</td></tr>
</table>

Session/ Time	Presenter	Institution	Title
Session 3 15.00-15.50 PM (2 panels)	Nurlaila Septi Choirunnisa	UNSRI	Fuel Cell Analysis of Gas-Cooled Fast Reactor (GFR) Uranium Nitride (UN) Using OpenMC Software
	Ade Ristika	UNSRI	Effect of Addition Np, Am, and Cm as Minor Actinides on (U-10%Zr) Fuel Cell Design
	Novian Wildan Rosyidi	UNS	Development of Learning Media with Articulate Storylines to Improve Student Learning Outcomes on Virus Materials

Session/ Time	Presenter	Institution	Title
	- Adi Satrio Ardiansyah - Cici Rayagura Rahmatillah	UNNES	Development of Set Textbook with STEM-CBL nuanced integrated Learning Video for Students' Critical Thinking Ability
	Arum Dinasari	UNNES	Development of Indefinite Integral Textbook that integrated STEM-CBL assisted QR-Code for Students' Critical Thinking Ability
	Chair: Humairoh Ratu Ayu, M.Si. Co-chair: Donni Kis Apriyanto, M.Sc.		
Session/ Time	**Presenter**	**Institution**	**Title**
Session 4 15.50-16.10 PM (1 panel)	Gurum Ahmad Pauzi	UNILA	Voltage Storage Analysis of Galvanic Cells with Silver Coated Cathodes using Sea Water Electrolyte on Power Bank Type Lithium Polymer 4000 mAh and Rechargeable Battery Type NiCD 900 mAh
	Mia Abi Nisa	UNILA	Design And Realization Running Text Based On Arduino In Real-time Using Wireless For Digital Information Board

TABLE OF CONTENTS

xlii

KEYNOTE SPEAKER

Isatin (2,3-dioxoindole) as privileged nucleus in medicinal chemistry

Dr. Muhammad Moazzam Naseer

Associate Professor, Department of Chemistry, Quaid-i-Azam University, Islamabad 45320, Pakistan
*Email: moazzam@qau.edu.pk; Phone: +92-51-90642129

Isatin (2,3-dioxoindole) is considered a privileged nucleus for the design and synthesis of multifunctional molecules having diverse applications in medicinal chemistry. This is a well-known natural product which can be found in plants of genus Isatis and Couroupita guianensis. This indolic derivative has been recognized in the chemical industry for nearly 140 years, as it is a oxidation product of indigo dye by means of nitric and chromic acid.[1–7] It is an endogenous oxidized indole exist in the mammalian brain, peripheral tissues, and body fluids,[6] initially identified in humans as one component of the monoamine oxidase inhibitory activity.[8] Isatin has been widely studied in behavioral and metabolic assays, and >90 proteins have been identified through proteomic analysis as its potential biological targets.[9] It acts as a potent inhibitor of human mitochondrial monoamine oxidase B (MAO-B)[10] and administered exogenously was found to significantly increase the levels of acetylcholine, choline, and dopamine in rat brain tissues.[11] It is a flexible and versatile synthetic scaffold, consisting of an indole nucleus and two types of carbonyl groups, a keto and a lactam group that render it a favorable building block for Schiff base reactions, heterocyclic compound synthetic strategies, and pharmacophore development (Figure 1).[12] Isatin derivatives possess a wide range of biological activities, including antimicrobial, anti-HIV, antiviral, antimalarial, anticancer, anticonvulsant, antiasthmatic, anti-inflammatory, and analgesic activities.[13,14]
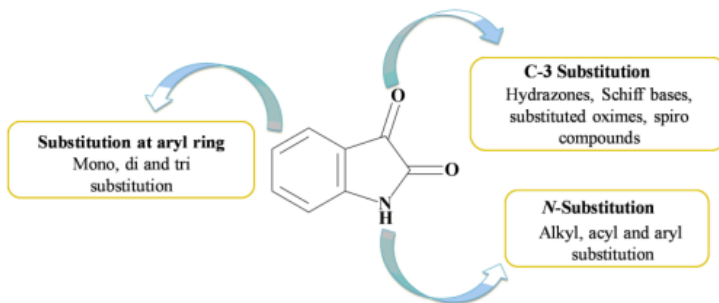
Figure 1. Reactive sites of Isatin

(1) Erdmann, O. L., J. Prakt. Chem. 1840, 19, 321−362.
(2) Laurent, A., Ann. Chim. Phys. 1840, 3, 393−434.
(3) Guo, Y., and Chen, F., Chin. Trad. Herb. Drugs. 1986, 17, 8−11.
(4) Bergman, J., Lindström, J. O., and Tilstam, U., Tetrahedron 1985, 41, 2879−2881.
(5) Wei, L., Wang, Q., and Liu, X. Yaowu Fenxi Zazhi. 1982, 2, 288−291.
(6) Medvedev, A., Buneeva, O., and Glover, V., Biologics 2007, 1, 151−162.
(7) Sagnou, M., Mavroidi, B., Kaminari, A., Boukos, N., and Pelecanou, M., ACS Chem. Neurosci. 2020, 11, 2266−2276.
(8) Glover, V., Halket, J. M., Watkins, P. J., Clow, A., Goodwin, B. L., and Sandier, M., J. Neurochem. 1988, 51, 656−659.
(9) Medvedev, A., Buneeva, O., Gnedenko, O., Ershov, P., and Ivanov, A., Biofactors 2018, 44, 95−108.
(10) Binda, C., Li, M., Hubalek, F., Restelli, N., Edmondson, D. E., and Mattevi, A., Proc. Natl. Acad. Sci. U. S. A. 2003, 100, 9750.
(11) Hamaue, N., Yamazaki, N., Minami, M., Endo, T., Hirafuji, M., Monma, Y., Togashi, H. et al., Biog. Amines 1999, 15, 367−377.
(12) Pakravan, P., Kashanian, S., Khodaei, M. M., and Harding, F. J., Pharmacol. Rep. 2013, 65, 313−335.
(13) Khan, F. A., and Maalik, A., Trop. J. Pharm. Res. 2015, 14, 1937− 1942.
(14) Grewal, A. S., Int. J. Pharm. Res. 2014, 6, 1−7.

Optimization Models for Collection Routing Problems in Municipal Solid Waste Management (MSWM))

Adibah Shuib[1, 2 a)], Nur Hayatul Asna Mohamed Fishal[1, b)], Siti Khairunnisa Mohd Roslan[1, c)]

Author Affiliations

[1] Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA (UiTM),
Shah Alam 40450, Selangor MALAYSIA

[2] Malaysia Institute of Transport (MITRANS), Universiti Teknologi MARA (UiTM),
Shah Alam 40450, Selangor MALAYSIA.

Author Emails
a) Corresponding author: adibah253@uitm.edu.,my
b) hayatulasnaoffc@gmail.com
c) snisa05@gmail.com

Cities worldwide are facing great challenges in municipal solid waste management (MSWM) due to rapid economic growth and urbanization causing ever increasing volume of waste. MSWM is a complex problem due to processes required and without proper management can lead to harmful effects towards public health. environment and sustainability of cities. Waste collection and transportation costs account for about 75% of total MSWM budget and thus, even slight improvement in operations can greatly reduce cost. Studies on collection and routing optimization of municipal solid waste are still lacking in Malaysia. This paper discusses on two Mixed Integer Goal Programming (MIGP) models for MSWM for selected cities using vehicle routing problem approach with heterogeneous vehicles. The first model is for transportation of waste from collection zones to transfer stations in Shah Alam where model's objective functions are to minimize transportation cost, minimize carbon dioxide emission and minimize noise pollution. Another MIGP model proposed is for transshipment problem of waste involving collection schemes to transfer stations to landfills of Kuala Lumpur city where the objective functions involve minimizing total transportation costs, minimizing carbon dioxide emission and minimizing final waste disposals. The MIGP models were solved using preemptive GP method due to multiple objective functions (goals). Based on the optimal solutions, a transfer station has been identified as most recommended for Shah Alam where it received the highest amount of waste which almost reach the maximum capacity of transfer station. For Kuala Lumpur, results indicate reduction in total number of vehicles used and with newly

proposed transfer station, total waste brought to landfills reduced by 1035.54 tons (45.02%) from the initial amount collected. Solutions found based on these models can provide optimal strategies that could improve decision making concerning MSWM that consequently lead towards resilient and sustainable urban areas.

Genetic diversity and molecular interaction between rice and rice blast fungus in Thailand

Chatchawan Jantasuriyarat

Department of Genetics, Faculty of Science, Kasetsart University, Bangkok, Thailand
fscicwj@ku.ac.th

Development of resistant rice varieties to rice blast disease is the priority goal of Thailand. Rice blast disease, caused by a fungus Magnaporthe oryzae, is the most devastating disease affecting rice yield reduction worldwide. Genetic diversity of rice blast fungus population in Thailand is examined using DNA markers and Avirulence (AVR) gene sequences. AVR genes, which involve in pathogenicity, are used to suppress rice defense signaling and enhance host susceptibility. The fungal AVR genes are extremely diverse and rarely have matches in sequence databases. They often are specifically expressed or strongly over-expressed inside plant tissue during plant–pathogen interaction. Very little is known about how these AVR genes are regulated or how does the fungus know that the AVR genes need to be expressed only inside the plant tissue. The overall aim of this project is the dissection of the regulatory mechanism of the rice blast fungal AVR genes. The promoter of AVR gene is characterized. Single-cell transcriptome of infected rice plant with blast fungus is conducted to identify genes that are involved in the pathogenicity. These candidate genes are important for the development of the strategies to prevent the infection of the rice blast fungus.

Keywords: defense mechanism, disease resistant, In-planta, rice blast disease

INVITED SPEAKERS

Calcium Hexaaluminate derived from Blood Cockle Shells Waste: Synthesis and Its Characterisation

Dwi Asmi

Departement of Physiscs, Faculty of Mathematics and Natural Sciences,
University of Lampung, Jl. Sumantri Brojonegoro No.1 Gedung Meneng Bandar
Lampung 35145 Indonesia
Email: dwi.asmi@fmipa.unila.ac.id

Blood cockle shells waste is one of the renewable source of calcium carbonate and it was successfully employed to produce calcium hexaaluminate (CA6) and alumina/calcium hexaaluminate (A/CA6) composites in this study. The formation of calcium aluminates (calcium monoaluminate-CA, calcium dialuminate-CA2, and calcium hexaaluminate-CA6) is temperature dependent. XRD results revealed that CA, CA2 and CA6 phases formed at approximately 1000, 1100 and 1400 oC respectively. Quantitative phase analysis of the A/CA6 composites by the Rietveld method has provided useful information on the phase relations and development in this system. The presence of CA6 phase in alumina matrix has significant effects on the physical properties, i.e. shrinkage, porosity and density of the final products. The shrinkage of A/CA6 composites decreased with an increase in CA6 content, whereas the porosity values increased rapidly for higher CA6 content. The bulk density of a composite also followed a similar trend with the porosity results. The presence of CA6 caused the reduction of hardness in A/CA6 composites. Despite their lower hardness, the composites have improved fracture toughness when compared to alumina.

Keywords: Blood cockle shells waste, calcium hexaaluminate, alumina/calcium hexaaluminate composites.

LaCr$_{0.99}$M$_{0.01}$O$_3$ (where M = Fe, Mo, and Ti) Nano Perovskites: Band Gap energy Determination for photocatalysis of nano Cellulose

Rudy Situmeang[1], Nabitaliah, Rika Meliani Putri, Tria Yuliarni, Mahliani

Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung,

Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung 35145, Indonesia

Promosi elektron dari tingkat HOMO (pita valensi) ke tingkat LUMO (pita konduktansi) ditentukan dari besarnya energi celah yang dibutuhkan sehingga fotokatalisis suatu substrat terjadi. Material yang dipreparasi adalah LaCr1-xMxO3 (M= Fe, Mo, dan Ti), menggunakan pengemulsi pectin dan freeze dry serta dikalsinasi pada suhu 700□C. Hasil Band gap energy menunjukkan bahwa material terkalsinasi 700□C memiliki nilai Eb terkecil, yaitu 2,47 eV. Selanjutnya, hasil konversi selulosa secara fototalitik menunjukkan konversi bertambah dengan semakin kecilnya nilai band gap energy.

The promotion of electrons from the HOMO level (valence band) to the LUMO level (conductance band) is determined from the amount of gap energy required so that photocatalysis of a substrate occurs. The material prepared was LaCr1-xMxO3 (M= Fe, Mo, and Ti) using pectin as emulsifier and freeze drying and calcined at a temperature of 700□C. Band gap energy results show that the 700□C calcined catalyst has the smallest Eb value, which is 2.47 eV. Furthermore, the results of photocatalytic conversion of nanocellulose showed that the conversion increased with the smaller band gap energy value.

Keywords: photocatalysis, bandgap energy, conversion, cellulose, perovskite

Molasses Fermentation Using K2 Isolate immobilized by Calcium Alginate For Ethanol Production

Getari Kasmiarti[1, b)], Hermansyah[2, a)], Claudia Indah Cantika[2], Ferlinahayati[2], Miksusanti[2]

[1]Doctoral Program of Environmental Science, Graduate Program Universitas Sriwijaya, Jalan Padang Selasa No.524, Bukit Besar, Palembang 30139, South Sumatra, Indonesia.
[2]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Sriwijaya, Jalan Raya Palembang Prabumulih KM32, Indralaya 30662, South Sumatra, Indonesia.

[a)] Corresponding author: hermansyah@unsri.ac.id [b)]getariikasmiarti@gmail.com

Molasses has a high sugar content and potentially good to be used as a fermentation substrate in the production of ethanol. The main purpose of this study is to compared the ethanol yield between free and immobilized on calcium alginate as the agent of fermentation. The fermentation of molasses was carried out directly using yeast isolate K2 which was free and immobilized on calcium alginate. Isolate K2 was tested physiologically first to determine the character of its tolerance to NaCl, pH, and molasses. The physiological character of isolate K2 showed its ability to grow at the limit of 12% NaCl, pH 3-6, and 25% molasses concentration at 30ºC. The highest ethanol content was 52% from 25% molasses concentration with 24 hours fermentation using immobilized K2 isolate while the lowest ethanol content was 9% from 5% molasses concentration with 24 hours fermentation time using free yeast. Substantially, it can be concluded that the immobilization of K2 isolate in calcium alginate has the potential to increase the production of ethanol from molasses.

Metaverse is the Future Work

Hoga Saragih
Bakrie University

The metaverse has been exercising our imaginations since Neal Stephenson introduced the concept in his 1992 cyberpunk novel Snow Crash. Since then, we've seen fully-immersive virtual worlds in movies like The Lawnmower Man and Ready Player One, and we've seen Robert Downey Jr use AR-style heads-up displays and conjure up holographic digital twins in his role as Iron Man. The past two decades have seen early versions of the metaverse creep into our real lives, too – from virtual social spaces like Second Life and Habbo Hotel through massively multiplayer online games like World of Warcraft and Fortnite, to mobile AR games like Pokémon GO and Wizards Unite. When thinking about the future of the metaverse, we might imagine a fully immersive, hyper-realistic virtual world that caters to all of our senses. Something like Star Trek's holodeck, where the crew takes holidays in artificially-generated worlds that are largely indistinguishable from reality.

But even from our vantage point today, it's clear that the metaverse isn't on a single evolutionary path. While some developments are indeed bringing us closer to general-purpose virtual worlds, others have more specific applications – many of them in the world of work and industry. At Northumbrian Water in the UK, for example, remote experts guide field technicians via AR headsets. Bank of America is using VR for employee training. And in a glimpse of what might one day be common practice, the team tasked with the restoration of Notre Dame in Paris collaborate on a VR version of the fire-gutted cathedral – a digital twin that they can work in, rather than on.

These examples show that some aspects of the metaverse are achievable today, with further developments around the corner. But what might those developments be, when will they arrive, and how can CSPs and enterprises best prepare for them? To answer those questions, it helps to have in mind the different components that will contribute to the evolution of the metaverse. The metaverse is a complex concept, combining many technologies to create many different types of user experience, depending on the intended use case. Think of it like a kaleidoscope: the same elements can be shaken up again and again to create an infinite array of different experiences. While those elements are many, they can be

grouped into four key drivers of metaverse evolution and five key attributes of the metaverse user experience.

The Metaverse is the post-reality universe, a perpetual and persistent multiuser environment merging physical reality with digital virtuality. It is based on the convergence of technologies that enable multisensory interactions with virtual environments, digital objects, and people such as virtual reality (VR) and augmented reality (AR). In futurism and science fiction, the metaverse is a hypothetical iteration of the Internet as a single, universal and immersive virtual world that is facilitated by the use of virtual reality (VR) and augmented reality (AR) headsets. In colloquial use, a metaverse is a network of 3D virtual worlds focused on social connection.

The term "metaverse" originated in the 1992 science fiction novel Snow Crash, as a portmanteau of "meta" and "universe". Metaverse development is often linked to advancing virtual reality technology due to increasing demands for immersion. Recent interest in metaverse development is influenced by Web3, a concept for a decentralized iteration of the internet. Web3 and The Metaverse have been used as buzzwords to exaggerate the development progress of various related technologies and projects for public relations purposes. Information privacy, user addiction, and user safety are concerns within the metaverse, stemming from challenges facing the social media and video game industries as a whole. The metaverse is a network of virtual places that are linked to a virtual universe. It is often described as a future version of the Internet.

In the Metaverse, customizable avatars and dynamic group experiences will enable a new era of social interaction. Weddings, happy hours, and religious ceremonies are increasingly taking place virtually, with individuals participating regardless of their geographic location. Metaverse members will engage with and purchase digital and real-world apparel, sporting goods, and other items through virtual shopping malls. Virtual try-on software and augmented reality. The metaverse refers to both current and future integrated digital platforms focused on virtual and augmented reality. It is widely hyped as the internet's next frontier and seen as a significant business and financial opportunity for the tech industry and other sectors.

In the vision for the metaverse articulated by social media and technology companies, devices like virtual reality headsets, digital glasses, smartphones, and other devices will allow users access to 3-D virtual or augmented reality environments where they can work, connect with friends, conduct business, visit remote locations, and access educational opportunities, all in an environment mediated by technology in new and immersive ways.

The metaverse is not just one type of experience. Instead, it refers to a continuum of immersive digital experiences that will be available to users in the future and which will allow them to engage in a range of different activities in completely digital spaces. That could mean participating in a massive virtual reality multiplayer game accessed through a VR headset or experiencing integrated digital and physical spaces such as location-specific immersive digital content from business users who are visiting via digital glasses or smartphones.

The metaverse isn't one digital space but several digital spaces and experiences currently being created by companies to offer more realistic and immersive digital experiences. The technology has a range of potential functionalities from augmented reality collaboration platforms that can enable better collaboration and integration to work productivity platforms for remote teams that might, for example, allow real estate agents to host virtual home tours.

Many social media and tech companies such as Meta Platforms (formerly Facebook) and Microsoft are investing heavily in Social VR to create platforms, where people can connect socially or work remotely reality (AR) capabilities that help buyers in various ways, are a natural fit for this use case.

PREDICTION OF A PERSONALITY BASED ON HANDWRITING

Samsuryadi

Computer Science Department, Faculty of Computer Science, Universitas Sriwijaya
samsuryadi@unsri.ac.id

A person's personality can be determined based on the characteristics of a handwriting. The traits found in a person's handwriting are analyzed by a graphologist to predict a person's personality. Handwriting has a certain pattern related to the mental, physical, emotional state, and behavior of the maker. The current development of computerization makes graphology automation to determine a person's personality through digital handwriting. The selection of the right technique, model approach, and feature extraction every time is confirmed to be very crucial and becomes a challenge in itself to get maximum results in finding someone. One approach used to overcome this problem is by using image processing techniques, such as bilateral filtering techniques to remove noise, inverted thresholding to convert gray images to binary images, dilation, contour, affine transformation to rotate hand text so that completely horizontal, and desalting technique to determine the angle of inclination of a text. The Five Factor Model (FFM) psychological measurement method is used to analyze a person's personality and classification using KNN, SVM, and Decision Tree. The result of this research is an image processing and machine learning approach model to predict a person based on the FFM method.

Keywords: prediction of a personality, handwriting, bilateral filtering, Five Factor Model.

Computational Mathematics:
An Analysis of The Image Cryptographic Based on A 2D Linear Mapping Derived from A 2D Nonlinear Mapping

La Zakaria[1, a)]

[1]Mathematics Depertment of Lampung University-Indonesia.
[a)]Corresponding author: lazakaria.1969@fmipa.unila.ac.id

Recently, we can meet the security of digital data in the form of images can be done by using the concept of mapping in mathematics. Arnold's Cat Map (ACM) 2D linear mapping is commonly used in securing image data. However, similar to ACM mapping, nonlinear 2D mapping can also be used after being modified to 2D linear mapping. Aside from the technicalities of encrypting image data using 2D linear mapping, this article also analyzes encryption and decryption results. The analysis focused on the computational results of the average RGB color, PNSR, and Entropy values

Some Results on Strongly Graceful Labeling

I Nengah Suparta
Department of Mathematics
Universitas Pendidikan Ganesha
Email: nengah.suparta@undiksha.ac.id

Through out this talk, the graph $G = G(V, E)$ will be undirected finite simple graph of order $|V|$ and of size $|E|$. A *matching* in G is a non empty subset M of E such that any two elements of M are not adjacent in G. The matching M is called *perfect* if every vertex of G is incident with an element of M.

Let f be an injective function from the vertex set V into the set $\{0, 1, \ldots, |E|\}$. If the set $\{|f(u) - f(v)| : uv \in |E|\} = \{1, 2, \ldots, |E|\}$, then f is called *graceful labeling* for G, and the graph G is called *graceful*.

Let M be some perfect matching in a graceful graph G with graceful labeling f. If in addition, we also have that $f(u) + f(v) = |E|$ for every $uv \in M$, then f is called *strongly graceful labeling* for G, and the graph G is called *strongly graceful*.

In this talk, we will discuss some results on strongly graceful graphs.

Keywords: Graceful, strongly graceful, perfect matching.

HEAVY METALS IN CRABS AND BIVALVIA FROM EAST JAVA COAST INDONESIA AND POTENTIAL HUMAN HEALTH RISK

Agoes Soegianto

Department of Biology, Faculty of Science and technology, Universitas Airlangga, Surabaya, Indonesia

This presentation was to evaluate the levels of metals particularly Cd, Pb, Hg, Zn, Cu, and Cr in soft tissues of crabs and bivalves captured from the East Java Coast, as well as the potential health concerns to humans who consume these animals. Concentrations of heavy metals in Bivalvia and crabs in northern of East Java Coast were higher than in eastern and southern of East Java Coast. Concentration of Cr and Pb in cockle from northern East Java Coast > Provisional Tolerable Weekly Intake (PTWI). Concentration of Cd, Cr and Pb in green mussel and white clam from northern East Java Coast > PTWI. Concentration of all metals in mud crab from East Java Coast < PTWI. Concentration of Cr in blue swimming crab from northern East Java Coast > PTWI.

BIOLOGY

Agarwood-inducing microbial inoculant in powder formula

[1]Aryanto, [1]Laras Murni Rahayu , [1]Sarah Asih Faulina, [1]Asep Hidayat,
[1]Maman Turjaman, [1]Luciasih Agustini, [1]Ragil S.B. Irianto, [1]Safinah Surya
Hakim, [2]Nida Humaida, [1]Whitea Yasmine Slamet

[1]Research Center for Applied Microbiology, National Research and Innovation
Agency Republic of Indonesia (BRIN). Jl. Raya Jakarta-Bogor KM. 46,
Cibinong, Bogor, Jawa Barat, Indonesia
[2]Research Center for Ecology and Ethnobiology, National Research and
Innovation Agency Republic of Indonesia (BRIN). Jl. Raya Jakarta-Bogor KM.
46, Cibinong, Bogor, Jawa Barat, Indonesia
sarahfaulina@gmail.com

The high demand of natural impregnated heartwood resin, agarwood, has
led to the scarcity of naturally-grown agarwood-producing trees.
Developing effective microbially-induced agarwood formation in
cultivated agarwood-producing trees is pivotal in meeting the demand.
Previously developed inoculation method to induce agarwood formation
uses liquid medium for agarwood-inducing fungi Fusarium solani. While
this inoculant has successfully induced agarwood formation, its liquid
form became a challenge when transported in a large amount.
Solidification of the inoculant while maintaining its effectiveness was
developed to ease the distribution process. This study observed and
compared the agarwood formation that was induced by the liquid and
lyophilized liquid F. solani inoculants into powder form. The powder
inoculant package was mixed with sterile water prior to inoculation to
reach a spore concentration of 8 x 106 spores/ mL, similar to that of liquid
inoculant. Agarwood formation was observed in 5-year-old Gyrinops sp.
inoculated trees with diameter of 15 cm at breast high with five
replications. The powder inoculant generated agarwood formation area of
157.09 □ 37.73 cm2, 255.06 □ 159.15 cm2, and 330.64 □ 35.21 cm2
one, two, and three months after inoculation, respectively. Similarly, the
liquid inoculant induced agarwood formation area of 150.94 □ 53.44
cm2, 252.28 □ 93.49 cm2, and 331.36 □ 44.81 cm2 one, two, and three
months after inoculation, respectively. The formation area did not
significantly differ between the liquid and powder with agarwood
formation rate of 89.54 □ 10.34 cm2/month and 90.21 □ 11.56 cm2 for
powder and liquid inoculants, respectively. These results indicated that
the powder form of F. solani inoculant still maintain its effectiveness in
agarwood formation, makes it a promising and favorable agarwood
microbial inoculant.
Keywords: Agarwood, Gyrinops, Fusarium solani, microbial inoculant

Phosphate Solubilizing Bacteria associated with the Rhizosphere of Sandalwood (Santalum album L.) and their phosphate solubilizing abilities

Arwan Sugiharto, Suliasih, Sri Widawati, and Idris
Research Center for Applied Microbiology, Research Organization for Life and Environment, National Research and Innovation Agency of Indonesia, Jl. Raya Jakarta Bogor Km 46, CSC, Cibinong 16911
E-mail of corresponding author: lishadari@yahoo.co.id

Some soil microorganisms that live around plant roots have an important role in the soil nutrient cycle in supplying plant nutrients. Furthermore, phosphate solubilizing bacteria have the ability to make insoluble phosphates available for plants. Therefore, the current study was conducted to examine the activity of phosphate solubilizing bacteria that inhabit the rhizosphere of Sandalwood (Santalum album L.) plants in solubilizing both inorganic phosphates (tricalcium phosphate ($Ca_3(PO_4)_2$), aluminum phosphate ($AlPO_4$), and iron phosphate ($FePO_4$) as P sources, as well as organic phosphate (p-nitrophenyl phosphate disodium and sodium phytate) as the substrate. There were 16 isolates of phosphate solubilizing bacteria (PSB) which were selected based on the formation and dimensions of the halo zone around the colony. All the isolates were capable of either solubilizing the three different inorganic phosphates in culture broth or mineralizing organic phosphate (Acid and Alkaline phosphatase; phytase). Two isolates with the highest phosphate solubilization potential were selected and identified by sequencing the 16S rRNA genes. The maximum inorganic P solubilizing levels were 150.28 µg/ mL ($Ca_3(PO_4)_2$, 109,13 µg/ mL ($FePO_4$) and 21.25 µg/ mL ($AlPO_4$). The solubility of organic was recorded to be 127.57 U/ mL (acid phosphatase), 152.42 U/ mL (alkaline phosphatase), and 4.17 U/ mL (phytase). Therefore, the selected efficient solubilization bacteria can be used as biofertilizer to increase P availability

Keywords: Phosphate solubilizing bacteria, phosphate solubilization, Santalum Album L.

Physicochemical and Phytochemical Characteristics of Fermented Sorghum Flour Using Bacillus amyloliquefaciens, Saccharomyces cerevisiae and consortium B. amyloliquefaciens and S. cerevisiae

[1,*]**Yati Sudaryati Soeka, [2]Tri Ratna Sulistiyani, [2]Nilam Fadmaulidha Wulandari, [3]Siti Irma Rahmawati, [4]Mardiah, [5]Dita Ariyanti, [6]Agus Budiyanto, [6]Abdullah bin Arif**

[1]Research Center for Applied Microbiology. National Research and Innovation Agency (NRIA)
[2]Research Center of Biosystematics and Evolution. National Research and Innovation Agency (NRIA)
[3]Research Center for Vaccine and Drug, Research Organization for Health, National Research and Innovation Agency (NRIA)
[4]Faculty of Food Technology, Djuanda University, Bogor.
[5]Department of Chemistry, Faculty of Military Mathematics and Natural Sciences, Universitas Pertahanan Republik Indonesia
[6]Research Organization for Agriculture and Food, National Research and Innovation Agency (NRIA)
*E-mail: ceuceu_lipi@yahoo.com

Sorghum (Sorghum bicolor L. Moench) is a cereal source of carbohydrates that have not been fully utilized by the community. This study aims to determine the physicochemical and phytochemical characteristics of unfermented and fermented sorghum flour. In this study, red and white sorghum flour were fermented using Bacillus amyloliquefaciens, Saccharomyces cerevisiae, and a consortium of B. amyloliquefaciens and S. cerevisiae as a starter, respectively. The parameters analyzed were proximate levels (fat, protein, water, carbohydrate, ash), crude fiber, antioxidant activity (% inhibition), phenol (mgGAE/g), flavonoids (mg QE/g), and steroids (mg/g). The design of study used a completely randomized design. The results of the analysis showed that fermentation of red and white sorghum flour using a consortium of bacteria and yeast increased fat, protein, water content, and steroid content but decreased crude fiber and antioxidants in flour. The statistical analysis of proximate level showed that fat, protein, water, carbohydrate, ash, and crude fiber were not significantly different between red and white sorghum flour. However, statistically proximate level fat, protein, water, carbohydrate, ash, and crude fiber were significantly different between the microbes used. The phytochemical analysis includes antioxidant activity, phenol, flavonoids, and steroids

significantly different between microbes used. Fermentation technology using superior microbes is able to change the physicochemical and phytochemical characteristics of sorghum flour.

Antioxidant Activity and Total Phenolic Contents of Several Marine Microalgae Isolated from Jakarta Bay

[1]Debora Christin Purbani, [4]Nalia Atalia, [3]Ismu Purnaningsih, [2]Mulyadi, [2]Ryan Setyawan, [1]Diah Radhini Noerdjito, [2]I Made Sudiana, [4]Wibowo Mangunwardoyo, [1]Kusmiati, [2]Iwan Saskiawan, [1]Danang Ambar Prabowo

[1]Research Center for Biosystematics and Evolution, BRIN, Cibinong, Indonesia
[2]Research Center for Applied Microbiology, BRIN, Cibinong, Indonesia
[3]Directorate of Scientific Collection Management, BRIN, Cibinong, Indonesia
[4]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Indonesia, Depok, Indonesia
deborachristin22@gmail.com

Three marine microalgae species (i.e. Chlorella vulgaris InaCC M205, Tetraselmis subcordiformis InaCC M206, and Nannochloropsis oceanica InaCC M206) were isolated from Jakarta Bay and their antioxidant activity as well as total phenolic contents were analyzed and quantifiedCrude extract of each species was subjected to antioxidant activity using DPPH radical scavenging assay and the total phenol contents were determined by the Folin-Ciocalteu method. The analysis was performed using the Varioskan LUX multimode microplate reader. All species exhibited DPPH radical scavenging activity. The IC_{50} value for the C. vulgaris InaCC M205, T. subcordiformis InaCC M206 , and N. oceanica InaCC M207 were 33.37 μg/mL, 37.29 μg/mL and 82.44 μg/mL respectively, which could be categorized as strong to very strong. The total phenol contents were the highest in C. vulgaris InaCC M205 (12.45 μg GAE/mg sample), followed by N. oceanica InaCC M207 (11.28 μg GAE/mg sample), and the lowest in T subcordiformis InaCC M206 (2.36 μg GAE/mg sample). The results of this study suggested that these marine microalgae species possess antioxidant potential as prospective sources for applications in medicine, dietary supplements ,cosmetics or food industries in the future.

Keywords: antioxidant activity, DPPH, IC50, marine microalgae, total phenol

Potential Activity of Plant Growth Promoting Rhizobacteria from Coal Mining Area in East Kalimantan

[1]Tirta Kumala Dewi, [2]Nuri Oktavia, [2]Dzul Fitharia Mumtazah and [1]Sarjiya Antonius

[1]Research Center for Applied Microbiology, National Research and Innovation Agency
Jl. Raya Jakarta-Bogor KM 46 Cibinong, Bogor, Indonesia
[1]Biology Department, Faculty of Mathematics and Natural Sciences, University of Lampung
JL. Prof. Dr. Ir. Sumantri Brojonegoro No 1, Bandar Lampung, Lampung, Indonesia
E-mail of corresponding author: tirta.kdewi@gmail.com

Coal mining activities often cause several changes in the soil ecosystem, especially soil bacteria. Soil bacteria from coal mining areas may have potential activities due to their specific conditions. The aim of this study was to obtain potential bacteria and evaluate their activities to promote plant growth. Soil samples were obtained from a coal mining area in East Kalimantan. The bacteria were cultured by spread plate methods on specific agar media. A Total of 14 bacteria isolates were obtained and 5 bacteria isolates (AD 1.2, AD 1.4, AD 2.4, AD 2.5, AD 7.1) have the highest activity as phosphate solubilizing, potassium solubilizing, protease enzyme-producing, siderophore producing and N-fixing. Four isolates have ACC deaminase activity. AD 7.1 isolate has the highest activity of phosphate solubilizing (index 1.1), siderophore producing (index 1.44), protease enzyme producing (328 u/mL and halo zone index 2.2), and potassium solubilizing (index 0.6). Two isolates have the potential activity to promote plant growth of red bean on root length, fresh weight of root and leaves, and plant height.

Keywords: coal mining, PGPR, East Kalimantan, plant growth, red bean.

Knowing the Coronavirus, including SARSCoV-2 in Animals, and Its Threats to Public Health

Risqa Novita

National Research and Innovation Agency (BRIN) Republic of Indonesia
Email : risq001@brin.go.id

SARS-CoV-2 virus which become a world pandemic since last of 2019 was classified as a zoonotic disease. More than half of known human pathogens are zoonotic, animal to human zoonotic disease transmission is influenced by close relationship between human and animal. It occured due to human needs of protein consumption, protection or animal companionship and massive deforestation. SARS-CoV-2 is a RNA virus, which is RNA virus tends to have higher virulence than DNA virus. Coronavirus is often found in various species. Alphacoronavirus and Betacoronavirus are often infects mammals, while Gammacoronavirus and Deltacoronavirus infects birds. Conclusion . Most of coronaviruses has been infecting animals for a long time, but is still in its original host so it is yet a pathogenic to humans, while SARSCoV2 has mutated so that it can infect humans and other animals such as cats and tigers.

Keywords: Covid-19, Coronaviruses, pathogenic

Bacterial Contaminants and Antibacterial Activity of Honeys from Bunut Hilir and Jongkong Districts, Kapuas Hulu Regency, West Borneo, Indonesia

Heddy Julistiono[1], Pujawati Arisandi[2], Zahra Noviana[1] and Achmad Dinoto[1]

[1]Research Center for Applied Microbiology, National Research and Innovation Agency (BRIN)

[1]Health, Population Control and Family Planning Office, Kapuas Hulu Regency

Corresponding author: heddy_j@yahoo.com

This study was aimed to investigate bacterial contaminants and antimicrobial activity of forest honey from Bunut Hilir (B) and Jongkong (J) districts, Kapuas Hulu regency, West Borneo, Indonesia. Identification of bacteria was done based on 16S rDNA sequencing. Antibacterial tests were carried out against Escherichia coli, Mycobacterium smegmatis, Straphylococcus aureus and contamoinant bacteria using MTT assay method. The results showed that two and one bacteria isolates were found in honey B and J respectively. Isolate B1, B2 and J1 were closed to Micrococcus luteus, Acinetobacter schindleri, and Micrococcus endophyticus respectively. Both honeys have antibacterial activity against target bacteria with range of Minimum Inhibition Concentration (MIC) from 12.5 % (v/v) to above 25 % (v/v). The highest antibacterial activity of honey B was against S. aureus and isolates B2 and J1 with a MIC of 12.5% (v/v). The lowest activity of honey B was in E. coli with a MIC of 25% (v/v). The highest activity of honey J was against S. aureus and isolate J1 with MIC value of 12.5% (v/v). The lowest activity of honey J was on Escherichia coli and isolate B1 with MIC > 25% (v/v). In E. coli and M. smegmatis, honey in low concentrations (3 – 6% v/v) caused increase in the population that exceeds the negative control with 0% honey concentration. The data indicated than although antibacterial activity of honey, in some circumstance bacterial cells can survive in honey.

Keywords: honey, antibacteria, MIC, bacterial contaminant.

DNA Barcoding of the Endemic Balikpapan Ginger, Etlingera balikpapanensis A.D. Poulsen

[1,*]Muhammad Rifqi Hariri, [2]Evi Muliyah, [3]Selis Meriem, [4]Didit O. Pribadi, [1]Hendra Helmanto, [1]Ade Y. Yuswandi, [1]Wihermanto, [1]Iyan Robiansyah

[1]Research Center for Plant Conservation, Botanic Gardens, and Forestry – National Research and Innovation Agency, Jl. Ir. H. Djuanda 13, Paledang, Bogor 16122, Indonesia
[2]Department of Biology Education, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Syarif Hidayatullah, Jakarta 15412, Indonesia
[3]Department of Biology, Faculty of Science and Technology, Universitas Islam Negeri Alauddin, Makasar, Gowa 92113, Indonesia
[4]Research Center for Circular Economy, National Research and Innovation Agency, Jl. Jend. Gatot Subroto 10, Jakarta 12710, Indonesia
Corresponding author: muhammadrifqihariri@gmail.com

Etlingera balikpapanensis is a wild ginger from the Zingiberaceae family. This species is only found in East Kalimantan Province, Indonesian. The IUCN Red List classifies it as an endangered species. The species is regarded as facing a very high risk of extinction in the wild due to forest encroachment and forest fires in this category. The aims of this study were to create a DNA sequence database and make E. balikpapanensis identification easier for the species' conservation and sustainable use. In this investigation, we used a rbcL and an ITS region for DNA barcoding on E. balikpapanensis. For the rbcL and ITS regions, 565-797 bp nucleotides were successfully amplified and sequenced. Compared to the rbcL result, the phylogenetic tree generated using the Neighbor-Joining method with Tamura 3-parameter showed that E. balikpapanensis was clustered together with the other Etlingera species based on ITS sequence. Using the NCBI database, the Balikpapan ginger was readily distinguished from other Zingiberaceae genera and the outgroup species, Hellenia speciosa. This work indicated that the DNA barcoding approach may authenticate E. balikpapanensis samples, aid in correct identification, and offer a sequencing database for this endangered plant species.

Keywords: Conservation genetic, East Kalimantan, nuclear DNA region, plastid DNA region, wild ginger

The Exploration of Ficus variegata seeds at Sungai Pinang, Banjar Regency, South Kalimantan

[1]Wahyuningtyas R.S., [1]Santosa P.B. [2]Junaidah

National Research and Innovation Agency (BRIN)
Jl. Ir. H. Juanda No. 18, Kota Bogor, Jawa Barat, Indonesia, 16122
Corresponding author: reni009@brin.go.id

Ficus variegata Blume. (Moraceae) is a native plant of Kalimantan which has the characteristic of producing fruit on the stem. This species has several important functions, i.e: for water conservation, traditional medicine and a for animal fooder. Furthermore F. variegata wood also has good wood quality especially for carpentry wood due with the wood colour is yellow. The fiber quality of F. variegata also suitable for pulp materials. Due with decreased of the F. variegata mother tree in a nature, the conservation activity of F. variegata is very important to do. The one activity is exploration of F. variegata seeds and mapping of the mother tree in natural habitats in Sungai Pinang-Banjar, South Kalimantan. Results from the exploration shows that 36 parent trees were found. However, only 24 trees had seeds collected during the exploration period from August to January. The peak of fruit season for   F. variegata in Sungai Pinang is November until January, and the ripe fruit season is October until November (early rainy season). F. variegata in Sungai Pinang generally is found growth in secondary forests, garden or fields and logged over areas around the Meratus mountains in Hakim Makmur Village and Kahelaan Village. This species are also often found growing around water sources such as ponds, brooks or rivers. The mother trees are found on average stem height 21.25 m tall, with a branch-free height of 7.76 m, and stem diameter at DBH is 46.58 cm. Seeds from exploration activity furthermore will be sown in nursery for the next genetic conservation purposes and progeny testing to support their breeding activities.

Keywords: Ficus variegata, exploration, natural distribution, parent trees, pulp paper

Genetic Conservation of Hantap (Sterculia oblongata R. Br.) through DNA Barcoding

[1]Fauzi Akbar, [1]Arnia Sari Mukaromah, [2,3,*]Muhammad Rifqi Hariri

[1]Program Study of Biology, Faculty of Science and Technology, UIN Walisongo Semarang, Jl. Prof. Hamka Semarang 50185, Indonesia.
[2]Research Center for Plant Conservation, Botanic Gardens, and Forestry – National Research and Innovation Agency, Jl. Ir. H. Djuanda 13, Paledang, Bogor 16122, Indonesia
[3]Indonesian Genetic and Biodiversity Community, Jl. Ikan Mujair no. 15, Lowok Waru, Malang 65142, Indonesia
Corresponding author: muhammadrifqihariri@gmail.com

Hantap (Sterculia oblongata R. Br.) is an important medicinal plant from Indonesia. This species is classified as a Least Concern species by IUCN Red List with a severely fragmented population and continuing decline of mature individuals in the wild. Genetic conservation activities were carried out through DNA barcoding to maintain genetic diversity and species validation. Due to the high species-level variation, the psbA-trnH region was chosen as a barcode. This study aimed to analyze the characteristics and determine the role of the psbA-trnH sequence in identification activities and genetic conservation efforts for S. oblongata in Indonesia. The phylogenetic tree was constructed using the Maximum Parsimony method with Subtree-Pruning-Regrafting algorithm. The region was successfully amplified for 350 bp consisting of 39.7% T, 13.7% C, 30.6% A, and 16.0% G nucleotides. The phylogenetic tree showed that all Sterculia species could be discriminated against clearly, with the notable S. oblongata being closely related to S. foetida and the most distant to S. lanceolata. This study demonstrated that the psbA-trnH region supports the correct identification of this species and could be used to authenticate the Sterculia species.

Keywords: Bogor Botanic Gardens, cpDNA, Living Type, Maximum Parsimony, Subtree-Pruning-Regrafting

Genetic Fingerprinting of Indigofera tinctoria L. using ISSR Molecular Markers

[1]*Muhammad Rifqi Hariri, [2]Tatik Chikmawati, [2]Alex Hartana
[1]Research Center for Plant Conservation, Botanic Gardens, and Forestry –
National Research and Innovation Agency, Jl. Ir. H. Djuanda 13, Paledang,
Bogor 16122, Indonesia
[2]Department of Biology, Faculty of Mathematics and Natural Sciences, IPB
University, Jl. Meranti, Kampus IPB Darmaga, Bogor 16680, Indonesia
Corresponding author: muhammadrifqihariri@gmail.com

Indigofera tinctoria L. is one of the economically and ecologically important plant species cultivated for its dye in Indonesia. Due to the development of synthetic dye, tumbuhan ini mulai ditinggalkan penggunaannya sebagai pewarna tekstil alami oleh masyarakat lokal. To prevent the problem of reduced genetic variability, we need to track all available genetic diversity within the Indigo germplasm. Fifty Indigo accessions from Java and Madura islands were investigated using fifteen ISSR markers to establish their DNA fingerprinting and propose valuable ISSR markers. The findings of this study shed new light on the detection of various Indigo populations in Java and Madura. Hence, these ISSR technique markers can be used not only for identifying the Indigo population but also as a genetic database useful for the future breeding program.

Keywords: Indigo plant, Java, Madura, PCR markers

Abundance of Bacillus sp. phage and its plaque morphology from various water sources around Toba Lake, North Sumatra, Indonesia

[1]Evi Triana, [1,a]Titin Yulinery, [1]Qori Emilia, [2]Nilam Fadmaulidha Wulandari and [1]Novik Nurhidayat

[1]Research Centre for Applied Microbiology, National Research and Innovation Agency. 2Research Center for Biosystematics and Evolution, National Research and Innovation Agency

Jl. Raya Jakarta-Bogor Km. 46 Cibinong, Bogor 16911, Indonesia

[a]Corresponding author: tyulinery@yahoo.co.id

Bacillus sp. is one of the most abundant bacteria in nature. However, contamination that is caused by several Bacillus strains can lower the quality and safety of some products, which may bring negative impacts on the economy and health. Bacteriophage is a virus that has been used as a natural agent to control bacterial load in various applications. This study aimed to assess the diversity of phages infecting Bacillus sp. from 18 samples of different water sources around Toba Lake, North Sumatra, Indonesia. Abundance of phages was determined by evaluating the quantity and morphology of phages in all water samples. Phages isolation and enumeration were carried out by using plaque assay method. Observation on plaque morphology showed that most of Bacillus sp. phages have clear and turbid plaques. Enumeration of phages was expressed in plaque forming unit per ml (PFU/ml). The number of phages in all samples fall between 0,21x107 PFU/ml to 7,01x107 PFU/ml. The knowledge of Bacillus sp. phages diversity can be used for Indonesia bioprospecting mapping and basis data for further investigation related to the characteristics and advantages of Bacillus sp. phages.

Keywords: Bacillus phage, phage isolation, phage enumeration

Protein Analysis of Friesian Holstein and Jersey Cattle Frozen Semen

Nina Herlina, Nova Dilla Yanthi, Muhammad Gunawan, Ekayanti M Kaiin

Research Center for Applied Zoology, Cibinong Science Center
Jl. Raya Bogor KM. 46, Cibinong, Bogor, Indonesia, 16911
Email : nina011@brin.go.id

Friesian Holstein and Jersey cattle are dairy cattle that can be found in Indonesia. Both of them are commonly reproduced using artificial insemination technology. Sperm quality examination still uses conventional methods in the form of analysis of motility, concentration and morphology of sperm. The cryopreservation process is reported to be able to degrade the cell membrane of spermatozoa, thereby damaging the nucleic acid (DNA). Several sperm proteins play a role in protecting sperm from the cryopreservation process. These proteins can also act as fertility markers. This is the basis for developing a method to obtain quality male seeds, namely by looking at the sperm protein profile through a proteomic approach. This study aimed to examine the quality and protein profile of frozen sperm of Friesian Holstein and Jersey dairy cattle using Sodium Dodecyl Sulfate Poly Acrylamide Gel Electrophoresis (SDS PAGE) after stored in liquid nitrogen for a certain period of time. Frozen semen were thawed and sperm analysis was performed. Spermatozoa protein was isolated using lysis buffer with Triton X and sonication. The data obtained were analyzed descriptively by comparing the protein profile of spermatozoa in the FH and Jersey. The 4-7 protein found on FH spermatozoa samples including 90 kDa, 75 kDa, 64 kDa, 50 kDa, 38 kDa, 27.5 kDa and 14 kDa. Jersey sperm protein showed 2-8 including 73,29 kDa dan 64,62 kDa, 53,82 kDa, 42,01 kDa, 27,32 kDa, 25,70 kDa, 18,87 kDa, 13,04 kDa dan 10,86 kDa.

Keywords: cattle bull, frozen semen, protein, SDS PAGE

Palm Conservation in Bogor Botanic Gardens

Rizmoon Nurul Zulkarnaen
Research Center for Plant Conservation, Botanical Gardens, and Forestry - BRIN (National Agency for Research and Innovation), Ir. H. Juanda Street No. 13 Paledang, Bogor City, West Java
*email: rizmoon.zulkar@gmail.com

Bogor Botanic Gardens (BBG) is the first institution for ex situ plant conservation in Indonesia. BBG has a special conservation theme for wet lowlands. BBG has a collection of plant collections that are interesting and have many functions in human life, they are the collection of palms. The BBG's palm collection does not only come from Indonesia (original Indonesian palms) but also from outside Indonesia. This study provides data on palm species collection in the BBG. The study was a descriptive study with inventory methods and grouping of the species of palm collections. Palm (Arecaceae) collection BBG until 2020 recorded 1.246 specimens / individual plants from 80 genera, 843 species with 118 individuals unidentified. The largest number of individual palm collections include the following Livistona chinensis (Jacq.) R. Br. ex Martelli (14 ind.), Roystonea elata (Bartram) Harper (12 ind.), Hydriastele beguinii (Burret) W.J. Baker & Loo (10 ind.), and Rhopaloblaste ceramica (Miq.) Burret (10). In addition, palm conservation efforts in the BBG have contributed 3% for the conservation of endangered plants and 83% have conserved palm at Plants Protected in Indonesia.

Keywords: Palm Collections, Indonesian Palms, World Palms, Diversity

Selection of pigment production by Fusarium and their application in cotton cloth painting

Suciatmih

Research Center for Applied Microbiology, National Research and Innovation Agency (BRIN)
Cibinong Science Center, Cibinong-Bogor 16911, Indonesia
E-mail: suciatmih1958@gmail.com

Fusarium preserved in liquid paraffin can secrete pigment that can be used to paint cotton cloth. Twelve Fusarium strains secreting pigment in liquid paraffin were then tested for their ability to produce pigment in four different media, Potato dextrose broth (PDB), PDB + liquid paraffin (Pf), PDB + mineral salt (MS), and PDB + Pf + MS. Only six Fusarium strains secreted pigment, two Fusarium strains (873 and 2128) secreted pigment in all four media, while the other four Fusarium strains (1845, 2197, 2215, and 2248) secreted pigment only in the PDB + Pf + MS medium. Pigment-producing Fusarium cultured in the PDB + Pf + MS medium was then tested for their ability to paint cotton cloth. Determining the color of the filtrate or pigment and the scale of colors made on the painted materials using the RHS color chart. The color forming on the cloths were influenced by the concentration and type of mordants. Colors created on cotton cloth will add colors variation to textile painting.

Keywords: cotton cloth, Fusarium, painting, pigment production, selection

Severity of Mistletoes Infestation on Living Plants Collection Cultivated in Purwodadi Botanic Garden

Solikin Solikin

Research Center for Ecology and Ethnobiology, National Research and Innovation Agency, Jl. Raya Jakarta-Bogor Km 46, Cibinong, Bogor West Java 16911, Indonesia
lipisolikin@gmail.com; solikin@brin.go.id

Mistletoes are hemiparasitic aerial plant that parasitize wild and cultivated plants. This sudy aimed to investigate and determine the severity of mistletoes infestation in living plants collection in Purwodadi Botanic Garden in 2013, 2017, and 2021. Exploratory and descriptive methods were used to collect data of species and number of mistletoe and their hosts in blocks of living plants collection in the garden. The mistletoes species was identified using binoculars in the garden and further identified by constructing herbarium specimens and photographs. The results showed that the severity index of mistletoes infestation varied from 0 to 100 depended on plants species and year. The highest severity index of mistletoe infestation was Ficus religiosa L., i.e., 71.20 with 35.33 parasites per plant. Infestation of mistletoes was the highest in 2017, i.e., 104 species, 75 genera, and 31 family of cultivated plants. Whereas the highest severity index was occured in 2021, i.e. 12.39 per infested species.

Keywords: host, infestation, mistletoe, Purwodadi Botanic Garden, severity

Seagrass Soil Carbon at Two Different Designation Zones in Karimunjawa National Park

[1]Jeverson Renyaan, [2]Reza Ilham Burhanudin, [2]Endang Sunarwati Srimuriana, [2]Dea Fauzia Lestari, [1]La Ode Alifatri, [3]Muhammad Safaat, [1]Firman Zulpikar, [2]Adriani Sunuddin, [2]Muhammad Noval Alghifari, [1]Husen Rifai[*]

[1]Research Center for Oceanography – National Research and Innovation Agency, Indonesia
[2]Marine Science and Technology Department, IPB University, Indonesia
[3]Research Center for Chemistry – National Research and Innovation Agency, Indonesia
*Corresponding author: lamunhusen@gmail.com

Karimunjawa National Park (KNP) has large seagrass meadows crucial to be used as nature-based solutions to mitigate global climate change. To date, many studies related to biological and ecological aspects of seagrass ecosystems have been conducted in KNP, however, studies regarding important roles of seagrasses as natural carbon sink are lacking. Thus, this study aims to reveal the potential of seagrasses carbon stock, especially their soil carbon as the main component of blue carbon in seagrass ecosystems. Two seagrass sites located at two different zones in KNP were chosen as study sites i.e., Menjangan Besar (utilization zone) and Sintok (protection zone). There were nine soil cores for each 100x100 m2 site. Parameters used for estimating soil carbon stock i.e., compaction factor, dry bulk density, and Corg content (% soil dry weight). A PVC corer with 5.5 cm in diameter and 80 cm in length was applied to collect the soil. The length of the soil core was varied between 42 and 68.5 cm at Sintok and between 60 and 69 cm at Menjangan Besar. Laboratory analysis showed that soil carbon stock at Sintok is 63.54 MgCorg/ha in the top 58 cm of soil, whereas at Menjangan Besar is 65.32 MgCorg/ha in the top 65 cm of soil. The result of T test analysis showed that there was no significant different of soil stock carbon between two sites. These seagrass soil carbon values highlight the need for implementing better management strategies to conserve seagrass ecosystems in KNP.

Keywords: blue carbon, climate change, Karimunjawa National Park, seagrasses, soil carbon

Identification Of Morphology, Endogenous Hormones And Nutrient Fe, Mg, N Of Palm Oil Plant (Elaeis Guineensis Jacq.) Off-Type Post-Acclimatization

[1]Karyanti, [1]Hayat Khairiyah, [2]Tati Sukarnih, [2]Yayan Rudiyana, [2]Wahyu Setia Wibawa, [2]Andi Rochandi, [3]Shafira Aliifa

[1]Research Center for Horticultural and Estate Crops, Research Organization for Agriculture and Food, BRIN, Cibinong Science Center, Jl, Raya Jakarta-Bogor,Cibinong, Jawa Barat

[2]Directorate of Laboratory Management, Research Facilities, and Science and Technology Park, Deputy for Research and Innovation Infrastructure, BRIN,Gedung 630,Kawasan Puspiptek, Serpong, Banten

[3]Agronomy and Horticulture Program,Faculty of Agriculture, IPB University, Bogor, Jawa Barat

Kary005@brin.go.id

Clonal propagation of oil palm has long been developed and is an alternative to producing quality seeds. The explant sources commonly used are young leaves, propagated by the somatic embryogenesis method. Oil palm propagation from sampling young leaves to producing plantlets takes about three years. The propagation process begins with sampling, sterilization, callus induction, embryo induction, shoot propagation, shoot enlargement, and root induction. Each stage is monitored, particularly in media use and subculture time. This is done to anticipate the occurrence of mantle fruit when planted in the garden. The study was conducted on one of the genotypes of the virescens variety, where several embryos were found to produce plantlets that were identified as off-type. Plantlet morphology selection was carried out before entering the acclimatization stage. Two types of plantlets were found that had normal morphology and height, but there were differences in the length of the leaf midrib. Identification and observations were carried out starting from plantlets to the post-acclimatization stage. The morphological characteristics of off-type oil palm seeds after acclimatization were dark green leaves, stiff, prominent leaf veins, and slow growth in height. Post-acclimatization off-type seeds can return to normal after 4-6 months of treatment. Analysis of endogenous hormones in oil palm leaves that were identified as normal found BAP 32.48 ppm and ABA 0.62 ppm. In contrast to off-type plants, BAP was found around 0.95 – 7.62 ppm and ABA around 2.54 – 3.44 ppm. analysis of the nutrients element of iron (0.03 – 536 ppm), magnesium (836 -1448 ppm), and nitrogen (1.72 – 2.32 ppm) in off-type oil palm plants which were higher than normal plants (Fe 3.6 ppm, Mg 732 ppm, N 1.55 ppm).

Keywords: Oil Palm, BAP, ABA, Hormones, embryogenesis

Expression of Cytokine and Chemokine Gene Families from The Blood of Dairy Cattle Infected With Mastitis

Nova Dilla Yanthi[1], Anneke Anggraeni[2], Syahruddin Said[1], Retno Damayanti[3], Muladno[4]

[1] Research Center for Applied Zoology of National Research and Innovation Agency, Cibinong, Bogor
[2] Indonesian Research Institute for Animal Production, Ciawi, Bogor
[3] Faculty of Veterinary Medicine, Bogor Agricultural University
[4] Faculty of Animal Science, Bogor Agricultural University
Email: nova.dy@gmail.com

The period of breastfeeding until the cowshed dry make the dairy cows susceptible to bacteria assault, which can cause inflammation of the udder. infected bacteria cows trigger an innate immune system reaction including inflammatory of cytokine and chemotactic. The purpose of this activity was to analyze the gene expression profile of cytokines and chemokines in the blood of dairy cattle infected with subclinical mastitis. There are 6 genes used, namely the TLRs group (TLR 2 and TLR 4), the cytokine group (IL1A and IL6) and the Chemokine group (IL8 and CXCR1). Expression was obtained from the isolation of mRNA in the blood of 10 healthy and infected cows with subclinical mastitis using RT-PCR. Subclinical mastitis control was performed using the California Mastitis Test (CMT) method.

Keyword: subclinical mastitis, innate immune, inflammation, gen

Insecticidal Activity of Lantana Camara Extract Against Spodoptera litura (F.) (Lepidoptera: Noctuidae)

Rosma Hasibuan[1], Sang Aji Wirojati[2], Agus M. Hariri1, Purnomo[1], Favorisen. R. Lumbanraja[3a]

[1]Department of Plant Protection, Faculty of Agriculture, University of Lampung, Indonesia Jl. Prof. Sumantri Brodjonegoro No 1 Bandar Lampung, 35145, Indonesia

[2] Department of Plant Protection's Alumni Faculty of Agriculture, University of Lampung, Indonesia Jl. Prof. Sumantri Brodjonegoro No 1 Bandar Lampung, 35145, Indonesia

[3]Department of Computer Science, Faculty of Computer Science, University of Lampung. Jl. Prof. Dr. Soemantri Brojonegoro No. 1 Bandar Lampung 35145, Indonesia

[a]Corresponding author: favorisen.lumbanraja@fmipa.unila.ac.id

Lantana camara (Verbenaceae) leaves extract is one of important source of botanical insecticide. Laboratory study was conducted to find out the insecticidal activity of L. camara extract on polyphagous lepidopteran Spodoptera litura (Noctuidae). The six treatments were concentration of L. camara leaves extracts: control, 1%, 2%, 3%, 4%, and 5% w/v. Each treatment was replicated three times. All experimental units were arranged in a randomized complete block design. Early instar (2-3) larvae of S. litura were used for the bioassays. Mortality of treated and control larvae were recorded daily. The results indicated that the application of L. camara leave extracts significantly affected the S. litura mortality throughout the experimental period. The toxicity of L. camara leaves against S. litura larvae increased as a concentration of leaves extracts increased. The value of lethal concentration 50 (LC50) L. camara extracts after 72 h exposure was 0.1267% (w/v) and the value of lethal time 50 (LT50) of L. camara leaves extracts 5% w/v was 12.73 hours. The application of L. camara leaves extracts on early instar larvae of S. litura caused not only mortality in larval stage, but also caused defects in pupal and adult stages. While in the control, S. litura larvae grew and molted into normal adults. The results suggested that the use of naturally derived products such as L. camara leaves extracts show promise as a potential tool in S. litura management programs.

Keywords: Spodoptera litura, mortality; Lantana camara, toxicity

The Combination Use of Fungal Induced Compost Tea and Coco peat Media on the Growth of Brassica oleracea L.

Bambang Irawan[*1], Sally Khoirunisa[1], Rochmah Agustrina[1], and Endang Nurcahyani[1]

[1]Department of Biology, Faculty of Mathematics and Natural Sciences, the University of Lampung, Bandar Lampung 35145, Indonesia.
[*]Corresponding Author: bambang.irawan@fmipa.unila.ac.id

The combination of fertilizer type and growth media is an important element of plant production. Compost tea, a compost extract that has many nutrients, and coco peat, a growing medium capable of storing nutrients and water were used in this research. The aim of study was to determine: a) the effect of lignocellulolytic fungi-induced compost tea and coco peat growing media on growth of B. oleracea, L.; and b) the type of compost tea and its composition as the best growth media for B. oleracea, L. This research was carried out in the Greenhouse of the Integrated Field Laboratory Faculty of Agriculture, University of Lampung. The research was carried out in a factorial method using Completely Randomized Design (CRD) consisting of 2 factors. The first factor is compost tea (A) with 2 treatment levels, aerated compost tea (ACT) (A1) and non-aerated compost tea (NAC) (A2). Second factor is growth medium (B) with 3 levels ratio, coco peat and soil with a ratio of 2:1 (B1); 1:1 (B2); 1:2 (B3) to obtain 6 treatment units. Observed parameters were number of leaves, fresh and dry weight, chlorophyll a, b, and total, and Net Assimilation Rate (NAR). The difference among treatments are analyzed using variance analyses followed by Tukey's test. The results showed that aerated compost tea (ACT) gave good results higher average compared to non-aerated compost tea (NACT) while the composition of coco peat: soil = 1:2 gives the average yield which is higher than the composition of the coco peat: soil = 2:1. Compost tea treatment, cocopeat growing media, and their interactions can increase all parameters including number of leaves, fresh and dry weight, chlorophyll a, chlorophyll b, and chlorophyll total and Net Assimilation Rate (NAR).

Keywords: fungi, compost tea, coco peat, growth

Potency of Macroalgae Eucheuma cottonii and Sargassum sp. as an Antimalarial Agent

Endah Setyaningrum[1,a], Endang Linirin Widiastuti[1,2], Dzul Fithria Mumtazah[1], Jeany Audina Suryaningkunti[2]

[1]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung

[2]Department of Coastal and Marine Management, Multidisciplinary Postgraduate Faculty, University of Lampung

[a]Corresponding author: endahsetyaningrum375@gmail.com

Resistance of Plasmodium falciparum to various kinds of antimalarial drugs (multidrugresistance) is a serious public health problem and is a challenge in treatment efforts as part of malaria eradication. One effort to overcome this is by exploring natural materials such as the macroalgae Eucheuma cottonii and Sargassum sp. which are abundant in the coastal areas. The purpose of this study was to determine the potential of macroalgae Eucheuma cottonii and Sargassum sp. which was extracted with ethanol as an antimalarial through phytochemical, GC-MS and antimalarial activity tests against Plasmodium falciparum. The results of the phytochemical test showed that both the ethanol extracts of Eucheuma cottonii and Sargassum sp. contains alkaloids, flavonoids, tannins, saponins, and terpenoids. The results of the GC-MS test showed that 1,2-Benzenedicarboxylic acid and Heptadecene-(8)-Carbonic Acid-(1) compounds had potential as antimalarials. Exploration of macroalgae Sargassum sp. extracted using ethanol has more potential as an antimalarial than the macroalgae Eucheuma cottonii in the same extraction.

Keyword. Eucheuma cottonii, Sargassum sp., Antimalarial, GC-MS

Comparative male performance of Nile tilapia hatchlings (Oreochromis sp) through immersion in sea cucumber steroid extract with addition of honey bee

[1]G N Susanto, [2]D W Safitri, [2]Istiqomah

[1,2]Department of Biology, Faculty of Mathematics and Natural Sciences,
University of Lampung
Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia 35145
Corresponding author: gregorius.nugroho@fmipa.unila.ac.id

Tilapia is sexual dimorphism, with males growing faster than females, so the production of monosexual males is much more profitable. In aquaculture, the male formation process generally uses 17α-methyltestosterone, but this synthetic hormone has a negative impact on the residue and a carcinogenic effect. Therefore, it is necessary to look for natural substitutes, such as steroid extracts of sea cucumber which are safer and more environmentally friendly. The purpose of this study was to determine the performance of male monosexuals in 2 weeks old tilapia (Oreochromis sp) larvae through immersion in sea cucumber of steroid extracts (SCSE) combined with the addition of honey bee. The research was carried out in stages experimentally with the Completely Randomized Design (CRD) method. In the first stage, the research was carried out by immersing fish in 2 mg. L-1 of SCSE for 0, 12, 24, and 36 hours. From the results of the first phase, further research was carried out with the addition of honey bees in an effort to increase male formation. The addition of honey bee at the dose of 5, 10, 15, and 20 mg. L-1 in SCSE dose of 2 mg. L-1 in order to determine the effective dose of honey in increasing male formation. Data were analyzed using analysis of variance (ANOVA) and continued with the smallest significant difference (LSD) test at the level of α = 5%. From the results of the initial research, it was known that the length of immersion in SCSE of 2 mg. L-1 had an effect on male sexual formation. The results of the further test showed that the immersion for 12, 24 and 36 hours was different than the control (0 hours), but the duration of immersion was not significantly different between treatments. The highest male formation was found in the immersion SCSE dose of 2 mg. L-1 for 12 hours which reached 41.25%. The results of the next stage through immersion in SCSE dose of 2 mg. L-1 for 12 hours combined with honey bee, significantly affected male sexual formation. The addition of 20 mg. L-1 honey was quite effective in increasing the formation of male monosexuals by 83.33%, but it didn't affect the survival and growth of tilapia larvae.
Keywords: tilapia, monosexual, immersion, sea cucumber, honey

QUALITY IMPROVEMENT OF TOMATO (Lycopersicum esculentum Mill.) SEEDS USING A MAGNETIC FIELD 0.2 mT

Rochmah Agustrina, Eti Ernawiaty, Sri Wahyuningsih, Bambang Irawan, and Yulianty

Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung

JL. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia 35145

E-mail :rochmah.agustrina@fmipa.unila.ac.id

Magnetic fields are known to affect the metabolism of plant cells which then have an impact on plant growth and development, starting from germination, growth, to the production of various plants. In this study, magnetic field treatment was exposed to old tomato (Lycopersicum esculentum Mill.) seeds, seeds whose planting period had expired. The purpose of this study was to determine whether exposure to a 0.2 mT magnetic field could improve the quality of old seeds. The study was conducted using a completely randomized design (CRD) with one treatment consisting of: positive control, new seeds without being exposed to a magnetic field (SnM0); negative control, old seeds without being exposed to a magnetic field (SoM0); old seeds were exposed to a magnetic field for 7 minutes 48 seconds (SoM7); 11 minutes 44 seconds (SoM11); and 15 minutes 36 seconds (SoM15) which were repeated 5 times each. Seed quality was observed on several growth and development parameters starting from the germination phase to plant production. The results of ANOVA at = 5% indicate that exposure to a 0.2 mT magnetic field in general does not have a significant effect on vegetative and generative growth except for dry weight and chlorophyll content in the vegetative growth phase and carbohydrate content in the generative phase. However, the average measurement results for all parameters showed that the 0.2 mT magnetic field treatment for 11 minutes 44 seconds on old seeds tended to show higher vegetative and generative growth including production than that produced by positive control treatments or new seeds. These results indicated that exposure to a 0.2 mT magnetic field was able to improve the quality of old seeds.

Keywords: new seeds, old seeds, Magnetic field

The Effects of Nutgrass Rhizome Extracts (Cyperus rotundus L) on Forelimb and Hindlimb Skeletal Development in Mice Fetuses (Mus musculus L)

Nuning Nurcahyani[1,a)], Yan Wirasti[2,b)], Jamsari[3,c)], and Djong Hon Tjong[4,d)]

[1]Department Biology, Faculty of Mathematics and Sciences, University of Lampung, Bandar Lampung, Indonesia.
[2]Department of Pathological Anatomy, Faculty of Medicine, University of Andalas, Padang, Indonesia.
[3]Department of Biotechnology, Faculty of Agriculture, University of Andalas, Padang, Indonesia.
[4]Department of Biology, Faculty of Mathematics and Sciences, University of Andalas, Padang, Indonesia.
a) Corresponding author: nuning.nurcahyani@fmipa.unila.ac.id
[b)] yanwirasti@med.unand.ac.id, [c)] ajamsari@yahoo.com,
[d)] djonghontjong@sci.unand.ac.id

Previous research studies have shown that some medicinal plants have side effects, such as teratogenic and embryotoxic effects on the organisms that consume them. One of them is nutgrass (Cyperus rotundus L), that might cause abortion during pregnancy or abnormalities during embryonic development. This research aimed to examine the effects of nutgrass rhizome methanol extracts on skeletal development of forelimb and hindlimb in mice (Mus musculus L) fetuses. In this research, the pregnant mice (n=24) were divided into 4 groups, each group consisted of 6 mice. The first group was control group (K) which was given 0.4 ml aquabides, the other groups were treatment groups which were given nutgrass rhizome methanol extract at the dose of 45 mg / 40 g BW, 90 mg / 40 g BW, and 135 mg / 40 gr BW on 0.4 ml of aquabides. All groups were treated from day 6th to day 17th after fertilization. The fetuses were taken on the day 18th after fertilization, after that the study parameters such as the length of humerus, ulna, metacarpus, femur, tibia, and metatarsus of mice fetuses were assessed. Based on the research results, it was concluded that the nutgrass rhizome methanol extracts decrease the length of the humerus, ulna, and metacarpus in mice fetuses. Moreover, the nutgrass extracts also decrease femur, tibia, and metatarsus length in mice.

Keywords: nutgrass, Cyperus rotundus L, forelimb, hindlimb, teratogenic effect

YIELDS OF FRUIT, SEEDS AND FORAGE THOSE HARVESTED FROM INTERCROPPING OF SORGHUM (Sorghum bicolor [L.] Moench) AND BEAN (Phaseolus vulgaris L.)

[1]Eko Pramono, [2]Tundjung Tripeni Handayani, and [1]Tumiar Katarina Manik

[1)]Department of Agronomy ang Horticulture, Faculty of Agriculture University of Lampung

[2)]Department of Biology Faculty of Mathematic and Natural Sciences University of Lampung

[1,2)]Jalan Soemantri Brojonegoro No. 1 Bandar Lampung, Indonesia 35145
E-mail of corresponding author: pramono.e61@gmail.com

The limited availability of agricultural land had forced farmers switch from solecropping to intercropping. The purpose of this study was to determine the yield of bean fruit, bean and sorghum seeds, and sorghum forages harvested from sorghum-bean intercropping compare to those from solecropping. The research was carried out on the agricultural land of the Vegetable Seed Center in Sekincau District, West Lampung Regency, Lampung Province at 05°02'27" South Latitude and 104°18'16" East Longitude and at the altitude of 1173.1 m from sea level, during April to August 2021. Two varieties of bean, Balitsa2 was dwarf bean and Horti-3 was climbing bean, were respectively planted intercoppingly with sorghum of Numbu variety. As comparators were solecroppings of Balitsa-2 bean, Horti-3, and Numbu sorghum.   The single factor treatment was applied in a randomized complete block design with six blocks as six repliclates. yield of sorghum seeds and yields of sorghum forages harvested from the sorghum-bean intercropping were lower than those harvested from solecropping.   Yield of bean fruits and bean seeds harvested from the sorghum-bean intercropping did not different from those harvested from the solecropping.

Keywords: bean, forages, intercropping, seeds, sorghum

Genetic Polymorphism of Iron-Regulated Transporters Gene in Rice

[1]Lili Chrisnawati, [2]Miftahudin, [3]Dwinita Wikan Utami

[1]Departement of Biology, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[2]Departement of Biology, Faculty of Mathematics and Natural Sciences, Bogor Agricultural University, Bogor, Indonesia
[3]National Research and Innovation Agency of Indonesia. Cibinong Science Centre, Jl. Jalan Raya Bogor KM. 46, West Java, Indonesia.
lili.chrisnawati@fmipa.unila.ac.id

Iron-regulated transporters is the main root tansporter taking up iron from soil and also regulate iron transportation in plant to prevent iron toxicity. Identification of gene polymorphism related to iron toxicity tolerance is important for the development of molecular marker tool in Marker Assisted Selection. We identified polymorphism of iron-regulated transporters gene in a doubled haploid rice population and associated with iron toxicity tolerance. We screened the phenotype for forty-five doubled haploid rice lines derived from reciprocal double-crossing, i.e. IR54/Parekaligolara // Bio 110/Markuti in high Fe wetland rice field. We used OsIRT1, OsIRT2, and AtIRT1 for molecular analysis. Statistical analysis used Tassel 3.0, in which the P-value <0.05 indicated that the gene was associated with iron toxicity tolerance. PCR anayisis showed DNA band polymorphism. The statistical analysis showed OsIRT1 and OsIRT2 gene associated with iron toxicity tolerance in rice.

Keywords: rice, iron toxicity tolerance, OsIRT1, OsIRT2, AtIRT1

The Effects of Synbiotics and Various Herbs During Photobacterium Damselae Challenge Test On The Histopathology Of Seabass Internal Organs

[1]Khrisna L Budi, [2]G N Susanto, [3]S Antoro, [3]R Purnomowati
[1]Graduate School of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung,
[2]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung
Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia 35145
[3]Lampung Marine Aquaculture and Fishery Center, Jl. Yos Sudarso, Hanura, Teluk Pandan,
Pesawaran, Lampung, Indonesia 35450
Corresponding author: gregorius.nugroho@fmipa.unila.ac.id

Seabass, Lates calcarifer is a widely distributed species with a high economic potential in fish culture. One of the causes of death in the cultivation of seabass is often attacked by Photobacterium damselae bacteria. The provision of synbiotics and natural herbal ingredients in feed is one way to increase the body's defenses and prevent disease attacks in fish. The aim of the study was to examine the histological internal organs of seabass that had been exposed to P. damselae to determine the impact of feeding it synbiotics and various herbs. The research was carried out at the Lampung Marine Aquaculture and Fishery Center with a completely randomized design method, consisting of 5 treatments with 4 replications. The treatments included commercial feed
(- control); commercial feed + synbiotics (+ control); synbiotics; commercial feed + some herbs (herbs), and commercial feed + herbs + synbiotics (mixed) which was given to seabass fry with an average length of 7-8.5cm. The challenge test was carried out by infecting the test fish with P. damselae bacteria by injecting it intra-peritoneally. The results indicated the mixed treatment was able to maintain the best mortality rate compared to other treatments during the challenge test with P. damselae. Internal organ histopathology observations in each treatment did not reveal any differences. According to histological findings, all treatments resulted in organ necrosis, congestion, hemorrhaging, melanomacrophage centers (MMCs), inclusion bodies, and fat degradation in the internal organs. Clinical symptoms that appear in fish, such as flaking on the caudal and anal fin area, body and abdomen necrosis with red spots, loose scales, distended head and abdomen.
Keywords: synbiotics, herbs, histopathology, seabass, internal organs

Characteristics and Potency of Culturable Bacteria from Tidal and Non-Tidal Swamps in South Kalimantan and South Sumatra, Indonesia

Dwi N. Susilowati[1,*], Sri Widawati[2], Suliasih[2], M. Farhan Syah[3], Nani Radiastuti[3], Markus Anda[4], Indah Sofiana[5]

[1]Riset Center for Horticulture and Plantation, Research Organization for Agriculture and Food, National Research and Innovation Agency (BRIN), Cibinong Science Center, Jl. Raya Jakarta Bogor Km 46 Bogor 16911, West Java, Indonesia

[2]Riset Center for Applied Microbiology, Research Organization for Life Sciences and Environment, National Research and Innovation Agency (BRIN), Cibinong Science Center, Jl. Raya Jakarta Bogor Km 46 Bogor 16911, West Java, Indonesia

[3]Faculty of Science and Technology, Syarif Hidayatullah State Islamic University Jakarta, Ciputat 15412, Banten, Indonesia

[4]National Research and Innovation Agency (BRIN), Cibinong Science Center, Jl. Raya Jakarta Bogor Km 46 Bogor 16911, West Java, Indonesia

[5]Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development, Jl. Tentara Pelajar 3A Bogor 16111, west Java, Indonesia

*Corresponding author: d_nengsusi@yahoo.com

Tidal and lowland swamps have the potential to be used as agricultural land. However, to manage their sustainably, it needs technological improvements to increase productivity such as the diversity of indigenous microbes. This research was conducted to explore the information on culturable bacterial diversity and their potency in the tidal swamp soils of South Kalimantan and lowland swamp soils of South Sumatra. Our current research was conducted in laboratory at the Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development. Two samples were isolated from tidal swamp soils at Jerapat Baru Village, Tamban, Barito Kuala District, South Kalimantan Province and lowland swamp soils at Tapus Village, Pampangan, Ogan Komering Ilir District, South Sumatra Province. Serial dilution and molecular identification were used to assess the diversity of bacterial species. Production of IAA, siderophores, and ACC Deaminase were evaluated. A total of 11 species comprising Lysinibacillus xylanilyticus 26_1, Bacillus cereus 26_2, B. cereus 26_3, B. subtilis 27_1, B. siamensis27_2, Brevibacillus halotolerans 27_3, Peanibacillus alvei 27_4, Lysinibacillus xylanilyticus 27_5, B. nitratireducens 27_6, B.

cereus 27_7, and B. cereus 27_8 was chacterized from two samples collected from these areas. The most abundant group was Firmicutes. The dominant species in both tidal and lowland swamp soils were B. cereus and L. xylanilyticus, while common species was B. cereus. Potential analysis showed that all bacterial isolates were able to produce IAA, siderophores, and ACC Deaminase. The bacterial diversity was higher in South Sumatra than that of South Kalimantan. The differences were observed in percentage occurrence of bacterial species between two type of swamp lands. The reason may be that the soil pH condition, quality of litters, different micro-environments and other characteristics in those areas. Soil pH in South Sumatera is higher than South Kalimantan, hence, it may have provided more resources for bacterial growth.

Seagrass Posidonia australis roots architecture and morphology are not affected by nutrient inputs

Husen Rifai[1*], Matthew Fraser[2], Renae Hovey[2]

[1]Research Center for Oceanography – National Research and Innovation Agency (BRIN). Jl. Pasir Putih 1, Ancol Timur, Jakarta Utara, Indonesia
[2]School of Biological Sciences, The University of Western Australia. Stirling Highway, Perth, Western Australia, Australia.
*Corresponding author: lamunhusen@gmail.com

Seagrass meadows in oligotrophic environments are particularly susceptible to nutrient enrichment, yet morphological and architectural seagrass root responses in these ecosystems are poorly understood. This study aimed to investigate the response of Posidonia australis, one of dominant seagrass species in Shark Bay, roots to nutrient additions along a salinity gradient in the oligotrophic ecosystem of Shark Bay, Western Australia. A fully factorial nutrient additional experiment with four treatments (Control, N, P and N+P) was conducted at each of five sites along a salinity gradient (between ~38ppt in site 1 and ~50ppt in site 5) in Shark Bay across a three-year period (2012-2015). In the laboratory, the roots morphology and architecture A. antarctica were investigated using a software (WinRhizo). Then, a two-way analysis of variance (ANOVA) was performed to investigate if there was a significant change in the morphology and architecture of the roots after the nutrient inputs and along five sites with salinity gradient. There was no significant impact of nutrient addition on the root's morphology and architecture of P. australis species. However, the effect of site factor with salinity gradient was significant to root diameter of P. australis roots. These findings highlight the more ecological function of P. australis roots being in anchoring of the plant into the seafloor rather than to absorb nutrient from the sediment.

Keywords: Nutrient addition, Oligotrophic habitats, Posidonia australis, Shark Bay

Seed Germination and Seedling Establishment of a Critically Endangered Dipterocarp, Hopea bilitonensis

[1]Siti Roosita Ariati, [1]Fitri Fatma Wardani, [1]Ely Kristiati Agustin, [1]Harto, and [1]Mimin

[1]Research Center for Plant Conservation, Botanic Gardens and Forestry, BRIN
Jl. Ir. H. Juanda No. 13 Bogor 16122, Indonesia
e-mail: sita_ariati@hotmail.com

Hopea bilitonensis P.S. Ashton is one of critically endangered Dipterocarps species. The species has a disjunct distribution, one being confined to the sandy soil of Belitung Island and the other occurs on a limestone area in Perak, Malay Peninsular. Like most Dipterocarps, the seed of H. bilitonensis is recalcitrant which is sensitive to desiccation, and will not survive drying to any large degree. Therefore it does not amenable to a long term storage. Studies on seed germination of recalcitrant seeds of threatened tree species is still limited. The aim of this study is to find out the pattern of seed germination, establishment and development pattern of H. bilitonensis. The results showed that there were no significant differences in the viability of the seed among three media (i.e. soil, sand, and peat moss). The seeds were firstly germinated on the fourth and fifth day after sowing with the germination rate of 87.77 to 94.45%, with a vigor index of 21.11 to 36.67%. A viability test was also conducted showing a reduction of 11.16% moisture content during four weeks germination, however their viability was plunged as much as 88%. Seed development pattern of H. bilitonesis is epigeal, paracotyledon. The plumulae was appeared in day seven after sowing, the second leaves emerged on day 16 after sowing, whilst the cotyledons fell on day 35 after sowing. By documenting the pattern of seed germination and establishment we can develop an appropriate conservation action for this important threatened dipterocarp.

Keywords: seed, seedling, germination, Hopea bilitonensis.

Screening of cellulolytic fungi from Trichoderma sp. and Aspergillus sp.

[1]Trisanti Anindyawati, [2]Eka Triwahyuni, [2]Sri Sugiwati, [3]Asrul M. Fuad, [4]Irika D. Anggraini and [4]Septhian Marno

[1]Research Center for Applied Microbiology, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong 16911, Indonesia
[2]Research Center for Chemistry, National Research and Innovation Agency (BRIN), 452 Building, Kawasan PUSPIPTEK, Serpong 15314, South Tangerang, Banten, Indonesia
[3]Research Center for Genetic Engineering, National Research and Innovation Agency (BRIN), Jl. Raya Bogor
Km. 46 Cibinong 16911, Indonesia
[4]Research and Technology Center, PT. Pertamina Persero, Jl. Raya Bekasi Km. 20 Pulogadung, Jakarta 13220, Indonesia
Corresponding author: atrisanti@yahoo.com; rrtr001@brin.go.id

The third most important commercial enzyme in the world is cellulases. Trichoderma sp. and Aspergillus sp. are the most popular fungi for cellulase production. Four isolates of Trichoderma sp. (T. viride, T. reesei. T. harzianum and T. longibrachiatum) and five isolates of Aspergillus sp. (A. niger, A. versicolor, A. oryzae, A. tamarii and A. terreus) were screened on cellulose media using medium Carboxymethyl Cellulose (CMC) and the Congo Red method to obtain potential cellulolytic isolates. Crude cellulase was prepared using solid state fermentation on medium consisted of 10 g of rice bran and 10 ml of distilled water in Erlenmeyer flask. The spores were spread out in the sterile medium, well mixed, and incubated at 30oC for 5 days. The extraction was done by added with five volumes of distilled water, mixed thoroughly, leaved for 2 hours in cold room, then the extract was filtered through filter cloth. The filtrate was centrifuged at 8000 rpm for 10 minutes to remove some contaminating spores and the supernatant was used as crude cellulase. Trichoderma sp. grow faster than Aspergillus sp. and all of the isolates showed clear zone with different cellulolytic abilities.

Keywords: screening, cellulolytic fungi, Trichoderma sp., Aspergillus sp.

Population and Potential of Nitrogen Fixing Bacteria from Rhizosphere of Sandalwood (Santalum album L.) as Phytohormones Producer and Stress Resistance Indicators

[1]Sri Widawati, [1]Suliasih, [2]D N Susilowati, [3]Sumardi

[1]Research Center for Applied Microbiology, Life and Environment, National Research and Innovation Agency of Indonesia, Jl. Raya Jakarta Bogor Km 46, CSC, Cibinong 16911
[2]Riset Center for Horticulture and Plantation, Research Organization for Agriculture and Food, National Research and Innovation Agency of Indonesia
[3]Research Center for Plant Conservation, Botanic Garden and Forestry, National Research and Innovation Agency of Indonesia, Jl.Ir.H. Juanda No. 18 Bogor 16122
E-mail of corresponding author: widadomon007@gmail.com

Nitrogen fixing bacteria are a group of functional bacteria that are widely used as biostimulant agents to increase the availability of nitrogen in the soil and to revegetate critical lands. Information on the population and potential of nitrogen-fixing bacteria can be used as an indicator of soil health and fertility. The objectives of this study is to determine population, potential, and identity of N-fixing bacteria from the rhizosphere of sandalwood (Santalum album L.) plantations and to identify the selected N-fixing bacteria species. This research was conducted in the laboratory of Applied Microbiology – National Research and Innovation Agency of Indonesia. Four soil samples were taken randomly from the rhizosphere of healthy mature sandalwood plants, dead mature sandalwood plants, healthy seedling plants, and dead seedling plants. Isolation of N-fixing bacteria was carried out on specific media (Caceres, Ashby mannitol, yema Congo red, and nitrogen free bromothymol blue) using a total plate count (TPC) technique and color indicators. Analysis of potential as producers of IAA, ACC-diaminase, siderophore, cellulase, and nitrogenase were used to characterize functional NFB. The results showed that qualitatively all isolates were positive for nitrogenase activity with the highest population of nitrogen fixing bacteria obtained from the rhizosphere of healthy adult sandalwood plants on Caceres media (1.7 x 106 CFU/g soil). The potential characteristics of the majority of selected Nitrogen-fixing bacteria showed the ability to produce IAA, ACC-deaminase, siderophore, and cellulase of 3,481 ppm, 27,119 ppm, and 3.60 ppm, respectively. Selected nitrogen fixing bacteria with code 2.4 was suspected as Bacillus sp.

Keywords: Population, Characterization, Nitrogen, Rhizosphere, Sandalwood

Potency of Renewable Natural Pigments for Batik and Other Woven Fabrics from Karimun, Riau Islands

Saefudin and Efrida Basri

Research Center for Biomass and Bioproducts, Agency for National Research
and Innovation, Cibinong, West Java, Indonesia
E mail: saefudinkahfi@gmail.com

Exploration, production, and application of natural pigments from wood wastes aimed to produce various pigments which should sound environmentally friendly. Those wastes were originated from degraded coastal forests and eroded mangroves (all growing on Karimun District, Riau Islands), further sorted based on waste-shaped types, i.e. wood barks, fruits, twigs/branches, fruit skins, roots, leaves, and sawdust. Wastes were then extracted and processed to natural pigments in two forms, i.e. dry solid and liquid, for batik and other woven fabrics. Application procedures referred to traditions of Bogor's local batik crafters. Assessment results revealed varying color performance of pigment-colored fabrics was due to fixative effects, i.e. kapur/lime ($CaCO_3$), sodium sulphate (Na_2SO_4), and tunjung/ferro-sulphate ($FeSO_4$); as well as waste-shaped types. Fabrics colored with pigments from coastal forests' and mangroves' wastes always exhibited brownish and red or yellowish colors. Pigments from twigs/branches' wastes, with tunjung fixative displayed fabric's strong grey color; while with lime appeared brown. Fabrics colored with pigments from twigs and leaves, fixated with tunjung revealed greenish grey colors. Fabrics with sawdust and twigs/branches' pigments, fixated with lime favorably appeared reddish brown. Quality test results of color-leaching/fading resistance of pigmented-colored fabrics against rubbing/ironing and sun drying belonged to very good category (4-5), but fabric's color resistances against the detergent washing were low (2-3).

Keywords: wood wastes, environment-friendly, natural pigments, varying color performance, batik and other woven fabrics

The Diversity of Lizards and Snakes (Reptilia: Squamata) along Tambakbayan River, Province of Daerah Istimewa Yogyakarta

[1]Donan Satria Yudha, [1]Rury Eprilurahman, [2]Luthfi Fauzi, [2]Nureini Hanik, [2]Nola Desmi, [2]Christian Manggala Yudha Pratama, [2]Luthfi Erieco Nugraha

[1]Laboratory of Animal Systematics, Departement of Tropical Biology, Faculty of Biology, Universitas Gadjah Mada, Jl. Teknika Selatan Sekip Utara, Yogyakarta 55281, Indonesia.

[1]Herpetology Study Club, Departement of Tropical Biology, Faculty of Biology, Universitas Gadjah Mada, Jl. Teknika Selatan Sekip Utara, Yogyakarta 55281, Indonesia.

Corresponding author: donan.satria@ugm.ac.id

Snakes and lizards are reptiles which inhabit large variety of habitat, one of which is river banks. We have published the diversity of snakes and lizards on several rivers in the Province of Daerah Istimewa Yogyakarta (DIY) i.e., Code River, Opak River and Gadjah Wong River. Tambakbayan River is one of the rivers in the Province of DIY which does not have any data of snakes and lizards. This river is potential for the habitat of snakes and lizards due to its dense riparian vegetation which still exist on some part of the river. This research was aimed to record, to know, and to understand the diversity of snakes and lizards which inhabit along the Tambakbayan River, province of Daerah Istimewa Yogyakarta. The data record is useful for reference in future research. Sampling was done along Tambakbayan River from upstream to downstream. The research was conducted during Mei to November 2016. Methods use is Visual Encounter Survey combine with line transect along 500 m on each sampling point (Guyer & Donnelly, 2012; Lovich, et al, 2012). Sampling was done twice a day which are day and night. Two times of sampling in one day is used to maximize the number of species encountered during sampling. All specimens of snakes and lizards encountered were identified, recorded and documented. Identification of snakes and lizards based on Manthey (2008) and Das (2010). On the upstream part of the Tambakbayan River, there were total 8 species of lizards and 7 species of snakes. Five out of eight species lizards were arboreal species. Snakes encountered on upstream, mostly is water snakes and arboreal snakes. On the midstream part of the Tambakbayan River, there were total 7 species of lizards and 7 species of snakes. Two arboreal lizards were found in large number of individuals. Two arboreal snakes were found in large

number of individuals. On the downstream part of the Tambakbayan River, there were total 6 species of lizards and 9 species of snakes. One arboreal lizard and one terrestrial lizard were found in large number of individuals. Two arboreal snakes were found in large number of individuals.

Keywords: Snakes, lizards, diversity, Tambakbayan River.

Response of Slow-Release Organic Fertilizers on Plant Growth and Capsaicin Content of Chili (Capsicum frutescens)

[1]Dwi Umi Siswanti, [1]Nafiatul Umah, [2]Muhlisin, [3]Pipit Noviyani

[1]Faculty of Biology, Teknika Selatan, Sekip Utara, Yogyakarta, Indonesia
[2]Faculty of Veterinary, Fauna No. 3 Kampus UGM Bulaksumur, Yogyakarta, Indonesia
[3]PIAT UGM, Kalitirto Berbah Slemas, Yogyakarta, Indonesia
E-mail of corresponding author: dwiumi@ugm.ac.id

Chili (Capsicum frutencens) is one of the agricultural crops that are cultivating conventionally using chemical fertilizers such as NPK fertilizer. The application of NPK fertilizers causes a decrease in the quality and productivity of agricultural products, so there is a need for alternatives to overcome these problems. Sludge is waste from milk production which contains carbon material needed by plants that can be used as organic material in fertilizers mixtures. The objective of research was to analyze the most appropriate formula for organic fertilizer made from sludge of PT Sari Husada and compost from the forest of Universitas Gadjah Mada on the growth of chili and to analyze the content of capsaicin of chili due to benefits of industrial waste for increasing agricultural productivity. The materials used to make organic fertilizer include sludge and compost with a variety of formulas including 1:1; 1:2; 1:3; 1:4; 1:5; and 1:6 ratio, each applied in polybag planting media with a dose of 75 kg/ha once every 10 days. The parameters measured were plants height, the number of leaves, N and P levels of fertilizer and capsaicin content of chili. The results showed that the application of organic fertilizer made from sludge increased plant height and the number of leaves of chili. Application of organic fertilizer with formula 1:2 increased plant height while application of organic fertilizer with formula 1:3 increased the number of leaves of chili. All treatments produced chilies containing the same capsaicin. The third dose (1;3) showed the best N and P levels compared to other treatments and was not significantly different from positive control (fertilization with NPK). It was conducted that sludge of PT Sari Husada as an industrial waste can be used as an organic material to make fertilizers that can increase plant growth. The use of 1:2 to 1:3 ratio of sludge and compost formula can increase the growth of chili as a horticultural crop.

Keywords: chili, capsaicin, growth, organic and sludge

Diversity of 21 Shallot Cultivars (Allium cepa L. var. ascalonicum) from Indonesia Based on Morphological Characters

[1]Dewi Masithoh, [2]Purnomo, [3]Tuty Arisuryanti, and [4]Budi Setiadi Daryono

[1,2,3,4]Faculty of Biology, University of Gadjah Mada, Yogyakarta, Indonesia.
E-mail of corresponding author: deemasy89@mail.ugm.ac.id

Species diversity of Allium cepa L. var. ascalonicum in Indonesia is interesting to study. This shallot commodity has many benefits and potential. Shallots are included in seven foodstuffs whose prices fluctuate and cause inflation. The development of new shallot varieties requires a genetic variation of the germplasm. However, information on the genetic diversity of shallot in Indonesia is still lacking. Therefore, efforts are needed to develop genetic resources to increase shallots' productivity in Indonesia. This study aims to identify the variations of shallot cultivars in Indonesia based on morphological characteristics. This study was conducted from January 2022 to May 2022 at the Sawitsari Experimental Garden Laboratory, Faculty of Biology, UGM. The research sample used 21 shallot cultivars that had been released by the Indonesian Research Institute for Vegetables Crops (IRIVC or BALITSA) 2018. Morphological observations were carried out using 53 shallot characters. The result showed that twenty-one shallot cultivars from Indonesia have some variations in morphological characters. These variations might be caused by genetic factors that result from plant adaptation to different environments. This study suggested the importance of bulb morphology in the characterization of shallot cultivars. The results obtained can be used as information material for genetic resources and consideration for compiling the shallot library in Indonesia.

Keywords: allium, ascalonicum, diversity, morphology, shallot

The Effects of Fertilization on Yield of Garlic (Allium sativum L.)

[1*]Sidiq Permana Putra, [1]Sudjino, [1]Fitra NofranYosa Putri

[1*]Laboratory of Plant Physiology, Department of Tropical Biology, Faculty of Biology, Universitas Gadjah Mada, Yogyakarta, Indonesia

*corresponding author: sidiqpermanaputra@ugm.ac.id

The application of some nutrients to the plant was one of the problems with the yield of a crop. To support the effort of food availability fulfillment, the farmers usually use several ways to increase agricultural production. The objectives of this research were to determine the effect of the application of fertilizer on garlic (A. sativum). The method in this study was to use a Complete Randomized Design (CRD) with treatment fertilization and with six replications. The treatment were five levels of variations in fertilization, P0 = without basic fertilization, P1 = with basic fertilization (KCl), P2 = with organic advanced fertilization (compost), P3 = with inorganic advanced fertilization (NPK & Phosphate) and P4 = with mixed advanced fertilization (organic & inorganic). The measured parameters were fresh weight, tuber fresh weight, and plant height. The data were analyzed statistically using the Analysis of Variance (ANOVA) and Duncan Multiple Range Test (DMRT) with $p \leq 0,05$ level of significance. Organic fertilizer increased the growth and productivity of garlic (A. sativum).

Keywords: Allium sativum, fertilization, growth, productivity

Anther Development of Flower of Red Dragon Fruit (Hylocereus polyrhizus (F.A.C.Weber) Britton & Rose)

Utaminingsih, Sulhan Etfanti, Suharyanto, *Maryani
Laboratoty of Plant Structure and Development, Faculty of Biology, Universitas Gadjah Mada
Teknika Selatan Street, Sekip Utara, Yogyakarta, Indonesia 55281
Corresponding author: *mmyani@ugm.ac.id

Red dragon fruit is one of the cultivated fruits in Indonesia. The need for red dragon fruit continues to increase so that it has good prospects for increasing the amount of production. Research on the anatomy of anther development in red dragon fruit flowers so far has not been found. This study aims to determine the anthers of red dragon fruit flowers in various stages of development. Flowers were collected at 1, 5, 9, 13, and 17 days before anthesis. Parameters observed were bud size, anther size, and anatomical anther development. Sample preparation for anatomical observations using the paraffin method (embedding). The results of this study showed that the anthers had an increasing pattern of development, reaching a maximum size at 17 days before anthesis. The anther of red dragon fruit is composed of four microsoporangium. The anther wall layers from outside to inside are the epidermis, endothecium, middle layer, and tapetum. The anther development stages are the primary parietal cell phase, primary sporogenous cell, secondary sporogenous cell, solitary microspore and mature microspore with three nuclei. The tapetum type is the secretory tapetum.

Keywords: anther, development, red dragon fruit, embedding method

Guide for Sargassum Characterization: Description of Morphology Characteristics

Nurmiyati[1], Purnomo[2], Rina Sri Kasiamdari[2], Sutarno[3]

[1]Doctoral Program in Faculty of Biology, Universitas Gajah Mada, Jl. Teknika Selatan, Sekip Utara, Bulaksumur 55281, Yogyakarta 55281 Indonesia
[2]Faculty of Biology, Universitas Gajah Mada, Jl. Teknika Selatan, Sekip Utara, Bulaksumur 55281, Yogyakarta Indonesia
[3]Department of Biology Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret, Jl. Ir. Sutami 36 A Kentingan 57126, Surakarta, Indonesia
*Corresponding author: nurmiyati485205@mail.ugm.ac.id

The Sargassum is derived from the Central Indo Pacific (CIP) region and encountered independent distribution to other marine areas. Furthermore, there is some distribution structure of the Sargassum. It is influenced by water temperature, tidal level, water movement, substrate type, propagules' spread and attachment, and herbivorous species. These environmental factors affect the morphological structure of the Sargassum. Moreover, the long history of the Sargassum distribution in the Central Indo-Pacific region correlates with the diversity of the Sargassum in this region. Thus, it has a greater variety of the Sargassum than other water areas. One of the territorial waters located in the Central Indo-Pacific is Indonesian Island which includes: the Sunda Shelf (Sunda Shelf/Java Sea); Java Transitional (Southern Java); Western Coral Triangle (Palawan/North Borneo, Sulawesi Sea/Makassar Strait, Halmahera, Papua, Banda Sea, Lesser Sunda, Northeast Sulawesi); Sahul Shelf (Gulf of Papua, Arafura Sea).

In addition, Indonesian Island has a high potential for Sargassum diversity. Thus, it needs precise and comprehensive identification efforts. One way to identify the Sargassum is to characterize its morphological structure. However, the obstacle in identifying the Sargassum is the variety of morphological forms in its thallus. The Sargassum has a complex morphological system compared to other types of algae, as well as high polymorphism among individuals and populations. Therefore, a complete and correct description is the basis for using identification keys to minimize errors in naming the Sargassum species. This paper aims to guide the morphological character of the Sargassum through a morphological characterization guide. Moreover, this study used an appropriate literature study. Meanwhile, the observed characters were:

habitus thallus, holdfast, stipe/axis, branch, phyllodes, vesicles, and receptacles.

Transovarial Transmission of DENV and Resistance Status to Cypermethrin Insecticide in Aedes spp. (Diptera: Culicidae) from Prenggan Village, Kotagede District, Yogyakarta City

[1]Dila Hening Windyaraini, [2]Anggi Syabani Rahmawati, [3]Mujadidatul Istiqomah, [4]Titi Marsifah, [5]Soenarwan Hery Poerwanto

[1,2,3,4,5]Faculty of Biology, Universitas Gadjah Mada. Jl. Teknika Selatan, Sekip Utara 55281, Yogyakarta
dila.windyaraini@ugm.ac.id

Dengue Hemorrhagic Fever (DHF) is a disease caused by the dengue virus through Aedes spp. Yogyakarta City has the highest cases with an Incident Rate (IR) value of 43,65% in 2017. The spread of dengue virus may be affected by virus transmission and its distribution, which was regulated by the breeding site. This study aims were to determine the transovarial transmission of dengue virus, breeding site characteristics, and resistance status to cypermethrin insecticide of Aedes spp. larvae dan mosquitoes from Prenggan village, Kotagede District, Yogyakarta City. Aedes spp. larvae were collected and treated with immunohistochemistry SBPC analysis used the head squash technique. Resistance status to cypermethrin was analyzed using CDC bottle assay and biochemical methods. There were 17 samples of positive dengue viruses with a TTI value of 28,33%. Transovarial transmission can be influenced by mosquito abundance, productivity, breeding sites, and dengue case history. Based on the breeding site characteristics, there were 8 larval positive containers from 143 total examined containers with a HI value of 11%, BI 8%, and CI 5,59%. The result of the resistance status indicates that 14 larvae were resistant, 8 larvae were tolerant, and 57 larvae were susceptible to cypermethrin. In addition, 6 adult mosquitoes were found to be resistant, 10 were tolerant, and 44 were categorized in a susceptible to cypermethrin.

Keywords: Aedes spp., breeding site, DHF, resistance, transovarial

SCREENING OF CELLULOLYTIC BACTERIA FROM SUGARCANE GARDEN AS A STEP TO CREATE CELLULO-ETHANOL STRAIN

Arief Muammar[1*], Mesha Arjuna[1], Maria Manullang[1], Endah Retnaningrum[1]

[1]Faculty of Biology, Universitas Gadjah Mada, Jalan Teknika Selatan, Sekip Utara, Yogyakarta 55281

*email: arief.muammar@ugm.ac.id

Cellulolytic bacteria are microorganisms that can produce cellulase enzyme to degrade cellulose. Cellulolytic bacteria could be isolated by analyzing enzyme activity (enzymatic screening) for each isolate that we get from the environment. The soil around the sugar cane garden is a promising habitat for cellulolytic bacteria because in that habitat is a source of decomposition of cellulose, hemicellulose and other carbon sources derived from the remaining organic matter of sugar cane. Cellulase enzymes had important role to hydrolyze cellulose to become monomer of glucose, which is will be used as a carbon source for metabolisms to gain energy for the most organisms. This study was conducted to determine the presence of cellulolytic bacteria isolated from sugar cane garden soil and to determine the ability level of cellulolytic bacteria to degrade cellulose based on the value of Optical Density and sugar redustion isolated from sugarcane garden soil. The method used in this research are taking soil samples by taking five sampling points (T1, T2, T3, T4, T5), sterilizing tools and materials, preparing soil samples, isolating bacteria in CMC (Carboxyl Methyl Cellulose) medium, testing the cellulase enzyme activity quantitatively uses a Congo Red and Iodine Assays, and the cellulase enzyme activity test quantitatively using the DNS Assay. The results obtained in the qualitative test with the congo red assay showed that there were 3 positive isolates clearly visible clear zone, namely TII C4, TII C1, and TIV C4 and after quantitative supernatant tests, the OD values of all isolates were higher than negative control in supernatant samples using 540nm wave length using spectrophotometer, by using synthetic cellulose called Carboxy Methyl cellulase (CMC) as a substrate in the Cellulase Enzyme Test. Those isolates will be used as candidate to make a yeast cellulo-ethanol strain in the next step of this topic research.

Keywords: Cellulolytic bacteria; cellulase enzymes; cellulose; sugarcane garden

Antibacterial Activity of Bacillus sp. Crude Extract from Soil in Liwa Botanical Gardens West Lampung against Dickeya sp.

[1]Lisa Maryati, [2]Kusuma Handayani, [2]Wawan A Setiawan, and [2]Christina Nugroho Ekowati

[1]Undergraduate school of Biology Department, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Sumantri Brojonegoro no. 1, Bandar Lampung, 35141 Indonesia
[2]Biology Department, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Sumantri Brojonegoro no. 1, Bandar Lampung, 35141 Indonesia
lisamaryati05@gmail.com, kusumahandayani@yahoo.co.id, wawan.a.setiawan@gmail.com, ecoli.lacto@gmail.com

Soil Bacillus groups have been reported to produce antibacterial compounds against plant pathogenic bacteria. One of the plant pathogenic bacteria is Dickeva sp. which causes soft rot disease in leaves, stems, and roots of plants organ. Liwa Botanical Garden (KRL) in West Lampung has soil and environmental conditions that allow the existence of the genus Bacillus. It has been successfully founding isolates of Bacillus sp. TSR 6 from the soil of the KRL showed the best antagonistic activity against Dickeya sp. This study aims to determine the antibacterial activity of Bacillus sp. from the soil in KRL against Dickeya sp. Bacillus sp. TSR 6 was cultured on a liquid antibacterial production medium and extracted to produce crude ethyl acetate extract (222 mg). Antibacterial activity test of Bacillus sp. TSR 6 crude extracts via agar disk diffusion method showed antibacterial activity against Dickeya sp. with an inhibition zone was 3.25 mm at a stock concentration of 5000 μg/ml. The results of Thin Layer Chromatography (TLC) of a crude extract with eluent n-hexane: ethyl acetate (7:3) showed polar to non-polar compounds. There were polar compounds that showed positive results in ninhydrin based on purple stains indicating that compounds have similarities with lipopeptide groups. Therefore, Bacillus sp. TSR 6 has the potential to produce lipopeptide as antibacterial compounds that have antibacterial activity against Dickeya sp.

Keywords: antibacterial, Bacillus sp., disk diffusion, lipopeptide.

Effects of Nannochloropis sp. and Haematococcus sp. on the Density of the Diphanosoma sp. in Intermediet Scale Culture

[1]Leni Agustin, [2]Suratman, [3]Safei

Biology,.Faculty of .Mathematics and Natural Sciences,.University of Lampung
Prof..Dr..Ir..Sumantri.Brojonegoro
Street.No.1,.Rajabasa,.Bandarlampung,.Lampung 35141,.Indonesia
leniagustin714@gmail.com

Food is a key factor that determines the success in cultivation. One of the zooplankton that acts as a natural food is Diaphanosoma sp. This plankton has some culture advantages such as easy to culture, does not damage the water condition of the media, and has a short growth period so that might be mass-produced. In order the needs of Diaphanosoma sp. are always fulfilled, it is necessary to cultivate Diaphanosoma sp. The purpose of this observation was to observe the density of Diaphanosoma sp. fed with Nannochloropis sp. and Haematococcus sp. in an intermediate scale so that a better type of food could be determined. This observation was carried out on 04 January 2022 - 14 February 2022 at the Zooplnkton Laboratory of the National Center for Marine Aquaculture Fisheries (BBPBL) Lampung. The results showed that Diaphanosoma sp. fed with Nannochloropis sp. had a higher density than fed with Haematococcus sp.

Keywords: Diaphanosoma sp, Nannochloropis sp, Haemtococcus sp, Density.

Anticancer Potential Of Ethanol Extraction Seagrass (Enhalus acoroides) In Brain Tissue Mice (Mus musculus) Induced by Benzo(α)pyrene

Ulfah Astriani, Endang Linirin Widiastuti, Nuning Nurcahyani
Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Lampung.
Jl. Prof. Soemantri Brodjonegoro, No. 1, Gedung Meneng, Bandar Lampung
E-mail : elwidi@yahoo.com

Cancer, or malignant tumors, is a disease caused by abnormal cell proliferation. This abnormal growth causes lumps and bumps in certain areas. In general, there are not many drugs that have been used to stop the growth of these cancer cells, and one of ways to treat cancer is by using chemotherapy. However, chemotherapy has very strong side effects such as severe hair loss, nausea, vomiting, pain, loss of appetite and anemia. Therefore, alternative treatment can be done using plants that have antioxidant properties such as herbal ingredients derived from plants, namely Seagrass (Enhalus acoroides (L.f) Royle). This study aimed to determined effect of ethanol extration of seagrass on the brain tissues of male mice. The study used a Completely Randomized Design (CRD). Twenty four male mice (Mus musculus) were induced by the carcinogenic substance Benzo(α)pyrene at a dose of 0.3 mg/bb/day and they were administered with ethanol extract of seagrass (Enhalus acoroides (L.f) Royle) at a dose of 0; 4,4 ; 8,7; 17,8 mg/bb/day with 6 repetitions. The data obtained were then analyzed using the one way ANOVA test. The results showed that all treatment groups did not show any significant different in body weight. In the histopathological description of the brain tissue of mice, induction of benzo(α)pyrene could be repaired by giving seagrass extract at a dose of 8.7 mg/bb/day. In this study presumably seagrass ethanolic extraction was able to maintain the histopathological condition of the mice's brain.

Keywords: Benzo(α)pyrene, Cancer, Mice (Mus musculus), Seagrass (Enhalus acoroides (L.f) Royle)

POTENTIAL EXTRACT OF SEAGRASS (Enhalus acoroides) AS ANTI-CANCER AGAINST HEART Tissue in mice (Mus musculus)

[1]Tiffany Nurya Safitri, [2]Endang Linirin Widiastuti, [2]Nuning Nurcahyani

[1]Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Lampung.
Jl. Prof. Soemantri Brodjonegoro, No. 1, Bandar Lampung 35145
Email: elwidi@yahoo.com

One of the carcinogenic substances that are often encountered in everyday life is benzo(α)pyrene. Carcinogenesis can be stopped with antioxidants and anticancer (chemopreventive), in this case Seagrass (Enhalus acoroides (L.f.) Royle) is thought to have natural compounds with antioxidant and anticancer potential as chemopreventive agents. The purpose of this study was to determine and analyze the effect of the content of flavonoids and saponins contained in seagrass extracts on the liver of mice induced by benzo(α)pyrene. on seagrass extract against the liver of mice induced by benzo(α)pyrene. This research was conducted in a completely randomized design (CRD) using 24 male mice which were divided into 4 groups with 6 replicates induced by benzo(α)pyrene subcutaneously at a dose of 0.3 mg/bb for 10 days. The results of the ANOVA analysis in the treatment group did not affect the weight of the mice. The distribution of seagrass extract (Enhalus acoroides (L.f.) Royle) at a dose of 8,7 mg/bb/day (P2) and a dose of 17,4 mg/bb/day (P3) was better to maintain or prevent hepatocyte cell damage due to exposure to the compound. carcinogenic benzo(α)pyrene compared to a dose of 4,4 mg/bb/day.

Keywords: Anticancer, Seagrass (Enhalus acoroides (L.f.) Royle), benzo(α)pyrene, carcinogenesis

PESTICIDE ACTIVITY OF KITOLOD STEM EXTRACTS (Hippobroma longiflora (L.) G.Don) AGAINST MEALYBUG (Planococcus minor Maskell., Hemiptera: Pseudococcidae) ON COCOA PLANTS

Zahroini K. Qolbi[1], Nismah Nukmal[2]. R. Agustrina[2], C.N. Ekowati[2]
[1]Mahasiswa Program Strudi Biologi FMIPA Universitas Lampung Jl. Sumantri Brojonegoro No.1 Bandar Lampung, 35145, HP: 081315206464.
[2]Staff Pengajar Program Strudi Biologi FMIPA Universitas Lampung Jl. Sumantri Brojonegoro No.1 Bandar Lampung, 35145, HP: 081315206464.
*Email : agustrina@gmail.com

Kitolod (Hippobroma longiflora (L.) G.Don) is a herbaceous plant that is widely used by the community as eye drops. Results various studies have proven that kitolod contains many secondary metabolites that have the potential as antibiotics and antifungals in humans. In this study, a study was conducted on the potential content of secondary metabolites in kitolod stem extract as a vegetable insecticide against mealybugs. The mealybug (Planococcus minor Maskell., Hemiptera: Pseudococcidae) is one of the insects that infect cocoa plants. The study was conducted using a completely randomized design (CRD) with 1 factor, namely the concentration of kitolod stem extract, consisting of concentrations of 1%, 2%, 3%, 4%, 5% and 25% metindo (as a positive control) with 5 replications. Parameters observed were LT and LC50 as well as mealybug mortality.

The results of the phytochemical test showed that the extract of kitolod stem contained alkaloids, saponins, and flavonoids. The results of probit analysis proved that kitolod stem extract was effective at 3% concentration (LC50) after 48 hours of treatment (LT50). This result is in accordance with the results of Tukey's test at $\alpha = 5\%$ which also showed that the treatment with 3% extract concentration for 48 hours caused the highest mortality in mealybugs.

Keywords: Kitolod, mealybug, LT50, LC50, and Mortality

THE EFFECT OF BANDOTAN (Ageratum conyzoides L.) STEM EXTRACT ON THE GROWTH OF Fusarium oxyporum L. IN VITRO

Nurul Fadhilla[1], Rochmah Agustrina[2], Lili Chrisnawati[2], and Mahfut[2]

Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung.
Jl. Prof. Soemantri Brodjonegoro, No. 1, Bandar Lampung 35145
E-mail: agustrina@gmail.com

Fusarium oxyporum L. is an important pathogen that infects many agricultural crops, causes plant wilt disease and causes high losses for farmers. Controlling plant wilt disease using chemicals can have a negative impact, so it is necessary to find other alternatives that are safer and environmentally friendly, one of which is by using natural pesticides. Bandotan plant (Ageratum conyzoides L.) is known to contain secondary metabolites that have antifungal activity. This study aimed to determine the effect of bandotan (Ageratum conyzoides) stem extract on the growth of Fusarium oxysforum in vitro. This study used a one-factor completely randomized design (CRD) with 5 replications. The results of ANOVA at = 5% proved that the treatment of bandotan stem extract significantly caused differences in the diameter of the growth of Fusarium sp. The extract treatment that resulted in the lowest growth diameter of the fungus Fusarium oxysporum was the 60% bandotan stem dry extract treatment, which was 6.3 cm. This result was significantly lower than the fungal growth diameter of the other treatments.

Keywords: Fusarium oxysporum and Ageratum conyzoides L.

THE POTENTIAL OF MORINGA LEAF (Moringa oleifera) FLOUR AS ANTHELMINTIC AGAINST Ascaridia galli IN LAYING HENS (Gallus domesticus)

Hanifa Fauzia Utami[1], Emantis Rosa[1], Gina Dania Pratami[1]
[1]Department of Biology, Faculty of Mathematics and Natural Sciences,
Lampung University
Jalan Prof. Dr. Soemantri Brodjonegoro No. 1 Bandar Lampung, Lampung
35145
e-mail: real.fauziah1@gmail.com

The livestock farming sector plays an important role in agricultural development. In order of that, farmers cannot be separated from obstacles and problems that must be faced, one of which is diseases that attack poultry. Ascaridia galli is a parasitic nematode that is often found in poultry, including laying hens. This parasite causes a disease called ascariasis and can cause huge losses to farmers. The treatment by breeders can be done by giving anthelmintics from chemicals or synthetic anthelmintics. However, the use of synthetic anthelmintics in the long term will have an impact on chickens and the consumers who consume chicken meat and eggs. Therefore, it is recommended that in the prevention of A. galli worms it is better to use natural ingredients. The purpose of this study was to determine the most effective dose as well as the potential of Moringa leaf flour as anthelmintic against A. galli. This study used 21 laying hens infected with A. galli. The treatment of giving Moringa leaf flour mixed in feed with 4 different doses for 21 days. The data obtained was analyzed statistically using the ANOVA. If a significant difference is obtained, data analysis continued with Duncan's test. Based on the research that has been done, the most effective dose of Moringa leaf flour as an anthelmintic against A. galli in laying hens is a dose of 24 grams as indicated by the average number of eggs, which is 27.80 ± 11.41. Moringa leaf flour has potential as anthelmintic against A. galli in laying hens as indicated by the decrease in the average number of worm eggs at each dose, namely 6 grams (97.80 ± 10.73), 12 grams (81.60 ± 18.06), 18 grams (52.60 ± 11.32), and 24 grams (27.80 ± 11.41).

Keywords: Anthelmintic, Moringa leaf (Moringa oleifera), Ascaridia galli

THE EFFECTIVENESS OF PAPAYA LEAF FLOUR (Carica Papaya L.) AS ANTHELMINTIC AGAINST Ascaridia galli EGGS

Pera Priantini[1], Emantis Rosa[1], Priyambodo[1]

Department of Biology, Faculty of mathematics and natural sciences, Lampung University Jalan Prof. Dr. Sumantri Brodjonegoro No. 1 Bandar Lampung, Lampung 35145
e-mail: perapriantini10@gmail.com

One of the inhibiting factor that caused the increasing of the productivity chicken farms is a parasitic disease caused by Ascaridia galli. A. galli infection can cause quality degradation such as inhibition of absorption nutrients and food that causes chickens not to grow properly. Treatment against ascaridiasis can be done by administering anthelmintic ingredients of synthetic or natural ingredients Long-term administration of synthetic anthelmintics will cause resistance problems in chickens. The purpose of this study was to determine the effective dose and anthelmintic potential of papaya leaves in overcoming A. galli worms in chickens. This study used 25 laying hens that had been infected with A. galli. By providing 4 dose treatments of papaya leaf flour of 6g,12g and 18g mixed in chicken feed. The results of the analysis of the number of eggs for each treatment at doses of flour 6g (78.37 ± 8.15), 12g (58.25 ± 9.86) and doses 18g (15.25 ± 11.24). The average number of A.galli eggs less found in chicken feces was at the highest dose of 18g at 15.25 ± 11.24.

Keywords: Anthelmintic, Acaridia galli, Carica papaya L.

The Role of The Bird Community as a Bioindicator of Environmental Quality and The Potential Birdwatching Tourism in Liwa , West Lampung

Indah Fitri Sari[1*] , Nuning Nurcahyani[2] , Jani Master[3], Tugiyono[3], Emantis Rosa[3]

[1]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung

[2]Postgraduate Student of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung

[3]Postgraduate Student of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung

*Correspondence: indahfitri1998@gmail.com.

Liwa Botanical Gardens is located in Pekon Kubu Perahu, Balik Bukit District, West Lampung Regency, Lampung Province. Good environmental quality can be a good habitat for various types of birds. Therefore, birds can be used as a bioindicator of environmental quality. The existence of birds in a habitat also has the potential as a birdwatching tourist attraction. This study aims to analyze the diversity of bird species, analyze environmental quality based on bird communities as bioindicators of environmental quality and analyze the potential for birdwatching in Liwa Botanical Gardens, West Lampung. This research was conducted in September-December 2021 at the Liwa Botanical Gardens, West Lampung. Bird species data collection was carried out in the morning at 06.00-08.00 WIB and in the afternoon at 16.00-18.00 WIB using the point count method. At each location there are 3 observation points. Observations were made for approximately 120 minutes. 35 minutes for observation at each point and 15 minutes for walking to the next observation point. The birds found were identified and the data were analyzed to determine the index of bird species diversity using the Shannon Wienner formula. The bird data obtained were also analyzed using the Bird Community Index (IKB) to determine the quality of the environment based on the presence of birds. In addition, this study also distributed questionnaires, the results of which were analyzed using a SWOT analysis, which describes the strengths, weaknesses, opportunities and threats related to bird conservation in the Liwa Botanical Gardens, West Lampung. The results showed that there were 27 species of birds with a total of 908 individuals with a moderate diversity index, the value of the Bird Community Index was 63.2% in the medium environmental quality category and the SO (Strenghts-Opportunities) strategy was

produced to increase the potential for birdwatching in the Liwa Botanical Gardens, West Lampung.

Keywords: birdwatching, conservation, Liwa Botanical Gardens, birds.

Toxicity Assays and Phytochemical Compound of Macroalgae and Seagrass Ethanol Extracts from Lampung Coastal Waters

[1,2]*Endang Linirin Widiastuti, [1]Ainun Rohmawati Bareta, [2]Yosi Dwi Saputra, [2]Eka Ayu Lailatul Istikomah

[1]Masters Program in Coastal and Marine Area Management, Multidisciplinary Faculty, University of Lampung

[2]Masters Program in Biology, Mathematics and Natural Science Faculty, University of Lampung

*Corresponding author : endang.linirin@fmipa.unila.ac.id

In the Pesawaran and South Lampung waters, there are various types of macroalgae and seagrass and the most abundant species are Sargassum duplicatum, Padina australis, and Enhalus acoroides as well as Cymodocea rotundata. The macroalgae and seagrass contain bioactive compounds that have potential as anticancer, as well as taurine, sulfur-containing amino acid that naturally contained in human and some fish. To clarify the anticancer potential of them, a preliminary study in the form of a toxicity test was carried out. The aim of this research was to determine the content of bioactive compounds and lethal concentrations (LC50), Artemia salina was used through Brine Shrimp Lethality Test (BSLT) method for taurine and ethanol extracts of Sargassum duplicatum, Padina australis, and Enhalus acoroides as well as Cymodocea rotundata.

The results showed that phytochemical of the ethanol extracts of Enhalus acoroides, Cymodocea rotundata, Padina australis, and Sargassum duplicatum contained saponins, steroids, alkaloids, and flavonoids. Meanwhile, the ethanolic extract of Cymodocea rotundata contained not only saponins, steroids, alkaloids, and flavonoids but also tannins. The BSLT results that taurine and ethanol extracts of Enhalus acoroides, Cymodocea rotundata, Padina australis, and Sargassum duplicatum had different LC50 values, respectively 133.73 µg/ml; 126.77 µg/ml; 163.18 µg/ml; 176.95 µg/ml; and 140.42 µg/ml. Those five samples of the compound showed low toxicity values > 100 ppm.

Keywords: Seagrass extract, macroalgae extract, taurine, anticancer, Brine Shrimp Lethality Test

POTENTIAL OF SEAGRASS (Enhalus acoroides) ETHANOL EXTRACT as ANTICANCER AGAINST THE CELL BLOOD PROFILE OF MICE (Mus musculus)

Endang Linirin Widiastuti[1], Argauli Sidabalok[1], Nuning Nurcahyani[1]
[1]Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Lampung
*email: elwidi@yahoo.com

The formation of cancer is mostly caused by carcinogenic agent. The initial phase of carcinogenesis is the formation of lesions on DNA, tissue destruction, changes in the immune system, body protein composition and body cell biochemistry. Seagrass (E. acoroides) is a natural compound with antioxidant and anticancer potential as a chemopreventive agent that can inhibit the process of carcinogenesis. The purpose of this study was to examine the effect of ethanol extract of seagrass (E. acoroides) on the cell blood plasma profile of male mice (Mus musculus) which induced by carcinogenic benzo(α)pyrene for 10 days. This research was conducted in a completely randomized design (CRD) using 24 male mice which were divided into 4 groups with 6 replications each. The administration extract seagrass were 0 mg/day (as control), 4.4 mg/day, 8.7 mg/day, and 17.4 mg/day. The results with the ANOVA test analysis showed that the administration of methanol extract of seagrass (Enhalus acoroides) in mice induced by benzo(α)pyrene did not affect the body weight of test animals. Meanwhile, seagrass (Enhalus acoroides) ethanol extract had an effect on reducing the number of leukocytes in mice at a dose of 17.4 mg/day.

Keywords: Enhalus acoroides, benzo(α)pyrene, erythrocytes, leukocytes, cancer

THE TOXICITY TEST OF LEAVES METHANOL EXTRACT KITOLOD (Hippobroma longiflora (L.) G. Don) ON MORTALITY RATE OF CACAO MEALYBUG (Planococcus minor Maskell.,Hemiptera: Pseudococcidae)

[1]Rochmah Agustrina, [1]Agung Ardian Syah, [1]Nismah Nukmal, [1]C.N. Ekowati

[1]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung

JL. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia 35145
rochmah.agustrina@fmipa.unila.ac.id, agung.ardiansyah9498@gmail.com, nismah.nukmal@fmipa.unila.ac.id

Cacao mealybug (Planococcus minor Maskell.) is one of the pest that cause decline of cacao production in Indonesia. Efforts to control the cacao mealybug (P. minor) utilize plant-based insecticides as a strategy to reduce the negative impact of using chemical insecticides. Secondary metabolites or active compounds of alkaloids, flavonoids, and saponins, found in the kitolod plant (Hippobroma longiflora (L.) G. Don) have the potential as a source of bioinsecticides. This research has been carried out at the Botanical Laboratory and Organic Chemistry Laboratory, Faculty of Mathematics and Natural Sciences, University of Lampung with the aim of this study was to determine the insecticidal power of the active compound in the methanol extract of kitolod leaves (H. longiflora) on the mortality rate of the cacao mealybug (P. minor) on cacao (T. cacao) based on the LC50 value. This research is a type of 2-factoran factorial experimental research using a Randomized Complete Block Design, carried out using 6 different treatments, giving kitolod leaf extract with concentrations of 1%, 2%, 3%, 4% and negative control (aquades) and positive control (insecticide methomyl 25%). Observation of mealybug mortality will be seen at 12, 24, 48 and 72 hours after treatment. Each treatment was repeated 5 times using 10 mealybugs for each replication. The data obtained were analyzed using probit EXE to determine LC50 and LT 50 values, ANOVA test using SPSS 25 application, and test Tukey which was used to determine the concentration of extracts that were effective as bioinsecticide. The results of this study showed that there was a significant difference between each treatment $\alpha = 0,05$. The concentration of 3% is the most effective concentration as a bioinsecticide for the cacao mealybug, which is characterized by the number of mealybug that die compared to other concentrations.

Keywords: cacao mealybug, bioinscticide, kitolod, toxic

HABITAT IDENTIFICATION AND PHENETIC ANALYSIS OF BRYOPHYTA IN LAMPUNG, INDONESIA

[1]Mahfut, [2]Putri Kendari, [2]Heni Erlita Sari
[1]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung
[2]Postgraduate Student of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung
E-mail of corresponding author: mahfut.mipa@fmipa.unila.ac.id

Moss plants are the second largest group after tall plants, numbering approximately 18,000 species and spread throughout the world. Information regarding the kindship relationship between mosses is still limited because it is necessary to identify the habitat and phenetics of mosses. The purpose of this study was to identify the habitat and kinship of mosses. This research method is a cruising method in several districts in Lampung province, those are Pesawaran, Metro, and Way Kanan. The mosses found recorded morphological data and their substrates Data analysis used cluster analysis using the Multivariate Statistical Package (MVSP) version 3.2 software and genetic distance in cluster analysis using the Unweighted Pair-Group with Arithmetic Average (UPGMA) method. Furthermore, to determine the morphological characters that affect the grouping between species, the Principal Component Analysis (PCA) method is used. The results showed that 5 species of moss were found around the rocks and in humid places around 45-70% with a height of 3-7cm at a temperature of around 27.5-30ºC and a pH of 6-7. The kinship relationship between 5 accessions of mosses has a similarity index between 0.22-1.00 and four characters play an important role in grouping leaf mosses. The four characters, namely height, root, leaf color, and leaf tip were able to separate all samples on PC1 and PC2.

Keywords: Bryophyta, Habitat, Lampung, Phenetics, UPGMA

RESISTANCE OF BANDOTAN (Ageratum conyzoides L.) LEAVE EXTRACT ON THE GROWTH OF Fusarium oxyporum L. IN VITRO

Derlian Ella Tamara, Rochmah Agustrina, Yulianty dan Mahfud
Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Lampung.
Jl. Prof. Soemantri Brodjonegoro, No. 1, Bandar Lampung 35145
Email: agustrina@gmail.com

One of the obstacles in horticultural cultivation is infectious disease caused by the fungus Fusarium oxysporum L. Bandotan plants (Ageratum conyzoides L.) are known to contain secondary metabolites that have fungicidal activity. This study aims to determine the inhibition of bandotan leaf extract on the growth of the fungus Fusarium oxysporum L. in vitro. The study was conducted at the Microbiology Laboratory of FMIPA UNILA using a one-factor Completely Randomized Design (CRD) with 5 replications. The results of ANOVA at = 5% showed that the leaf extract treatment caused significant differences in the growth inhibition of Fusarium sp. Treatment of dry leaf extract with a concentration of 60% resulted in an average diameter of fungal growth of 4.64 cm which was significantly lower than the average fungal growth in other treatments.

Keywords : Fusarium oxysporum and Ageratum conyzoides L.

STUDY ON DIVERSITY OF MOSQUITOES AROUND LIVESTOCK CAGE IN HANURA VILLAGE, PESAWARAN DISTRICT, LAMPUNG

Endah Setyaningrum[1], Linda Septiani[2*], Jeany Audina Suryaningkunti[3], Budi Santoso[4], Dimas Prayoga[5]
[1]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung, Indonesia
[2]Department of Parasitology, Faculty of Medicine, University of Lampung, Indonesia
[3]Master Program in Coastal and Marine area Management, University of Lampung, Indonesia
[4,5]Lampung Provincial Health Office, Indonesia
*Corresponding Author: linda.septiani@fk.unila.ac.id

Mosquitoes are vectors that caused the disease. One of the endemic area of Malaria in Lampung Province is Hanura village, Pesawaran District. In That village, there were livestock cage that could potentially affect to density of vector and increase the malaria cases. This study aimed to identify the mosquitoes diversity that were in the livestock cage environment.

This research is a descriptive observational study with a field survey method. Mosquito samples were taken at night which landed on livestock and humans. The mosquitoes obtained were then identified by their genus and species using the Identification key at the Zoology Laboratory of the Faculty of Mathematics and Natural Sciences, University of Lampung. The results of this study obtained data on mosquito catches were 135 tails. The results of the identification of mosquitoes found two genera namely Anopheles 106 tails (78.52%) and Culex 29 tails (21.48%). Furthermore, after conducting the morphological identification of Anopheles mosquitoes found the most dominant species was Anopheles sundaicus 53 tails (50%), followed by Anopheles maculatus 52 tails (49,06%) and Anopheles subpictus 1 tail (0,94%). The identification results for Culex mosquitoes species were found the Culex tritaeniorhynchus 29 tails (100%).

Keywords: Diversity, Mosquito, Identification, Anopheles, Livestock cage

CHEMISTRY

The Physical and Thermal Properties of Polypropylene/Poly(εCaprolactone) Polyblends

Muhammad Yusuf[1*], Mawaddatur Rahmah[2]

[1]Department of Chemistry Universitas Negeri Medan, Jl. Willem Iskandar Pasar V Medan Estate,
Medan 20221, Indonesia
[2]Fresh Graduate, Department of Chemistry Universitas Negeri Medan, Jl. Willem Iskandar Pasar V
Medan Estate, Medan, Indonesia, 20221
*Corresponding author E-mail: myusuf@unimed.ac.id\

Nowadays, polypropylene (PP) is produced massively by the chemical industry because of its superior properties, such as strong mechanical properties, resistance to chemicals and weather, does not rust, and can be dyed. In general, PP is used for plastic bags, glasses, buckets, bottles, automotive components, laboratory equipment, loudspeakers, and food containers. Nevertheless, PP is difficult to degrade, causing environmental pollution. Hence, in this study, a blending of PP with biodegradable poly(εcaprolactone) (PCL) was carried out to produce biodegradable PP/PCL polyblends. On the other hand, the PCL used in this study was produced by polymerizing εCL using a tris(acetylacetonato)zirconium(IV) catalyst. Meanwhile, the purpose of this research is to produce more compatible PP/PCL polyblends and to determine the physical properties of the resulting polyblends. Subsequently, the method used is solvent casting with the composition ratio between PP and PCL being 10/0; 10/1; 10/2; 10/3; and 10/4. Based on the results of the tensile test, the most biocompatible polyblend was found in a ratio of 10/4. Last, the chemical and thermal properties of the polyblend were also characterized.

Keywords: biocompatible; polypropylene; poly(εcaprolactone); polyblend; tris(acetylacetonato)zirconium(IV)

Molasses Fermentation With Yeast Isolate From Coconut Water Immobilized On Calcium Alginate For Bioethanol Production

[1]Getari Kasmiarti, [2]Claudia Indah Chantika, [3]Poedji Loekitowati Hariani, [4]Novia, [5]Hermansyah

[1] Doctoral Program of Environmental Science, Graduate Program Universitas Sriwijaya, Jalan Padang Selasa No.524, Bukit Besar, Palembang 30139, South Sumatra, Indonesia.
[2,3,5] Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Sriwijaya, Jalan Raya Palembang Prabumulih KM32, Indralaya 30662, South Sumatra, Indonesia.
[4]Chemical Engineering Department, Faculty of Engineering, Universitas Sriwijaya Jalan Raya Palembang Prabumulih KM32, Indralaya 30662, South Sumatra, Indonesia.
Hermansyah@unsri.ac.id

Molasses has a high sugar content which is good for fermentation substrate. Therefore, this study aims to produce bioethanol from molasses using yeast isolate that immobilized on calcium alginate. The yeast was obtained from coconut water whereas it added to the immobilizing gel with 1:1 ratio. The immobilized yeast was used for fermentation under 30°C with certain molasses concentration and fermentation time. The bioethanol produced was measured by UV-Vis spectrophotometer at 598,5 nm and the data was analyzed using one way ANOVA. The highest bioethanol content was 52% with 25% molasses concentration at 24 hours fermentation using immobilized yeast isolate. While the lowest bioethanol content was 9% using 5% of molasses concentration at 24 without immobilization yeast isolate. This showed that the immobilized yeast has the potential to produce molasses-based bioethanol compared to not immobilized yeast.

Keywords: Bioethanol, coconut water, Immobilization, molasses, yeast.

Synthesis and Antimalarial Activity of Some Diphenyltin (IV) Dichlorobenzoate Compounds Against *Plasmodium falciparum*

Samsuar Samsuar[1*], Sutopo Hadi[2], Wasinton Simanuntak[2], Hardoko Insan Qudus[2]

[1]Depatment of Pharmacy, University of Tulang Bawang, Bandar Lampung Indonesia
[2]Department of Chemistry, Universitas Lampung, Bandar Lampung, Indonesia
[#]corresponding author address: email: samsuar@utb.ac.id

Synthesis research, characterization of several Diphenyltin(IV) chlorobenzoate compounds have been carried out and preliminary tests of antimalarial activity against Plasmodium falciparum have been carried out. Synthesis was carried out from the initial compound Diphenyltin(IV) dihydroxide with ortho, meta and para chlorobenzoic acids with methanol as solvent at 60°C for 4 hours.

The characterization results obtained diphenyltin(IV) 2-chlorobenzoate 86.52%, diphenyltin(IV) 3-chlorobenzoate 92.30% and diphenyltin(IV) di-4-chlorobenzoate 94.69%.

Preliminary test results of antimalarial activity against P. falciparum showed the IC_{50} of the new compound of diphenyltin(IV) di-2-chlorobenzoate 97×10^{-2} μg/mL, diphenyltin(IV) di-3-chlorobenzoate 15.6×10^{-2} μg/ mL and diphenyltin(IV) di-4-chlorobenzoate 36.4×10^{-2} μg/mL These results show an antimalarial effect where the IC_{50} is less than 50 μg/mL so that it still needs to be tested further.

Keywords: antimalarial; diphenyltin(IV) chlorobenzoate; falciparum

THE UTILIZATION OF LAND SHELLS FOR THE MANUFACTURING OF EARTHQUAKE-RESISTANT CONCRETE

Agus.M.H.Putranto[1), Randi Putra[2), Kurnia Juang Purnomo[3)

1) Chemistry Department of FMIPA University 0f Bengkulu

2) Chemistry Laboratory of FMIPA University 0f Bengkulu

3) Chemistry Laboratory of FMIPA University 0f Bengkulu

Chemistry Department of Mathematics and Natural Science University of Bengkulu

Jln W.R. Suprtaman, Kandang Limun, Kota Bengkulu

E-mail of Corresponding author : agus.martono@unib.ac.id

Research has been carried out on the utilization of Gold, Kijing and Muara types of land snail shells, as a partial replacement of cement in earthquake-resistant concrete mixtures. This study aims to evaluate the strength of concrete which is commonly made for infrastructure purposes, as well as an innovation in making concrete by utilizing agro-industrial waste in the form of using land shells. So that stronger and more earthquake-resistant concrete can be made, as well as reducing waste in the form of shells that have not been utilized optimally. This research was conducted using experimental methods in the laboratory, to determine the structure of the shells of land snails, in the composition of making concrete. The analysis instrument uses the SEM-EDX Spectrophotometer. Results of the study, it was found that the content of calcium oxide (CaO) of the Golden snail species was 92.22%, for the Kijing Conch 75.84% while the Muara Shell was 74.45%.With particle magnification through SEM-EDX, it is seen that the shells, each of which has large pores, will be able to hold bonds with other concrete mixtures which can increase the strength of the formed concrete.

Keyword: Calcium Oxide; Ground Shells; Porosity

THE EFFECT OF MBTS ADDITIVES AS AN ACCELERATOR ON THE QUALITY OF ADHESIVE IN THE MANUFACTURE OF LIQUID RUBBER COMPOUND-BASED ADHESIVES

Tri Widayanti[1] Dr. Teja Dwi Sutanto, M.Si.[2], Prof. Dr. Irfan Gustian, S.Si., M.Si.[3]

Fakultas Matematika dan Ilmu Pengetahuan Alam

twidayati421@gmail.com, Tejasutanto_kim@yahoo.com, Irfan.g@unib.ac.id

The purposed of this study was to make an adhesive from liquid rubber compound with a variety of MBTS accelerator materials and to characterize the adhesive that has been made by testing pH, viscosity, adhesion, and functional group analysis. The basic material for making liquid rubber compound adhesives was the concentrated latex weighing 166,7 grams with dry rubber content (KKK) of 60%. Liquid rubber compound was made by mixing concentrated latex with chemical additives that have been dispersed beforehand, namely KOH as a stabilizer, stearic acid and ZnO as activator, BHT as an antioxidant, $CaCO_3$ as a filler, MBTS and TMTD as accelerators, and sulfur as a vulcanizer. The adhesive was made by mixing liquid rubber compound with 1 gram of gondorukem. In this study, variations of the MBTS accelerator material were carried out, that are 0 grams; 1.25 grams; 2.5 grams; 3.75 grams; and 5 grams. Adhesive characterization was carried out by testing pH, viscosity, adhesive strength, and functional group analysis using an FTIR spectrophotometer. In this study, the results obtained from functional group analysis using FTIR showed the presence of -OH, -C=C, and -CH alkanes. The results of the pH test showed that the addition of the MBTS accelerator did not affect the pH of the adhesive. Meanwhile, the viscosity test showed that the greater the addition of MBTS accelerator material, the greater the adhesive viscosity value. The optimum point for making adhesive is the addition of 2.5 grams of MBTS. At this optimum point the value of adhesive strength, viscosity, and pH obtained was 2.6482 N/mm; 375 cP; and 7. In this condition, the resulting adhesive has met the requirements for the manufacture of adhesives in accordance with SNI 12-7195-2006.

Keywords: characterization; concentrated latex; liquid rubber compound; adhesive

THE EFFECT OF CaCO$_3$ VARIATION AS A FILLER MATERIAL ON ADHESIVES QUALITY OF BASED LATEX

Umi Alma Anggraini[1], Dr. Teja Dwi Sutanto, M.Si.[2], Prof. Dr. Irfan Gustian, S.Si., M.Si.[3]

Fakultas Matematika dan Ilmu Pengetahuan Alam
umialmaanggraini20@gmail.com, tejasutanto_kim@yahoo.com,
irfan.g@unib.ac.id

The aim of this study was to make adhesives using the CaCO$_3$ variation and characterize them using pH meters, Brookfield Viscometers, FTIR and adhesion resistance tools. The raw materials used are 60% concentrated latex which is then mixed with additives that have been made dispersions such as: KOH as stabilizers, stearic acid and ZnO as activators, BHT as antioxidants, CaCO3 as fillers, MBTS and TMTD as accelerators, and sulfur as vulcanizers. The variation used in this study is a variation of the CaCO3 filler, which is 0 grams; 2.3 grams; 4.3 grams; 6.3 grams and 8.3 grams. The characterization of the adhesive is carried out with a degree of acidity with the result of the adhesive pH from the addition of variations, which is 7. Viscosity measured with Viscometer Brookfield has the highest value of 625 cp at a variation of 6.3 grams. Adhesion resistance at a variation of 8.3 grams has a adhesion of 1.7 N/mm. Analysis of functional groups using FTIR showed a change in the functional group due to the addition of CaCO3, namely at 3359.77 cm-1 which indicates the presence of an O-H bond. In 1638.09 cm-1 there was a C=C bond of the alkane group and 1442.82 cm-1 and 2935.68 cm-1 designating the C-H bond of the alkane group.

Keyword: Adhesive; CaCO$_3$; Concentrated latex.

THE EFFECT OF COCODUST MASS TO PHYSICO CHEMISTRY PROPERTIES OF PARTICLE BOARD

Teja Dwi Sutanto[1], Charles Banon[2]
[1,2]Department of Chemistry, Faculty of Mathematics and Natural Sciences,
Bengkulu University, Bengkulu, Indonesia
*E-mail: tejads@unib.ac.id

Particle board research made from cocodust with various mass and liquid rubber compound has been done. First particle board was made by mixing various cocodust mass were 53 g; 54 g; 55 g; 56 g and 57 g with 30% of liquid rubber compound to obtain a particle board with the length, width and height of 5 x 10 x 7.5 cm and then dried by drying. Subsequently the particle board pressed to a thickness of 2.5 cm and then tested the modulus of elasticity (MOE), the modulus of rupture (MOR) and firmness of screws. The results indicated that the best condition was obtained on the use of 55 g cocodust. In this condition, the MOR, MOE and the strength of screw were 5212.62 g / mm^2; 9053.63 g / mm^2 and 108670 g / mm^2 respectively. DTA-TG testing results show that the heat resistance of particle board was 240 ºC.

Keywords: particle board, cocodust, liquid rubber compound, MOR, MOE

Antioxidant Activity of Methanol Extracts of *Sesbania grandiflora* Roots, Barks and Leaves Using DPPH Method

[1]Noviany Noviany, [1]Habibah Monanisa, [1]Wulandari Agustin, [1]Heri Satria, [1]Buhani, [1]Sutopo Hadi

[1] Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung
Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia
E-mail of corresponding author
noviany@fmipa.unila.ac.id

Antioxidants are chemical compounds that can inhibit free radicals in the body by donating one or more electrons to free radicals. Plants have secondary metabolites that can be used as antioxidants. *Sesbania grandiflora* is one of the traditional medicinal plants native to Indonesia that can be used as a source of antioxidant compounds. In this study, antioxidant testing of the methanol extract of the roots, barks and leaves of *S. grandiflora* was carried out using the DPPH method (2,2-diphenyl-1-picrylhydrazil) with ascorbic acid as a positive control. Extraction of samples of roots, bark and leaves of plant was carried out by maceration. The methanol extract obtained was then concentrated with a rotary evaporator to obtain a concentrated extract. The extract obtained was made in 5 concentration variations to 250, 125, 50, 25, and 10 ppm through graded dilutions, then tested its antioxidant activity by DPPH method quantitatively to obtain the IC_{50} value of the extract using UV spectrophotometry at λ_{max} 517 nm. The results of the spectrophotometric measurements showed that the methanol extract from the bark, roots and leaves had IC_{50} values of 47.69 ppm, 54.44 ppm and 312.43 ppm, respectively, while the positive control of ascorbic acid has an IC_{50} value of 63.75 ppm. The antioxidant test results of white turi methanol extract indicate that the strongest antioxidant properties are found in methanol extract of *S. grandiflora* bark.

Keywords: Antioxidant; DPPH; methanol extract; *Sesbania grandiflora*

Effect of sodium borate as a crosslinking agent on the properties of sago starch – poly(vinyl alcohol) biodegradable films

[1]Sonny Widiarto

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lampung,
E-mail of corresponding author: sonny@fmipa.unila.ac.id

Biodegradable films of sago starch and poly (vinyl alcohol) (PVA) blends (SP) have been prepared by solution casting method. Glycerol was used as a plasticizer. Sodium borate (borax) was used to increase the compatibility of sago starch and PVA. The optimum amount of glycerol is 20% (w/w). The optimum values of tensile strength and elongation at break of the films are obtained with an addition of 8% (w/w) sodium borate (borax). Both pure PVA and sago starch films are apparently transparent. However, their blend films are slightly opaque probably due to phase separation. Increase the amount of PVA in the film leads to an increase of the tensile strength and reduces the elongation of films. Borax increases the tensile strength and elongation at break of the sago starch – PVA blend films.

The films produced were characterized by FTIR spectroscopy, differential scanning calorimetry (DSC), thermogravimetry analysis (TGA), X-ray diffraction (XRD), and scanning electron microscopy (SEM). FTIR spectrum of sago starch – PVA – borax (SPB) film showed the shifting of characteristic O-H stretching vibration peak to a higher wavelength number at 3426 cm^{-1} and an increase of O-H bending intensity of absorbed water peak at 1638 cm^{-1}, indicating more tightly bound water present in the film in comparison with that of SP film. SEM studies show that SPB film was porous. Meanwhile, TGA studies revealed that decomposition of SPB film is a three-stage process. XRD studies indicated that the degree of crystallinity of SPB film is higher than that of SP film.

Tensile strength of the films increase after storage treatment, whereas their elongation decrease. The changes of tensile properties could be related to both the changes on crystallinity and the loss of plasticizer during storage. The B-type crystallinity appeared on the films after two months of storage. Biodegradation of original and modified sago starch – PVA blend films have been studied by soil burial method. Percentage of weight loss the films increase with an increase of sago starch content.

Keywords: biodegradable plastic; borax; poly(vinyl alcohol) (PVA); sago starch

Application of Zeolite-A as Catalyst For Conversion of Coconut Oil Into Nitrogen Compounds As Green Corrosion Inhibitor

I. Ilim[1*], W Simanjuntak[1], K D Pandiangan[1], Herliana[2], and A. Ika[3]

[1]Department of Chemistry
[2]Post Graduate Student Department of Chemistry
[3]Undergraduate Student Department of Chemistry
Faculty of Mathematics and Natural Sciences, University of Lampung Jl.
Sumantri Brojonegoro No 1, Bandar Lampung-35145, Indonesia
Corresponding author: ilim@fmipa.unila.ac.id

In this work, zeolite-A synthesized from rice husk and aluminium foil using hydrothermal method was used as catalyst for production of nitrogen compounds from coconut oil. Before use, the synthesized zeolite was characterized using XRD and SEM techniques for confirmation. The zeolite was then used as catalyst for reaction between coconut oil and diethanolamine with different volume ratios of coconut oil to diethanolamine. The product of the reaction was analysed using GC-MS, and then used in corrosion experiment. The experimental results indicate that the optimum production of nitrogen compound was achieved using the diethanolamine to coconut oil ratio of 1:1, with lauril diethanolamide as the main nitrogen compound identified. Corrosion inhibition experiment indicate that the product of this optimum experiment has the ability to provide up to 88% protection for mild steel sample in brine solution saturated with CO_2 gas.

Keywords: Amidation; coconut oil, nitrogen compounds; Zeolite-A

Antidiabetic and Antibacterial Activity of The Flavonoid Compound Artocarpin From The Pudau Plant (*Artocarpus kemando* Miq.)

[1]Andi Irawan, [1]Yandri, [1]Sutopo Hadi, [1*]Tati Suhartati
[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences
University of Lampung, Bandar Lampung 35145, Indonesia
[*]tati.suhartati@fmipa.unila.ac.id

Diabetes, a disease caused by high blood sugar levels in the human body is a worldwide concern. IDF predicted that there will be a significant increase every year, to 700 million people by 2045. Diabetes is highly harmful to the body as high blood sugar levels cause immune dysfunctions, increasing susceptibility to infections and causing other complications. Flavonoid are known for its bioactivity, especially in the health sector. Several studies have shown that flavonoids have antidiabetic potential. Artocarpin flavonoid compounds have been isolated from the root wood of the pudau plant (*Artocarpus kemando* Miq.) and tested for antidiabetic amylase enzymes and antibacterial tests against *Staphylococcus aureus* bacteria. Artocarpin has antidiabetic ability with a percentage of inhibition of 43.33% at a concentration of 750 ppm. Artocarpin's antibacterial ability is in the moderate category against *S. aureus* bacteria.

Keywords: antibacterial; artocarpin; antidiabetic; diabetic; flavonoid

Effect of Variations of Phenol pH and NaOH Concentration on Phenol Transport Using 8% Co-EDVB Carrier Compound Based on Liquid Membrane

Anisa Rahmawati[1,2], Rinawati[1], Agung Abadi Kiswandono[1*]

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Bandar Lampung, Indonesia, 35141.
[2]Magister Program, Departement of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Bandar Lampung, Indonesia, 35141.
Email : _anisa.rw29@gmail.com_

Separation and purification of phenol liquid waste can use liquid membrane technology based on the Polymer Inclusion Membrane (PIM) method. In this study, PIM membranes were fabricated using polyvinyl chloride (PVC), dibenzyl ether (DBE), and Copoly-eugenol divinyl benzene (Co-EDVB) 8% as support polymers, plasticizers, and carrier compounds, respectively. Furthermore, the PIM membrane optimization test was carried out using the parameters of the effect of pH of the phenol solution on the source phase and the effect of NaOH concentration on the receiving phase. The results showed that the optimum pH of the phenol solution in the source phase was 5.5, and the optimum concentration of NaOH in the receiving phase was 0.1. PIM membranes before and after phenol transport were characterized using FTIR (Fourier Transform Infra Red) and SEM (Scanning Electron Microscope). The results of characterization using FTIR showed that the typical peak of the FTIR spectra experienced a shift in wave number, namely the absorption of the –OH group 3518.6 cm-1, this could occur because the active site in Co-EDVB 8% in the membrane was partially lost during the transport process. While the results of SEM characterization showed a comparison of the surface morphology of the membrane before and after phenol transport.

Keywords: Co-EDVB; Phenol; Polymer Inclusion Membrane

Cycloartobiloxanthone, a Flavonoid with Antidiabetic and Antibacterial Activity from *Artocarpus kemando* Miq.

[1]Antin Sri Prihatin, [1]Yandri, [1]Sutopo Hadi, and [1*]Tati Suhartati

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences
University of Lampung, Bandar Lampung 35145, Indonesia
*E-mail of corresponding author: tati.suhartati@fmipa.unila.ac.id

The flavonoid compound cycloartobiloxanthone has been isolated from the stem wood of the pudau plant (*Artocarpus kemando* Miq.). The structure was elucidated based on physical and spectroscopic data (UV-Vis, IR, and NMR). Flavonoids are known to have antidiabetic and antibacterial bioactivities. According to the IDF, there will be an increase in the number of people with diabetes in 2030. Diabetes can cause damage to cells and body tissues, under these conditions microorganisms such as bacteria can quickly enter the body and cause various infections and diseases. The cycloartobiloxanthone compound showed antidiabetic activity by inhibiting the activity of the α-amylase enzyme with the largest percentage of inhibition at a concentration of 2000 ppm $37.91\pm1.69\%$, lower than acarbose as a positive control of $81.85\pm0.68\%$. The antibacterial bioactivity test against *Staphylococcus aureus* bacteria showed antibacterial activity which was classified as strong at a concentration of 0.3 mg/disk, with an inhibition zone of 10 mm diameter. In contrast, no antibacterial bioactivity against *Salmonella typhi*.

Keywords: antibacterial; antidiabetic; *Artocarpus kemando* Miq.; cycloartobiloxanthone; flavonoid

SYNTHESIS OF NANO HOLLOW GRAPHEN OXIDE (NHGO) FROM GRAPHEN OXIDE CORN COMB

[1]Arya Rifan Syah, [1]Della Mita Andini, [1]Rudy Situmeang

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung

JL. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia 35145

E-mail : aryarifansyah951@gmail.com, dellamita91@gmail.com, rudy.tahan@fmipa.unila.ac.id

Nano Hollow Graphene Oxide is a carbon-based hollow nanoparticle that provides an alternative pathway for graphene due to its excellent properties such as a large specific surface area volume ratio and low production cost. NHGO can be applied in catalysis, composite materials, solar energy, and others. The synthesis of NHGO from graphene oxide (GO) from corn cobs was initiated by dispersing GO in ammonia and forming an emulsion using olive oil. The obtained NHGO were characterized using XRD, FTIR, and TEM instruments. The XRD results show the characteristics of NHGO at an angle of $2\theta = 23^\circ$ then the FTIR results show that the NHGO surface has an epoxy group (C-O-C) that appears at a wave number of 1148 cm-1, a carbonyl functional group (C=O) from a carboxylic acid group (C(=O).) OH) whose peak appears at 1736.9 cm-1, the C-H bond at wave number 723.1 cm-1. TEM studies show that hollows are formed in GO

Keywords: FTIR; Nano Hollow Graphen Oxide; TEM; XRD

Preparation and Characterisation of Graphene Oxides from waste of corn cobs using modified Hummers method

Della Mita Andini [1*], Arya Rifan[1], Rudy Situmeang[2**]
[1]Students of Master Program in Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung 35145, Indonesia
[2]Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung 35145, Indonesia
*)First Author : dellamita91@gmail.com and **) Corresponding author: rudy.tahan@fmipa.unila.ac.id

The preparation of graphene oxide (GO) was carried out using the modified Hummers method. The synthesis was initiated by oxidizing natural graphite from corn cobs' waste using sulfuric acid and potassium permanganate and sonication. The graphene oxide obtained was characterised using XRD and FTIR instruments. The XRD result showed the characteristics of graphene oxide at an angle of $2\theta = 11.56º$. Then the FTIR result showed that the surface of GO has an epoxy group (C-O-C) that appears at a wave number of 1204 cm^{-1}, a carbonyl functional group (C=O) from a carboxylic acid group (C(=O)OH) whose peak appears at 1700 cm^{-1}, the C-H bond in the wave number $700\text{-}900 \text{ cm}^{-1}$.

Keywords: corn cobs; FTIR; graphene oxide; XRD

Biodegradation of Diesel Oil by a Consortium of Indigenous Microbes Local Isolates from Seawater at Panjang Port, Lampung

[1]Fadhilah Rachmawati, [2*)]Nurhasanah., [3]Mulyono, [4]Agung Abadi Kiswandono

[1,2,3,4)] Department of Chemsitry, Faculty Mathematic and Natural Sciences, University of Lampung
Jl. Prof. Dr. Ir. Sumantri Brojonegoro No.1, Gedong Meneng, Kec. Rajabasa, Kota Bandar Lampung, Lampung 35141
fdr.fadhilah@gmail.com, nur.hasanah@fmipa.unila.ac.id, mulyono@fmipa.unila.ac.id, agung.abadi@fmipa.unila.ac.id
corresponding author :*) nur.hasanah@fmipa.unila.ac.id

Pollution of diesel oil in the waters has a large enough impact, such as the destruction of marine ecosystems and as the emergence of pollutant substances that can accumulate in the bodies of marine organisms. These conditions can cause harmfuleffect if consumed by humans. Currently, One of the simple and easy techniques to be developed to overcome these problems is biodegradations techniques.This study aims to determine the ability of indigenous microbes local isolates from seawater Panjang Port with isolate codes ALP D1, ALP E1 and the consortiumof these isolates in degrading diesel oil. The methods used includes a qualitative test by measuring the diameter of the clear zone and a quantitative test carried out by determining the residual content of diesel oil and percentage of biodegradation using the gravimetric method. The results of the qualitative test showed that the isolates ALP D1 had a wide clear zone than the isolates ALP E1 and consorsium which is 5 mm. Determination of residual oil content showed that the microbial consortium had a lower residual oil content than ALP D1 and ALP E1 which was 36 g/mL at 7 day incubation and 22.5 g/mL at 14 day incubation, with % biodegradation indicating that the microbial consortium had The highest % biodegradation compared to ALP D1 and ALP E1 was 64% at 7 days incubation and 77.5% at 14 days incubation. Based on these results, it can be concluded that a consortium of isolates of indigenous mircobes can increase the % biodegradation of diesel oil.

Keywords: Biodegradation; Consortium; Diesel Oil; Indigenous bacteria; Seawater Panjang Port Lampung

Liquid Pineapple Waste as Carbon Source for Production of Bacterial Nanocellulose (BNC) by a Local Isolated Microbes

[1*]Mulyono, [1]Nurbaiti, [1]Mita Rilyanti, [1]Dian Herasari
[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences
Lampung University,
Jl. Prof. Dr. Soemantri Brodjonegoro No.1 Bandar Lampung - INDONESIA
Corresponding author: mulyono@fmipa.unila.ac.id

Over the closing decade, bacterial nanocellulose (BNC) has earned growing international attention due to its great physical and chemical properties, such as green processing, low production cost, multiplied mechanical properties, hydrophilicity, outstanding biocompatibility, and biodegradability. BNC production generally uses commercial glucose as a carbon source in a liquid Hestrin-Schramm medium. Using natural carbon sources such as glucose-rich pineapple liquid waste as a source of alternate carbon in place of glucose is expected to minimize production costs. This study aimed to obtain isolates of BNC-producing bacteria and find the potential of pineapple liquid waste as a carbon source in BNC production. Here, we're reporting the BNC production by substituting glucose in liquid Hestrin-Schramm medium using pineapple liquid waste with variations in concentrations of 2%, 4%, 6%, and 8%. BNC production was carried out at a static state with an incubation time of 7, 14, and 21 days. The parameters measured include the weight of the BNC pellicle produced and the water hold capacity (WHC) and characterization using scanning electron microscopy (SEM). The results showed that the Kc-D-4 isolate was selected as the best isolate and produced a halo index of 2.6 in GEY medium. Optimum fermentation conditions for the production of BNC by Kc-D-4 isolates were achieved at a pineapple liquid waste as a carbon source with a concentration of 8% at an incubation time of 14 days in a static state. BNC pellicles weighing 10.2 grams with a WHC of 97.3% were produced in these conditions. SEM characterization showed that the pellicle structure has a nano-size with a diameter of 39-65 nm. Thus, pineapple waste has the potential to be used as a carbon source to produce BNC.

Keywords: Bacterial nanocellulose; BNC; pineapple liquid waste; Hestrin-Schramm medium

Hierarchical ZSM-5 Based on Silica Bagasse and Bio-Mesoporogen Starch as Catalyst for Glucose Production

[1*]Mita Rilyanti, [2]Zhaafira Allia Zahra, [1]Buhani, [1]Yandri, A.S.

[1]Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung, Jl. Soemantri Brojonegoro No. 1 Bandar Lampung, Indonesia
[2]Undergraduate Student of Chemistry Program, Department of Chemistry, University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
*corresponding author: mita.rilyanti@fmipa.unila.ac.id

This research has been successfully in utilizing potential of biomass waste, there are sugarcane bagasse ash (SCBA) as a source of natural silica to be used as the main precursor for the synthesis of *Zeolite Socony Mobile-5* (ZSM-5) hierarchical pores and cassava peel containing cellulose to be hydrolyzed into glucose. Synthesis of hierarchical ZSM-5 using starch as bio-mesoporogen with the addition of ZSM-5 seeds through the method hydrothermal preparation of precursor gels at 180 °C for 144 hours was successfully performed with the acquisition of mesoporous surface area 100.582 m^2/g, regular pore diameter 3.32 nm. Synthesis of ZSM-5 SCBA without bio-mesoporogen was performed as a comparison. Results showed the crystallinity of ZSM-5 with and without bio-mesoporogen are 80.09% and 82.40%, respectively. Cellulose content isolated from cassava peel flour is 88.21%. Optimization of the catalytic test variable showed that the hydrolysis of cellulose occurred at 140°C for 4 hours with a 1:1 ratio of catalyst and substrate. The conversion degrees of hydrolyzed cellulose using H-ZSM-5 SCBA hierarchy pores catalyst and H-ZSM-5 SCBA microporous catalyst was 88.2% and 76.7% with glucose concentrations produced at 218,083 ppm and 188,667 ppm, respectively.

Keywords: bio-mesoporogen; H-ZSM-5; hydrolysis; glucose; sugarcane bagasse ash

100

Preliminary Study of Hydrogel Micro-composite Production from Cellulose Fraction in Cassava Peel Waste using Grafting Technique

[1]Heri Satria, [1]Nurhasanah, [1]Dian Herasari, [1]Kamisah D. Pandiangan, [1]Ilim, [1]Aspita Laila, [1]Risma Handayani

[1] Department of Chemistry, FMIPA University of Lampung, Jl. Sumantri Brodjonegoro No. 1 Gedong Meneng Bandar Lampung

E-mail od corresponding author: heri.satria@fmipa.unila.ac.id

Tapioca production in Indonesia leaves a very significant amount of waste, one of which is cassava peel. Biochemically, cassava peel is a biopolymer that has great potential to be used as a medicinal raw material. This study aims to increase the added value of cassava peel waste by converting it into a carbohydrate derivative product called cellulose micro-composite. Conversion was carried out by grafting copolymerization of micro-crosslinked cellulose composites using acrylamide monomer, ammonium persulfate as an initiator, and N,N-methylene-bisacrylamide as a crosslinker. Copolymerization was carried out at 70ºC for 3h. The mixture was precipitated with ethanol and methanol and refluxed for 1 hour using acetone. The result of this copolymerization is a micro composite hydrogel and characterized by Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscope (SEM). Under optimum conditions, the hydrogel can swell in water and reach 3022.2%. Bacterial growth inhibition of amoxicillin-laden hydrogel was tested on *Escherichia coli* ATCC 25922 and *Staphylococcus aureus* ATCC 25923. The test results proved that the amoxicillin-containing hydrogel was able to inhibit bacterial growth respectively. Based on the results of the study, it can be concluded that micro- composite hydrogels have potential in the biomedical applications as medicinal raw materials.

Keywords: cassava peel waste; copolymerization; micro cellulose; micro composite hydrogel

Production of Lipopetide Biosurfactan From *Bacillus* sp. ALPD1 Using The Carbon Source of Diesel Oil

[1*)]Nurhasanah, [1]Silvana Citra, [1]Syaiful Bahri, [1]John Hendri
[1]Department of Chemistry, Faculty Mathematics and Natural Sciences,
University of Lampung
Jl. Prof. Dr. Soemnatri Brojonegoro No. 1 Gedong Meneng, Bandar Lampung
35154
corresponding author : nur.hasanah@fmipa.unila.ac.id

Biosurfactants are surfactants produced by microbes. The chemical structure of biosurfactants consists of hydrophilic and hydrophobic groups. Lipopeptide is one type of biosurfactan composed of lipid and peptides. microbes. This study aims to produce lipopeptide biosurfactans from *Bacillus* sp. ALPD1 using diesel oil as a carbon source. The methods used in this study include optimizing the production of lipopeptides using diesel oil as a carbon, extraction of lipopeptides and characterization using FTIR. The results showed that *Bacillus* sp. ALP D1 has optimum conditions in producing biosurfactant at 48 hours, pH 7 and salinity 0.01%. Extraction results obtained light brown dry powder as much as 0.6232 gram/L Analysis of the FTIR spectrum showed an absorption band in the 3265 cm^{-1} region which was the N-H stretching vibration of the peptide group, C-O stretching vibrations in the 1207 cm^{-1} area, CO-N stretching vibration in the area of 1625 cm^{-1}. C-H stretching vibrations (aliphatic) in the 2914 cm-1 region and amplified by absorption in the 1625 cm-1 and 1446 cm-1 regions which indicate the presence of a C-H aliphatic chain. Based on these results, it can be concluded that Bacillus sp. ALPD1 can produce lipopeptide biosurfactant by using diesel oil as a carbon source.

Keywords: diesel oil; *Bacillus* sp. ALPD1; Lipopeptide

Identification of Anti-Inflammatory Bioactive Fractions from the Stem Bark of White Turi Plant (*Sesbania grandiflora* (L.) Poir)

[1]Noviany Noviany, [1]Wulandari Agustin, [2] Mohamad Rafi, [3]Bambang Irawan, [4]Wisnu Ananta Kusuma, [1]Sutopo Hadi

[1] Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung
Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia
[2]Department of Chemistry, Faculty of Mathematics and Natural Sciences, IPB University
Bogor,16680, West Java, Indonesia
[3]Department of Biology, Faculty of Mathematics and Natural Sciences, University of Lampung
Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia
[4]Department of Computer Science, Faculty of Mathematics and Natural Sciences, IPB University
Bogor,16680, West Java, Indonesia
E-mail of corresponding author
noviany@fmipa.unila.ac.id

In this study, the anti-inflammatory activity of the stem bark of *Sesbania grandiflora* (white turi) has been investigated based on LC-MS/MS-based metabolomics. White turi bark will be extracted with three different solvent concentration variations. Solvent variations were carried out to determine the best solvent concentration that could extract the metabolite compounds. The isolated compounds were obtained by extraction method with 3 variations of solvent concentration including MeOH 100%, MeOH:EtOAc 50% and EtOAc 100%, while the anti-inflammatory activity of the extracts and compounds were tested by the protein denaturation inhibition method. All extracts obtained will be grouped based on the principal component analysis (PCA). In addition, the anti-inflammatory activity of the stem bark of *S. grandiflora* will be correlated with the analysis of the metabolite results of the LC-MS/MS profile using partial least squares (PLS) to determine the active compounds that contribute significantly to anti-inflammatory activity.

Keywords: anti-inflammatory; antioxidant; methanol extract; *Sesbania grandiflora*

Isolation and Characterization of Alkaloid Compound Fungi Mangrove Sediment and Bioactivity Test Against *Staphylococcus aureus* and *Pseudomonas aeruginosa*

[1]**Syaiful Bahri, **[2]**Reyzka Aulia Wihardini , **[3]**Andi Setiawan, **[4]**Aspita Laila, **[5]**John Hendri, **[6]**Suripto Dwi Yuwono**
[1]University of Lampung, Jl. S. Brojonegoro No.1 Bandar Lampung 35145
syaiful.bahri@fmipa.unila.ac.id

In this study, the isolation and characterization of fungi from mangrove sediments was carried out and to determine their activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Mangrove sediments were taken randomly in the ecotourism area of the Gebang Petengoran mangrove forest with coordinates of -5.570759°S 105.240765°E, and Dewi Mandapa beach area with coordinates of -5.571883°S 105.243494°E. The isolation results obtained four single fungal isolates and were cultivated and co-cultivated using solid rice media, the crude extracts were screened for bioactivity against *S. aureus* and *P. aeruginosa*. The results of the selected isolates were scaled up on a large scale and characterized using FTIR and LCMS. FTIR analysis showed absorption at wave number 1371.7 cm-1 indicating absorption of the C-N group which is the functional group of alkaloid compounds. Absorption at a wave number of 1744,4 cm-1 indicates an absorption of C=O. While the absorption at wave number 2922.2 cm-1 which indicates that there are aliphatic C-C or C-H bonds. LCMS analysis of RSM1 fraction compounds obtained alkaloid components with 365 m/z results indicating the structure of alkaloids with a base structure of triazine.

Keywords: antibacterial; alkaloid; fungi; mangrove sediment

SYNTHESIS AND ANTIDIABETIC ACTIVITY TEST OF Cu(II)-GLYCIN COMPLEX COMPOUNDS

Yuli Ambarwati[1], Rizky Yunianti[2], Syaiful Bahri[1], Aspita Laila[1]
[1]Chemistry Department, Faculty of Mathematics and Natural Sciences, Lampung University
[2]Freshgraduates, Chemistry Department, Faculty of Mathematics and Natural Sciences, Lampung University
*Coresponding author: yuli.ambarwati@fmipa.unila.ac.id

Copper(II) compounds are known have the ability as an antidiabetic supplement. This study aims to obtain the results of the synthesis of Cu(II)-glycin complex compounds and test the activity on glucose levels in the blood. The synthesis of Cu(II)-glycin complex are carried out by reacting copper(II) metals with amino acid glycine ligands using reflux and freeze dry methods. The synthesized compounds were characterized by UV-Vis spectrophotometer and IR spectrophotometer. The results of UV-Vis characterization showed that the absorption of the wavelengths of the Cu(II)-glycin complexes experienced a hipsochromic shift from the absorption of metal compounds CuCl2.2H2O. The results of the IR spectrum of the Cu(II)-glycin complex showed uptake of Cr-O and Cr-N in the area of 592.79 cm-1 and 513.94 cm-1. The Cu(II)-glycin complex compounds is blue with a yield of 85.92%. The synthesized compounds obtained were followed by in vivo antidiabetic activity testing. The data obtained were tested using One Way ANOVA which showed significant results in reducing blood sugar levels. The best dosage of Cu(II)-glycin complex compounds at 200 μg/KgBW which can reduce blood sugar levels 41.33%.

Keywords: Antidiabetic, Cu(II)-glycin, Synthesized, Complex

Characterization and Antioxidant Activity of Exopolysaccharide from Diatom Cyclotella striata

[1]Ni Luh Gede Ratna Juliasih, Vina Eka Munita, [1]Wulandari, [1]Hardoko Insan Qudus, [2]Zeily Nurachman, [1]Andi Setiawan

[1] Department of Chemistry, Faculty of Matematic and Natural Sciences, Lampung University,
Jl. Sumantri Brojonegoro No. 1 Bandar Lampung 35145, Indonesia
2 Biochemistry Division, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung,
Jl. Ganesha 10, Bandung 40231, Indonesia
E-mail of corresponding author
andi.setiawan@fmipa.unila.ac.id

Diatoms, one group of microalgae, are widely used in medicine, food industry, and alternative energy sources. The potential is related to the content of its natural compounds; one of them is exopolysaccharide (EPS). The aim of this study was to analyze the antioxidant activity of exopolysaccharide from diatom C. striata using the cyclic voltammetry method. The research was carried out through the cultivation of C. striata on agricultural fertilizer media for 15 days. The C. striata was then harvested using centrifugation technique and obtained a biomass concentration of 0.611 g/L. Finally, 90% ethanol was added to the supernatant (90% ethanol: supernatant = 3:1, v/v). The collected flocs were crude exopolysaccharides (EPS). The wet EPS weight obtained was 4.718 g/L, after freeze dry obtained 1.344 g/L. The total sugar content of the exopolysaccharide of C. striata obtained was 37.8%. The IR-spectroscopy characterization of exopolysaccharide showed that the peaks appeared in the 3526.75 cm^{-1} area were the absorption of O-H stretches that formed hydrogen bonds. The 1624.43 cm^{-1} area is the absorption of the C=O carbonyl group and the sharp absorption peak at the area 115I.61 cm^{-1} is the C-O bond absorption representing C-O in the monosaccharide framework. The voltammogram measurement of exopolysaccharide antioxidant activity showed that the peak of oxidation potential (Epa) was in the area of +1.1 V.

Keywords: antioxidant; C. striata; cyclic voltammetry; Exopolysaccharide

Synthesis of Copoly Eugenol-Ethylene Glycol Dimethacrylate (Co-EEGDMA) 8% Using Copolymerization Method

Eva Nuryana[1,2], Rinawati[1], Ni Luh Gede Ratna Juliasih[1], Sonny Widiarto[1], Agung Abadi Kiswandono[1]*

[1]Department of Chemistry, Universitas Lampung, Bandar Lampung, Indonesia 35145

[2]Magister Program, Department of Chemistry, Universitas Lampung, Bandar Lampung, Indonesia 35145

agungabadi@fmipa.unila.ac.id

Abstract. Copolymerization of eugenol with EGDMA is a cationic addition polymerization reaction. The results of this copolymerization can increase the number of active sites on the polymer, namely the benzene ring and hydroxyl groups, thus causing a higher molecular weight. This study aims to synthesize Copoly-Ethylene Glycol Dimethacrylate (Co-EEGDMA) 8% as a carrier compound in the process of separating phenol pollutants using liquid membrane techniques. Co-EEGDMA synthesis was carried out by copolymerization reaction between eugenol and 8% EGDMA using boron tri-fluoride diethyl ether as catalyst $(BF_3O(C_2H_5)_2)$. The results of the synthesis of carrier compounds were characterized using Fourier-Transform Infrared Spectroscopy (FT-IR), Scanning Electron Microscope (SEM), and Thermogravimetry-Differential Thermal Analysis (TG-DTA). The 8% Co-EEGDMA compound produced was a brick red solid. The results of characterization with FT-IR showed the loss of allyl groups and vinyl groups at wavelengths of 1636 cm^{-1} and 995.2 cm^{-1}, this condition is a parameter of the success of the synthesis. The results of SEM characterization showed that the morphology of Co-EEGDMA 8% was lumpy, round, and the distribution was uneven. Characterization with TG-DTA was carried out in a temperature range of 50 ℃ − 900 ℃. At a temperature of 300 ^{0}C the samples of co-EEGDMA carrier compounds experienced degradation, while at 400 ^{0}C the samples of co-EEGDMA carrier compounds experienced mass stability. The results of characterization with TG-DTA showed that the carrier compound was capable of being used to transport phenol at high temperatures.

Keyword: Copolymeritation; EGDMA; TG-DTA

STUDY ADSORPTION OF METHYLENE BLUE DYE BY CARBON FROM RUBBER FRUIT SHELL (*Hevea brasiliensis*) MODIFIED BY MAGNETITE (Fe₃O₄) COATING

[1,2]J S Dewi, [2,*]Buhani, [2]M Rilyanti, and [2]Suharso
[1]Undergraduate Student of Program in Chemistry, Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung, Prof. Soemantri Brojonegoro Street No 1, Bandar Lampung, Indonesia
[2]Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung,
Prof. Soemantri Brojonegoro Street No. 1, Bandar Lampung, Indonesia
e-mail: [1]jildasofianadewii@gmail.com, [2*]buhani@fmipa.unila.ac.id

In this research, the manufacture of carbon adsorbent from rubber fruit shell (*Hevea brasiliensis*) modified with magnetite (Fe₃O₄) coating using coprecipitation method to adsorb monocomponent methylene blue (MB) dye has been successfully carried out. Carbon and carbon-magnetite (CM) adsorbents were characterized using infrared (IR) spectrophotometer to identify the functional groups of the adsorbents, and X-Ray Diffraction (XRD) to identify the crystallinity level of the adsorbents. The study of the adsorption of MB dye on carbon and CM adsorbents was studied through adsorption experiments using the batch method. The adsorption of MB dye to carbon and CM adsorbents was optimum at pH 8 and 9, contact time was 60 minutes with an initial concentration of 300 ppm which resulted in the amount of MB adsorbed at 64.84 mg/g.

THE STUDY OF ADDITIONAL MIXTURE OF PINEAPPLE PEEL EXTRACT (*Ananas comosus*) AND COCONUT SHELL LIQUID SMOKE GRADE 2 AS CALCIUM PHOSPHATE (Ca$_3$(PO$_4$)$_2$) SCALE INHIBITOR USING UNSEEDED EXPERIMENT METHOD

[1,a]N.Qomariyah, [2,b]Suharso and [2]Buhani

Undergraduate student of programin Chemistry, Department of Chemistry University of Lampung, Jl. Prof Dr Ir Sumantri Bojonegoro No.1, Bandar Lampung, Indonesia.
[2]Department of Chemistry, Faculty of Mathematic and Natural Science, University of Lampung, Jl. Dr Ir Soemantri Brojonegoro No.1 Bandar Lampung Indonesia.
e-mail: nurulqomariyah207@gmail.com[a], suharso@fmipa.unila.ac.id[b,*]

In this study, the addition of a mixture of pineapple peel extract and coconut shell liquid smoke grade 2 was carried out as an inhibitor of calcium phosphate (Ca$_3$(PO$_4$)$_2$) scale formation at various concentrations 0.02, 0.04, 0.05 and 0.06 M using the unseeded experiment method. The results of this study showed that the use of a mixture of pineapple peel extract and coconut shell liquid smoke grade 2 as an inhibitor was able to inhibit the growth of Ca$_3$(PO$_4$)$_2$ scale depending on the concentration of the growth solution used and the concentration of the mixed inhibitor added. The effectiveness of the addition of mixed inhibitors reached 10.34-79.25% as evidenced by the results of the scanning electron microscopy (SEM) characterization which showed changes in morphology and the particle size analyzer (PSA) characterization results which showed the size distribution of crystal particles to be smaller.

Keyword: calcium phosphate scale; coconut shell liquid smoke; inhibitor; pineapple peel extract

The Effect of Additional Sorbitol on the Thermal Stability of Protease from *Aspergillus fumigatus*

[1]Hendri Ropingi, [1]Noura Lydia Utami, [1]Tati Suhartati, [1]Sutopo Hadi, and [1*]Yandri

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences,
University of Lampung, Bandar Lampung 35145, Indonesia
[*]E-mail of corresponding author: yandri.as@fmipa.unila.ac.id

Objective of this study is to study the effect of adding sorbitol to the stability of the protease enzyme from *A. fumigatus*. The protease enzyme was isolated and purified by centrifugation, fractionation with ammonium sulfate, and dialysis. The results showed the native enzyme and added sorbitol 0.1; 1.0; and 1.5 M has optimum pH of 5.5. The optimum temperature for the native enzyme was 45ºC. The optimum temperature after the addition of sorbitol with concentration of 0.5 M and 1.0 M changed to 50ºC and concentration of 1.5 M changed to 55ºC. The native enzyme has K_m value of 8.420 mg mL^{-1} substrate and V_{max} of 1.027 mol mL^{-1} min^{-1}. Meanwhile, after adding sorbitol with concentration of 0.1; 1.0; and 1.5 M has K_m value of 11.180; 9.096; and 8.917 mg mL^{-1} substrate and V_{max} of 1.488; 1.376; and 1.439 mol mL^{-1} min^{-1}. The native enzyme has ΔG_i of 97.957 kJ mol^{-1} and $t_{1/2}$ of 11.87 min, while sorbitol was added with concentration of 0.1; 1.0; and 1.5 M has ΔG_i value of 101.607; 102.222; and 104.615 kJ mol^{-1} and t½ 46.20; 56.34; and 77.00 min. The protease enzyme after the addition of sorbitol has higher thermal stability than the native enzyme, and this is evidenced by the increase in the half-life (t½).

Keywords: *A. fumigatus*; protease enzyme; sorbitol; thermal stability

SYNTHESIS AND CHARACTERIZATION OF COBALT(II) AND MANGANESE(II) COMPLEX WITH METHYL ORANGE LIGAND AND ITS APPLICATIONS AS DSSC

Zipora Sembiring, Kamisah Delilawati Pandiangan, Atika Nisrina, Alivia Natasya

Atikanisrina74@gmail.com

The synthesis and characterization of cobalt (II) and Manganese(II) complex compounds with methyl orange ligand has been carried out to be applied in DSSC (Dye Sensitized Solar Cell). The characterization of the synthesized complex compounds was carried out by determining the yield of the synthesized product, identifying the wavelength from the UV Vis spectrum, identifying the bonds formed using an infrared spectrophotometer, and their magnetic properties using MSB. The synthesis of complex compounds was carried out by reflux condensation using ethanol solvent, producing brownish orange crystals with a yield of 70.4% for the Co(II)-methyl orange complex and orange in color with a yield of 78.86% for the Mn(II)-methyl complex. orange. The crystals obtained were then characterized using UV Vis spectrophotometer and FTIR. Based on the results of the characterization showed the formation of complex compounds Co(II)-methyl orange and Mn(II)-methyl orange. The results obtained from the UV Vis spectrum showed that the direction of the spectrum showed hypochromic properties in both. The wavelength for methyl orange was obtained at 464 nm with the results of the synthesis of the complex compound Co(II)-methyl orange at 423 nm and Mn(II)-methyl orange at 463 nm. The complex compounds in Co(II) and Mn(II) synthesized are both paramagnetic.

Keywords: cobalt(II); complex compound; DSSC; manganese(II); *methyl orange*

Potency of Microfiltration Membrane in Purifying Fermented of Red Ginger (*Zingiber officinale var. rubrum*) for Preventive Drink of Natural Oxidation

1,* Agustine Susilowati, Aspiyanto, Hani Mulyani, Hakiki Melanie, Euis Filailla and Puspa D Lotulunge

[1] Research Center for Chemistry, National Research and Innovation Agency (BRIN)
Republic Of Indonesia, PUSPIPTEK, Serpong - 15314, Serpong, BANTEN, Indonesia
*E-mail of corresponding author : agustine_1408@yahoo.co.id

Concentrate of fermented red ginger (*Zingiber officinale* var. *rubrum*) as a result of purification through MF membrane had potency as preventive drink of natural oxidations. Biomass of fermented red ginger was get through fermentation of red ginger by kombucha culture. Fermented red gingers were biomasses of fermented red ginger A (FRG A) and fermented red ginger B (FRG B) with red ginger extract concentration of 5% and 10% (v/v, substrate). Purification process of FRG A and FRG B was conducted at trans-membrane pressure (TMP) of 40 psia with stirrer rotation speed of 200, 300 dan 400 rpm. The result of research activity showed that based on total phenolic concentration, treatment optimization was reached by FRG B under stirrer rotation speed of 400 rpm and TMP of 40 psia for 30 minutes. In this condition gave retentate and permeate with compositions of total polyphenol of 2.29 and 1.69 mg/mL, total solids of 10.56 and 10.55%, total acids of 0.17 and 0.13 %, total sugars of 57.31 and 83.52 mg/mL, pH 4.57 and 4.67, and inhibitor of 87.41 and 89.99%, respectively. In this optimum condition, retentate of FRG B produce phenol monomer as Diacetoxy –[6] gingerdiol, [4]-Shogaol, Methyl [6]-Shogaol, [7]-gingerol, Acetoxy-[8]-gingerol, Diacetoxy –[6] gingerdiol and permeate of FRG B produce phenol monomer as [4]-Shogaol, Methyl-[6]-Shogaol, [9]-Paradol, Methyl 5 acetoxy-[4]-gingerdiol, [8]-gingerol, [10]-gingerdiol, Acetoxy-[8]-gingerol, Methyl Diacetoxy –[4] gingerdiol, [13]-Paradol dan Diacetoxy –[6]- gingerdiol. Identification of volatile compound in retentate and permeate of FRG B at optimum condition dominated of Cyclopentene (19.128%), Decane (6.815%), Ethyl p-hydroxybenzoate (7.082%), Resorcinol (2.193%), 2.224% (2.224%),Ethyl p-hydroxybenzoate (7.082%) and another compound in conentration <2%.
Keywords: Antioxidant; DESFC; Fermented Red Ginger (FRG); polyphenol; retentate

Difference In Performance Of Microfiltration Membrane In Separating Total Phenolic From Fermented Red Ginger (*Zingiber officinale var. rubrum*) Suspension By Kombucha Culture For Natural Antioxidant

[1,*]Aspiyanto, [1]Agustine Susilowati, [1]Hani Mulyani, [1]Setyani Budiari, [1]Yati Maryati and [1]Puspa D. Lotulung

[11] Research Center for Chemistry, National Research and Innovation Agency (BRIN)

Republic Of Indonesia, PUSPIPTEK, Serpong - 15314, Serpong, BANTEN, Indonesia

E-mail of corresponding author : aspiyantolipi@gmail.com

Difference in microfiltration (MF) membrane performance on separation of valuable components from fermented red ginger (*Zingiber officinale* var. *rubrum*) was conducted to get concentrate with the best total phenolic as natural antioxidant. Separation on fermented red ginger A and B was carried out by using MF membrane (0.15 µm) fitted in dead-end stirred filtration cell (DESFC) system at stirrer rotation speed of 200, 300, and 400 rpm with trans-membrane pressure (TMP) of 20 psia for 30 minutes, respectively. Fermented red ginger A and B were the result of fermented red ginger at 5 and 10% of concentration of red ginger extract (v/v, substrate) from 20% inoculation of kombucha inoculum for 14 days of fermentation in room temperature. Based on the flux optimization, the result of experiment showed that the best performance of MF membrane fitted in DESFC on fermented red ginger of 5% and 10% were achieved with stirrer rotation speed of 400 rpm at 20 psia and gave flux values of 0.0418 and 0.0342 mL/cm^2.min., respectively. At this optimum condition of flux value were yielded retentate and permeate from fermented red ginger A with concentrations of total phenolic of 0.999 and 0.929%, and total solids of 9.89 and 9.85%, respectively, meanwhile retentate and permeate from fermented red ginger B gave concentrations of total phenolic of 1.024 and 0.527%, and total solids of 11.32 and 11.10%, respectively. In this optimum condition of flux, fermented red ginger of 5% (A) showed that mass spectra for phenol monomer was dominated by Acetoxy-[8]-gingerol with molecular weight (MW) of 365.27 Dalton (Da.), whereas fermented red ginger of 10% (B) indicated that mass spectra for phenol monomer was dominated by Diacetoxy-[6]-gingerdiol with MW of 381.22 Da.

Keywords: antioxidant; flux; microfiltration; phenol; red ginger (*Zingiber officinale* var. *rubrum)*

Inhibition of α-glucosidase activity and comparison of ABTS and DPPH assays for antioxidant activity of unfermented and kombucha fermented *Katuk* and *Kelor* leaves.

Nina Artanti[1,*], Santi Endrawati[2], Yati Maryati[1], Hakiki Melanie[1], Agustine Susilowati[1], Muhammad Hanafi[3].

[1]Research Center for Chemistry, National Research and Innovation Agency (BRIN), Tangerang Selatan 15314, Banten, Indonesia

SMKK Husada Pratama, Serang 42116, Banten, Indonesia

[2]Research Center for Traditional Medicine, National Research and Innovation Agency (BRIN), Tangerang Selatan 15314, Banten, Indonesia

There is a growing interest on kombucha due to the reported health benefits. The original kombucha is prepared using only sweetened black tea infusion. The development of kombucha, however, has been reported to incorporate other plant water extracts. For the last few years our research group is conducting studies on kombucha fermented fruits, vegetable and herbs. Here reported study using unfermented and kombucha fermented (14 days) of of katuk and kelor leaves water extracts. Results of previous study using the DPPH assay showed that the antioxidant activity of fermented samples were higher than that of unfermented samples. Besides having antioxidant activity, kombucha was also reported having hypoglycemic activity. Therefore, the purpose of current study was to study the α-glucosidase inhibitory activity and to compare the antioxidant activity using the ABTS and DPPH methods on unfermented and kombucha fermented katuk and kelor extracts. Results shows at 20 µl sample volume used, the pattern of activities of these samples were differed. The highest inhibition for a-glucosidase and DPPH were the mixture of *katuk* and *kelor* Kombucha fermented (KoKtKl 3:1) with inhibition of 41.04% and 57.25% respectively. While the highest inhibition for ABTS was unfermented kelor (Kl) with inhibition of 81.19%. Further analysis of chemical content responsible for those activities, need to be conducted

Coral Reef Organisms as a Potential Source of Anticancer Agents

[1,*]**Peni Ahmadi**, [2]**Andi Setiawan**, and [3]**Junichi Tanaka**
[1]Research Center for Vaccine and Drug, Research Organization for Health, National Research and Innovation Agency (BRIN), Jl. Raya Bogor Km. 46 Cibinong, 16911, Indonesia
[2]Department of Chemistry, Faculty of Mathematics and Natural Science, University of Lampung, Bandar Lampung, 35141, Indonesia
[3]Department of Chemistry, Biology and Marine Science, University of the Ryukyus, Nishihara, Okinawa, Japan
*peni.ahmadi@brin.go.id

Marine organisms, especially coral reef organisms, are known to be excellent resources for developing bioactive molecules into possible drug lead, such as anticancer agents. The purpose of this research is to discover bioactive compounds, especially anticancer agents. We collected a total of 245 specimens of coral organisms which consisted of 141 sponges, 78 seaweeds, 9 soft corals, and 17 others (tunicates, bryozoans, cyanobacteria, and some unidentified organisms). The resulted extracts, which consisted of ethyl acetate (EtOAc) and methanol (MeOH) extracts, from those organisms were then screened for their anticancer activity against NBT-T2 (urinary bladder) cells using an MTT assay. The screening results indicated that EtOAc extracts at a concentration of 10 mg/ml from the sponges (45%) are most likely to contain cytotoxic compounds, followed by soft coral and seaweed extracts with percentages of 22% and 14%, respectively. While MeOH extracts at a concentration of 10 mg/ml did not show a significant percentage of anticancer activity.

Keywords: anticancer; coral reef; invertebrate; MTT assay; NBT-T2

TRANSFORMATION OF LAMPUNG NATURAL ZEOLITE INTO ZEOLITE-A AND APPLICATION AS CATALYST FOR BIOMASS PYROLYSIS

Wasinton Simanjuntak[*], Kamisah D. Pandiangan, Mita Rilyanti, and Syayyidati Aulia

Department of Chemistry, Lampung University, Bandar Lampung 35145, Indonesia

Corresponding author e-mail: wasinton.simanjuntak@fmipa.unila.ac.id

In this work, clinoptilolite type natural zeolite from Lampung was successfully transformed into zeolite-A. The samples with the Si/Al ratios of 2.0, 1.5, and 1.0 were prepared by dissolving a specified mass of aluminum foil in 250 ml 1.0 M NaOH solution, and then 50 g of natural zeolite was added into the solution. The mixture was aged for 24 hours in autoclave at room temperature and finally subjected to crystallization at temperature 100 °C for 72 hours. The sample was washed, filtered and dried for 8 hours at 80 °C then subjected to calcination for 6 hours at 550 °C. The sample was grounded into powder, sieved with 325 mesh sieve, characterized using XRD and SEM, and finally used as catalyst for pyrolysis of a mixture of cassava tuber and rubber seed oil. Characterizations using XRD and SEM methods indicate that the samples with the Si/Al ratio of 1.5 and 1.0 were successfully transformed into zeolite-A. The results of pyrolysis experiment reveal that bio crude oil with the highest hydrocarbon content (97.71%) was produced with the of the zeolite-A with the Si/Al ratio of 1.5 catalyst.

Keywords: Lampung natural zeolite; transformation; zeolite-A; pyrolysis; bio crude oil

Sugarcane Yield, Harvested Potassium (K), and K Exchange Behaviour in Soil as Affected by Organic and Inorganic Fertilizers

Jamalam Lumbanraja[1], Wiwik Agustina[1], Sarno[1], Muhajir Utomo[1], Rosma Hasibuan[1], and Favorisen.R. Lumbanraja[2a].

[1]Department of Agrotechnology, Faculty of Agriculture, University of Lampung. Jl. Prof. Dr. Soemantri Brojonegoro No. 1 Bandar Lampung 35145 Indonesia

[2]Department of Computer Science, Faculty of Computer Science, University of Lampung. Jl. Prof. Dr. Soemantri Brojonegoro No. 1 Bandar Lampung 35145, Indonesia [*] Corresponding author

[a]Corresponding author: favorisen.lumbanraja@fmipa.unila.ac.id

Combination of organic and inorganic fertilizers plays an important role in increasing soil productivity of sugarcane. An experiment consisting of five treatments: 100% NPK; 100% organic fertilizer; 100% NPK + 50% organic fertilizer; 50% NPK + 100% organic fertilizer, and no fertilizer were conducted to determine sugarcane production, harvested potassium (K) and K exchange behaviour in Ultisol soil. Potassium exchange behaviour was determined by employing Quantity-Intensity (Q/I) method to find out the correlation between the Q/I parameters and the K availability. The results indicated that giving a combination of 100% NPK and 50% organic fertilizer had the highest yield of sugarcane biomass, total nutrient uptake of sugarcane. The highest value of Q/I parameters such as the potential buffering capacity of K (PBC^K) and the selectivity coefficient of K (K_v) were found in the treatment 100% organic fertilizer but not significant different from no fertilizer treatment. However, when the soil was treated with inorganic fertilizer, the PBC^K and K_v were very low meaning that the K can be leached down during the rainy season. There were highly significant positive correlations between ExK_L and ExK versus harvested K indicating that sugarcane production was heavily rely on labile adsorbed K from soil.

Keywords: K exchange behaviour; organic and inorganic fertilizers; quantity/intensity; sugarcane; Ultisol soil

Simple Synthesis of Silver Nanoparticles using $[Ag(NH_3)_2]^+$ Complex from Liquid Waste of Laboratory Experiment

Achmad Gus Fahmi[1], Suryaneta[1], Iwan Syahjoko Saputra[1], Kiki Yuli Handayani[1], Arif Ashari[1], Muhamad A Martoprawiro[2]
[1)]Institut Teknologi Sumatera (ITERA)
Jl. Terusan Ryacudu, Way Hui, Jati Agung, Lampung Selatan, 35365
[2)]Institut Teknologi Bandung (ITB)
Jl. Ganesa No.10, Lb, Siliwangi, Kota Bandung, Jawa Barat 40132
[3)]Departemen Kimia, FMIPA-UI
Kampus Baru Universitas Indonesia, Depok, 16424
E-mail: achmad.fahmi@km.itera.ac.id

In this paper, we report the colloid of silver nanoparticles (AgNPs) were successfully prepared through a simple method using liquid waste from the laboratory. The liquid waste from the laboratory containing the $[Ag(NH_3)_2]^+$ complex ion was used as a precursor in the synthesis of AgNPs colloids. The process of reducing Ag^+ ions to Ag^0 was carried out at room temperature until the solution color changed to brown. The reduction agent source was using Na-citrate solution with various concentrations of $5;7;9x10^{-4}$ M. The AgNPs colloids which formed were optimized and characterized using a UV-Vis Spectrophotometer, Particle Size Analyzer (PSA), and Particle Zeta Charge (PZC). The UV-Vis results showed the absorption peak spectrum of AgNPs colloids at 430, 432, and 421 nm wavelength. The addition of Na-citrate $5;7;9x10^{-4}$ M showed the stability of AgNPs colloids were 2, 5, and 7 days, respectively. The results of PSA characterization showed the distribution of the particle sizes average of 70, 50, and 35 nm, respectively. For the PZC analysis, the values of the inter-particle charges were -23, -25, and -32 mV, respectively. The liquid waste from the laboratory experiments containing the $[Ag(NH_3)_2]^+$ complex can be used as a source of Ag^+ ions to synthesize of AgNPs colloids. In addition, overcome the processing of liquid waste by utilizing it sustainably in the future.

Keywords: Ag Colloid; Liquid Waste Laboratory; Nanoparticles

Synthesis Activated Carbon From Shell of *Elaeis Guineensis Jacq* and Modified with Magnetite (AC-Fe$_3$O$_4$) as Adsorbent for Waste Metal Ion Pb(II) in Waters

[1]Buhani, [2*]A S Zulaicha, [3]A R Nuralita, [4]A Setiajaya

[1,3]Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia

[2*, 4]Sumatera Institute of Technology, Faculty of Sciences, Jl. Terusan Ryacudu, Way Huwi, Jati Agung, South Lampung, Indonesia

*E-mail of corresponding author
buhani@fmipa.unila.ac.id
*annisaa.zulaicha@km.itera.ac.id

In this study, the manufacture of palm shell activated carbon obtained from PT Inti Sentosa Alam Bahtera (ISAB) Lampung. The content of cellulose is quite large, namely 45% and hemicellulose by 26%, which causes this oil palm shell to be used as a basic material for making activated carbon. This study aims to modify activated carbon using magnetite (AC-Fe$_3$O$_4$). Modified physical-chemical activated carbon is used as an adsorbent which has the advantage of facilitating the filtration or separation process with the adsorbate. The adsorbent test used an adsorbate in the form of heavy metal ions Pb(II). The XRD characterization of AC-Fe$_3$O$_4$ has intensity peaks at 2□ at 30, 35, 43, and 56º which are consistent with the XRD pattern of magnetite. SEM-EDX characterization was also carried out to see differences in morphology and elemental composition between unmodified activated carbon and AC-Fe$_3$O$_4$. Then the surface area analysis was carried out using the BET$_{(surface area)}$ method. As well as identification of the amount of metal ions Pb(II) adsorbed using Atomic Absorption Spectrophotometry (AAS). The test results on the adsorbent (AC-Fe$_3$O$_4$) were carried out at the optimum variation, namely the adsorbent dose of 0.1 grams, contact time of 120 minutes, and at a concentration of 300 mg/L. Based on the zeta potential, the pH of PZC was obtained, namely 6 as the pH of the adsorbate solution with a Q value (number of Pb(II) ions adsorbed) of 6.175 mg/g. Adsorption isotherms tend to follow the pattern of Freundlich adsorption isotherms.

Keywords: Activated Carbon; Adsorption; Magnetite; Metal Ion Pb(II)

Utilization of $[Ag(NO_3)_2]^+$ from Laboratory Liquid Waste as a Precursor in the Synthesis of Silver Nanoparticles (AgNPs)

Iwan Syahjoko Saputra[1], Achmad Gus Fahmi[1], Arif Ashari[1], Suryaneta[1], Kiki Yuli Handayani[1], Muhamad A Martoprawiro[2]

[1]Institut Teknologi Sumatera (ITERA)

Jl. Terusan Ryacudu, Way Hui, Jati Agung, Lampung Selatan, 35365

[2]Institut Teknologi Bandung (ITB)

Jl. Ganesa No.10, Lb, Siliwangi, Kota Bandung, Jawa Barat 40132

[3]Departemen Kimia, FMIPA-UI

Kampus Baru Universitas Indonesia, Depok, 16424

E-mail: iwan.saputra@km.itera.ac.id

Silver nanoparticles (AgNPs) were successfully synthesized using $[Ag(NO_3)_2]^+$ precursors. Ag^+ ion sources were obtained from liquid waste samples of laboratory experiments. Na-citrate was used as the reducing agent of Ag^+ ions to Ag^0. The process of reducing Ag^+ ions to Ag^0 was carried out at room temperature. The color change of the solution from clear to brown indicates that AgNPs colloids have been successfully synthesized using Na-citrate. The AgNPs colloids were characterized using UV-Vis spectrophotometer, X-ray diffraction (XRD), Particle size analyzer (PSA), Particle zeta charge (PZC), and Transmission electron microscope (TEM). The UV-Vis spectrum showed the absorption peak of AgNPs colloid at 421 nm wavelength with an absorbance value of 0.7. The XRD analysis showed the crystallinity peak of silver nanoparticles at angle diffraction of (2θ): 33.26°; 39.89°; 61.21°; and 79.15° with a crystallite size average of 15 nm. The PSA and PZC characterization showed the average size distribution of AgNPs colloid was 35 nm with an inter-particle charge repulsion of -23 mV. TEM analysis showed the image of AgNPs colloids a sphere shape with an average particle size of 25 nm. Based on the results from the characterization data, it can be concluded that the liquid waste from the laboratory containing the Ag^+ ion can be used as a source of ions in the synthesis of silver nanoparticles. Additionally, the formed silver nanoparticles have the potential to be used in future cosmetic products as antibacterial agents.

Keywords: AgNPs; Colloid; Nanotechnology

Investigation Knowledge, Attitude, and Practice (KAP) on Laboratory Waste Management in Institut Teknologi Sumatera, Lampung, Indonesia

Suryaneta[1], Iwan Syahjoko Saputra[1], Achmad Gus Fahmi[1], Arif Ashari[1], Kiki Yuli Handayani[1], Muhamad A Martoprawiro[2]

[1]Institut Teknologi Sumatera (ITERA)
Jl. Terusan Ryacudu, Way Hui, Jati Agung, Lampung Selatan, 35365
[2]Institut Teknologi Bandung (ITB)
Jl. Ganesa No.10, Lb, Siliwangi, Kota Bandung, Jawa Barat 40132
[3]Departemen Kimia, FMIPA-UI
Kampus Baru Universitas Indonesia, Depok, 16424
E-mail: suryaneta@km.itera.ac.id

Recently, universities of science and technology have prioritized laboratory waste management as a strategic policy and practice in order to achieve sustainability goals. Knowledge about laboratory waste management has become a critical component of developing appropriate attitudes and practices toward laboratory waste management. Therefore, this study aims to investigate how universities currently manage laboratory waste by assessing the knowledge, attitudes, and practices (KAP) of laboratory staff, lecturer, students, and cleaning staff regarding laboratory waste management. This research was conducted at a public university of science and technology in Lampung, Indonesia. This research was a cross-sectional quantitative using self-administered questionnaires involving 410 participants in Institut Teknologi Sumatera. The questionnaire contains three sections with 26 items in total. Data were analyzed using SPSS version 25. The correlations between the KAP score and demographic variables and the presence of predictor variables were examined using linear regression. The Spearman's correlation of knowledge, attitude and practice scores were found to be positively correlated [$r(869) = .902$, $p < .001$] with KAP scores. Majority of respondents showed fair to poor knowledge, attitude, and practice towards all domains and showed significant results and correlation. Continuous education is necessary to increase the awareness among students in the near future; they will be the ones directly handling directly laboratory waste.

Keywords: Attitude; knowledge; Laboratory waste management; practice (KAP); science and technology university

THE STUDY OF ADDITION OF COCONUT SHELL LIQUID SMOKE *GRADE 2* AND PINEAPPLE PEEL EXTRACT (*Ananas comosus*) AS INHIBITOR OF CALCIUM SULPHATE (CaSO₄) SCALE USING UNSEEDED EXPERIMENT METHOD

[1,a]P.A. Erdanta, [2,b]Suharso, [2]A.A. Kiswandono, [2]M. Rilyanti
[1]Undergraduate Student of Program in Chemistry, Department of Chemistry, University of Lampung,
Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[2]Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung,
Jl. Soemantri Brojonegoro No. 1 Bandar Lampung, Indonesia
e-mail: phirenaauliae@students.unila.ac.id[a], suharso@fmipa.unila.ac.id[b*]

In this study, prevention of the growth of calcium sulfate (CaSO₄) scale by using mixed inhibitors in the form of coconut shell liquid smoke grade 2 and pineapple peel extract (*Ananas comosus*) has been successfully carried out. Each inhibitor was characterized using Infrared Spectrophotometer (FTIR) to identify the functional groups present in the inhibitor, and Gas Chromatography-Mass Spectrometry (GC-MS) to detect volatile compounds in the inhibitor. The process of preventing the formation of CaSO₄ scale using the unseeded experiment method or without adding crystal seeds to the growth solution. Utilization of the two inhibitors on the growth rate of CaSO₄ scale resulted in an inhibitor effectiveness of 79.51% with the lowest CaSO₄ concentration of 0.1 M and the addition of a mixture of liquid smoke inhibitors grade 2 and pineapple peel extract of 250 ppm (NA: 5:7).

Keywords: *Ananas comosus;* CaSO₄; coconut shell liquid smoke; scale; unseeded experiment

SYNTHESIS OF MANGANESE(II) COMPLEX WITH CONGO RED AND RHODAMINE B LIGANS

Zipora Sembiring, Syaiful Bahri, Agung Abadi Kiswandono, Afra Nabila Saputri, Ninid Widya Sari Lubis.

Jurusan Kimia FMIPA Universitas Lampung, Bandar Lampung

Synthesis of Mn(II) complex compound with congo red ligand and rhodamine B ligand has been carried out. Complex compound synthesis was carried out by refluxing a mixture of ligand and metal at 100 C using aquabides as solvent for congo red ligand and 78 C using ethanol as a solvent for rhodamine ligand. B, produced a dark red solid with a yield of 74.54% for the Mn(II)-congo red complex and produced a purple solid with a yield of 75.47% for the Mn(II)-rhodamine B complex. The solid obtained was then characterized using UV-Vis spectrophotometer and FTIR. The results of the characterization of the Uv-Vis spectrophotometer produced a maximum wavelength of 331 nm with an absorbance of 0.979 for the Mn(II)-congo red complex and a wavelength of 548 nm with an absorbance of 0.224 for the Mn(II)-rhodamine B complex. 449.41 cm-1 which shows the Mn-N vibration of the Mn(II)-congo red complex compound and produces a wave number of 476.42 cm-1 which indicates the Mn-N vibration and 362.62 cm-1 which indicates the Mn- O from the Mn(II)-rhodamine B complex. Based on the characterization results obtained, it is shown that the Mn(II)-congo red complex and the Mn(II)-rhodamine B complex are formed.

Keywords: complex compound; congo red; Mn(II) complex; rhodamine B

Surface Modification of *Sargassum sp.* Algae Biomass with Na⁺ Ions as Methylene Blue Adsorbent in Solution

[1,2]Khairunisa, [2,*]Buhani, and [2]Suharso

[1] Undergraduate Student of Program in Chemistry, Departement of Chemistry,
Faculty of Mathematic and Natural Sciences ,University of Lampung,
Prof. Soemantri Brojonegoro Street No. 1, Bandar Lampung, Indonesia

[2] Department of Chemistry, Faculty of Mathematic and Natural Sciences,
University of Lampung,
Prof. Soemantri Brojonegoro Street No. 1, Bandar Lampung, Indonesia

email: [1]khairunisa.0628@gmail.com, and [2,*]buhani@fmipa.unila.ac.id

In this study, a *Sargassum sp.* algae biomass modified using NaCl solution. The resulting adsorbents are algae and algae-Na to be used as adsorbent of methylene blue. The adsorbents were characterized by Fourier Transform Infra-Red (FTIR) to determine the functional groups and Scanning Electron Microscopy with Energy Dispersive X-Ray (SEM-EDX) to determine the surface morphology and elemental composition in adsorbents. The success of the modification was characterized by the appearance of a peak at the wave number 1419.61 cm^{-1} indicating the presence of O-Na bonds in the characterization of FTIR, the presence of fine grains attached on the surface of algae indicating the presence of Na on the SEM micrograph, and the presence of the element Na in the resulting EDX spectrum. Furthermore, adsorption tests were carried out on the influence of pH, contact time, and concentration. Adsorption results show that methylene blue is optimal at pH 6 with a contact time of 15 minutes and concentrations of 300 mg L^{-1}. Percentage of methylene blue adsorbed using algae-Na >95%, so it can be stated that alga-Na is very effective in adsorbing methylene blue in solution.

Keywords: adsorption; algae; methylene blue; NaCl; *Sargassum sp.*

Conversion of Palm Oil into Nitrogen Compounds using Zeolite-A as Catalyst

L Hidayah[1], A M Khoeroni[2], A D Sinaga[2], W Simanjuntak[3], K D Pandiangan[3], I Ilim[3*]

[1]Postgraduate Student Department of Chemistry
[2]Graduate Student Department of Chemistry
[3]Department of Chemistry
Faculty of Mathematics and Natural Sciences, University of Lampung Jl. Sumantri Brojonegoro No 1, Bandar Lampung-35145, Indonesia
Corresponding author: ilim@fmipa.unila.ac.id

This work was carried out to study preparation of nitrogen compounds from palm oil using two catalytic reactions using zeolite-A prepared from rice husk silica and aluminium foil as catalyst. The formation of zeolite-A was confirmed using XRD and SEM techniques. In the first step, palm oil was converted into methylesters by transesterification and the esters obtained were then reacted with diethanolamine to produce nitrogen derivatives. The experimental results indicate that complete conversion of palm oil into methyl esters was achieved as demonstrated by the GC-MS analysis. On the other hand, the experiment to convert the esters into nitrogen compounds is still limited, with only 1.73% relative percentage of nitrogen compound identified using GC-MS. Despite this limited success, this research indicates that it is possible to convert methyl esters of palm oil into nitrogen derivatives, which have the potential as green corrosion inhibitor.

Keywords: nitrogen compounds; Palm oil; transesterification, amidation; zeolite-A

Assessment of River Water Quality Status with Pollution Index Method in Lampung Province

[1]Purna Pirdaus, [2]Rinawati

[1]Master of Chemistry Student, Faculty of Mathematics and Natural Sciences,
University of Lampung
[2]Departement of Chemistry, Faculty of Mathematics and Natural Sciences,
University of Lampung
E-mail of corresponding : rinawati@fmipa.unila.ac.id

The availability and quality of good surface water has decreased due to several factors such as population increase, industrialization, urbanization, and others. River water quality can be assessed using physical, chemical and biological parameters. The pollution index method (IP) provides convenience and simplicity in determining the status of a river. In this study, water quality assessments were carried out in several rivers in Lampung Province with the aim of knowing the condition and level of water quality status so that they could take appropriate pollution management and control policies. This assessment was carried out during the dry season and rainy season. The water quality parameters measured included pH, DO, BOD, COD, TSS, Phosphate, Fecal Coli and N-NO3. In general, the status of the river water pollution index in Lampung Province shows a lightly polluted status based on the water quality standard Class II 22/2021 with an IP value of 0.58 - 4.11 in the dry season and 0.96 - 15.23 in the rainy season.

Keywords: Pollution Index (IP); River of Lampung; Water Quality Status

THE STUDY OF ADDITION MIXED PINEAPPLE PEEL EXTRACTS (*Ananas comosus*) AND COCONUT SHELL LIQUID SMOKE AS A SCALE INHIBITOR FOR CALCIUM CARBONATE USING *UNSEEDED EXPERIMENT* METHOD

[1]P.A. Anggraini, [2]Suharso, [2]M. Rilyanti and [2]Buhani.
[1]Undergraduate Students of Chemistry, Department of Chemistry, University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[2]Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung, Jl. Soemantri Brojonegoro No. 1 Bandar Lampung, Indonesia
e-mail: putriayuanggraini9800@gmail.com[1], suharso@fmipa.unila.ac.id[2*]

This research carried out the addition of mixed pineapple peel extracts and coconut shell liquid smoke as a scale inhibitor of $CaCO_3$ at various concentrations of growth solutions in 0.05, 0.075, 0.100, and 0.125 M with a mixture of inhibitors 5:1, 5:3, 5:5, and 5: 7 using an unseeded experiment method. The 5:7 inhibitor mixture had the highest effectiveness and inhibited $CaCO_3$ crystals growth, so the inhibitor mixture was retested again by varying the concentration by 50-250 ppm. The highest percentage of the effectiveness is 80,17% occurred at a 250 ppm inhibitor concentration. The results of Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), and Particle Size Analyzer (PSA) characterization showed that there was a change in the morphology of the $CaCO_3$ crystal and the new phase was detected. The particle size distribution of $CaCO_3$ is smaller with a mean value 21.15 µm to 13,128 µm after the addition of mixed inhibitor 5: 7.

Keywords: $CaCO_3$; inhibitor; liquid smoke; pineapple peel extract; scale

The Effect of MgO to SiO2 Mass Ratios on Catalytic Activity of MgO/SiO2 in Coconut Oil Transesterification

[1]Q. Ramadhina, [2]M. F. Ramadito, [3]D. Yuliyanda, [4]M. R. A. Zein,
[5]K. D. Pandiangan, [6]I. Ilim, [7]W. Simanjuntak

[1,2,3,4]Undergraduate student Department of Chemistry
[5,6,7]Department of Chemistry
Faculty of Mathematics and Natural Sciences, University of Lampung Jl.
Sumantri Brojonegoro No 1, Bandar Lampung-35145, Indonesia
E-mail of corresponding author
[7]Corresponding author: wasinton.simanjuntak@fmipa.unila.ac.id

This research was carried out to study transesterification of coconut oil using MgO/SiO2 with different MgO to SiO2 mass ratios as catalyst. Sol-gel method was applied to synthesize the catalysts from rice husk silica and Mg(NO3)2 solution with different concentrations, followed by calcination at 800°C for 6 hours. The produced catalysts were characterized using XRD and SEM technique. Transesterification experiments indicate that the highest yield (98.45%) was achieved with the use of MgO/SiO2 with the ratio of 1:10 catalyst, and the conversion of the oil into a mixture of methyl esters with methyl laurate as the main component as seen by GC-MS analysis.

Study of Phenol Transport Using Copoly-Eugenol Dialyl Phthalate (Co-EDAF) 8% Based on Supported Liquid Membrane (SLM)

Nurhudawati Ningsih[1,2], Dellania frida yunita[1], Rinawati[1], Hardoko Insan Qudus[1], Agung Abadi Kiswandono[1*]

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Bandar Lampung, Indonesia, 35141.
[2]Magister Program, Departement of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Bandar Lampung, Indonesia, 35141.
Email : agung.abadi@fmipa.unila.ac.id

The Supported Liquid Membrane (SLM) method has been used for the separation and recovery of phenol from the liquid waste. SLM is one of the liquid membrane methods consisting of a support polymer and a carrier compound. In this study, 8% copoly (eugenol-DAF) was used as a carrier compound and polytetrafluoroethylene (PTFE) as a supporting polymer. Membrane immersion time, carrier compound concentration, and optimum phenol transport time are parameters that affect phenol transport. In addition, the kinetics of the reactions occurring during the transport of phenol were also calculated. Characterization was carried out using SEM to determine the surface morphology of the membrane and FTIR to determine the interaction between phenol and copoly carrier compounds (eugenol-DAF). The results showed that the immersion time of the membrane was 30 minutes and the concentration of the carrier compound used was 0.01 M for 13 hours with the % phenol transported as much as 93.33%. Phenol transport follows first-order reaction kinetics with a mass transfer coefficient (k) of 1.02×10^{-6} m/s. The characterization shows that the results of the formation of pore widening and also the arrangement of pores are not tight and there is a thickening and an increase in the size of the fibers in the membrane. The absorption of -OH stretching at a wave number of 3421 cm-1 appears to have a shift in the wave number after being used for transport.

Keywords: Co-EDAF; phenol; Supported Liquid Membrane

Thermal and Morphological Characteristics of Chitosan Isolated from Banana Shrimp Shells (Penaeus merguiensis de Man)

[1]Ridho Nahrowi, [2]Andi Setiawan, [2]Aspita Laila, [1]Widyastuti Widyastuti, [2]Fendi Setiawan, [2]Nafila Khansa Salsabila, and [2,*]John Hendri

[1]Department of Doctor of Science, Faculty of Mathematics and Natural Science, University of Lampung, Jalan Sumantri Brojonegoro, Gedung Meneng, Kota Bandar Lampung 35141

[2] Department of Chemistry, Faculty of Mathematics and Natural Science, University of Lampung, Jalan Sumantri Brojonegoro, Gedung Meneng, Kota Bandar Lampung 35141

E-mail of corresponding author : *john.hendri@fmipa.unila.ac.id

The isolation chitosan generates the different characteristics of the product, depending on the raw material and isolation method. The focus of this research is to study the thermal and morphological characteristics of chitosan isolated from banana shrimp shells (Penaeus merguiensis de Man). The production of chitosan was started by the isolation of chitin from shrimp shells via deproteinization, demineralization, and decolorization processes. Chitin was converted to chitosan by the deacetylation process. The characteristics of isolated chitosan were compared to the standard chitosan. Both of those chitosans were characterized by using Fourier Transform Infrared (FTIR) Differential Scanning Calorimeter (DSC), and Scanning Electron Microscopy (SEM). The yields of chitin and chitosan obtained were 19.80 and 72.72%, respectively. The degree of deacetylation of chitosan was determined by using FTIR spectroscopy. The degrees of deacetylation of isolated and standard chitosan were 55.34 and 59.22%, respectively. The exothermic temperature peak of isolated chitosan was higher than standard chitosan. The isolation and standard of chitosan respectively had temperature peak values of 307.65 and 295.50oC. Based on SEM images, a smooth and homogeneous structure was found on the surface of the isolated chitosan and the amorphous sphere structure was observed in the standard chitosan. For biomedical purposes, the chitosan isolated from banana shrimp shells could be used as a material for nano chitosan synthesis.

Keywords: Banana Shrimp Shell; Chitosan; DSC; FTIR; SEM

Inhibition Test of Several Extract Fractions from Branch Bark Kenangkan (*Artocarpus rigida*) As Antidiabetic Agent

[1]Rinda Harijuliatri, [2]Tati Suhartati, and [3]Yandri

harijuliatri@gmail.com; tati.suhartati@fmipa.unila.ac.id;
yandri.as@fmipa.unila.ac.id

Kenangkan (*Artocarpus rigida*) is a species of Artocarpus genus from the Moraceae family, which contains many prenylated flavonoid compounds that have several bioactivities. This research aimed to study several extract fractions from the branch bark of the kenangkan (*Artocarpus rigida*), which obtained from Keputran Village, Sukoharjo, Pringsewu, Lampung, of it's abilty in inhibiting α-amylase enzyme (as an antidiabetic agent) actions. This study begins with the collection and preparation of samples, the extraction of the compounds was carried out by maceration method using methanol as a solvent. The separation of the compounds was carried out by partitioning the methanol extract using destilled n-hexane and acetone as solvents. Antidiabetic bioactivity test using in vitro method of inhibition the action of the α-amylase enzyme. The result showed that the n-hexane, acetone, and methanol fractions showed inhibitory activity with a high category of 94.4; 90.3; and 60.3% respectively, at a concentration of 2000 ppm.

Keywords: *Artocarpus rigida*; antidiabetic agent; inhibition of α-amylase

ANTIDIABETIC ACTIVITY TEST OF SNAKEHEAD FISH (*Channa striata*) WASTE OIL EXTRACT ON MICE (*Mus musculus* L.)

Yuli Ambarwati[1], Rusydi Iskandar[2], Syaiful Bahri[1], Aspita Laila[1]
[1] Chemistry Department, Faculty of Mathematics and Natural Sciences, Lampung University
[2] student of Chemistry Department, Faculty of Mathematics and Natural Sciences, Lampung University
*Coresponding author: yuli.ambarwati@fmipa.unila.ac.id

The head of the fish and the entrails of the snakehead fish were waste from the result of fish processing activities which is generally only taken from meat parts. The highest fish oil content is known to be in the head (63.8%) and entrails (19.9%). Utilization of oil as a source of omega-3 and omega-6 unsaturated fatty acids can prevent and treat various diseases, one of which is diabetes mellitus. This research was carried out by extracting oil from snakehead fish waste with three different solvents (hexane, chlororform, and diethylether), with the purpose is to determine the best solvent that produces omega fatty acids as antidiabetic. The snakehead fish oil content obtained using these three solvents which successively have a yield of 23.44%; 22.28%; and 28.18%. The extraction results are characterized using IR spectrophotometer and Gas Chromatography Mass Spectrometry (GC-MS). Antidiabetic test is with In-Vivo using male mice. Characterization with IR spectrophotometer shows that the three fish oils found in them is ester (C=O) functional group with an absorption at a wave number of 1745.58 cm^{-1}. The result of GC-MS characterization shows that omega fatty acids identified are 24.00% for fish oil with hexane solvent, 34.18% for fish oil with chloroform solvent, and 51.80% for fish oil with diethylether solvent. Antidiabetic test results using OneWay ANOVA which show significant results ($p \leq 0.05$) in reducing blood sugar levels. The best dosage of snakehead fish oil extract is at 72.8 mg/KgBB which could reduce blood sugar levels as big as 60.48%.

Keywords: Antidiabetic; blood glucose levels; fish oil; mice; snakehead fish

Isolation and Identification of Alcohol-Tolerant Lipase Producing Bacteria from Oily Soil Environtment as Catalyst for Transesterification Reactions for Biodiesel Production

Sri Astuti, Kamisah DP, Nurhasanah, Dian Herasari
Department of Chemistry, Faculty of Mathematics and Natural Sciences,
University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung,
Indonesia
astutichemsr@gmail.com

Biodiesel production through enzymatic transesterification reactions using lipase catalysts has been widely developed. The transesterification reaction occurs in an organic environment because it uses a large amount of alcohol as an alkyl group donor. Therefore, the lipase used must have good stability in alcoholic solvents. In this study, the isolation and identification of alcohol-tolerant lipase-producing bacteria from soil samples in the fried rice seller's environment was carried out. The bacterial isolates obtained were identified and tested for their lipolytic activity in alcohol solvents (methanol and ethanol) using the plate assay method. Enzyme production is also carried out to obtain lipase enzymes which are then used as a catalyst for transesterification reactions between coconut oil and methanol with a ratio of 1:6 as much as 10% of the volume of oil. Identification of bacterial isolates showed a positive test for Pseudomonas sp.. Pseudomonas sp. more stable in methanol than ethanol with optimum growth conditions at pH 7 media and incubation time of 36 hours with unit activity value of 23.06 U/mL. The purified lipase enzyme has a specific activity value of 22.48 U/mg and has optimum activity at a temperature of 35℃, pH 6, and 75% methanol concentration with a specific activity of 22.76 U/mg. The results of the analysis of the product of the transesterification reaction using GC-MS showed the presence of methyl ester compounds formed, namely methyl laurate 4.6%; methyl myristate 1.53%; and methyl palmitate 1.11%. The amount of methyl ester produced indicates that the transesterification reaction has not gone well because only a few fatty acids that make up the oil are converted to methyl esters.

Keywords: Alcohol; Biodiesel; Lipase; Pseudomonas sp.; Transesterification

The Physicochemical Analysis of Modified Porang (*Amorphophallus Oncophyllus*) Flour Through Fermentation Using Mocaf Starter

[1]Qori Hikmah Faranida, [1]Marcella Indriani, [1]Arip Ramadani, [2]Nida Rafa Afifa, [1]Hapin Afriyani

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung

[2]Department of Agricultural Product Technology, Faculty of Agriculture, University of Lampung

E-mail of corresponding: hapin.afriyani@fmipa.unila.ac.id

Porang (Amorphophallus oncophyllus) is one of the commodities in demand lately because of its favorable selling price. However, during the pandemic, porang farmers experienced difficulties in distributing postharvest products, which resulted in a decrease in the selling price of tubers, so it was necessary to find alternative solutions for processing porang tubers into other products with a longer shelf life through the flouring process. Porang flour has a high glucomannan content ranging from 49-60% and a calcium oxalate content of 0.19%, which causes itching. In this study, a chemical modification was carried out through the fermentation process in processing porang flour. This study aimed to obtain porang flour with good physicochemical characteristics and reduce calcium oxalate levels. This research method was carried out by soaking porang chips in a 10% lime solution, then fermented for 12 hours using a mocaf starter. The resulting modified porang flour was determined for its oxalate content using the permanganatometric titration method. The results showed decreased oxalate levels from the modified porang flour sample by 63.39% against the control. This is supported by physicochemical analysis data in the form of proximate tests of modified porang flour, namely the levels of protein, fat, water, ash, and carbohydrates, 5.57%; 3.46%; 8.52%; 21.23%; and 76.88%, respectively.

Keywords: Fermentation; Modification; Physicochemical Analysis

The Effect of Methanol to Oil Ratios on Transesterification of Coconut Oil Using Zeolite-A as Catalyst

[1]M. A. Nadhief, [2]E. Noviana, [3]S. A. Hasan, [4]Z. Luthfiyyah, [5]D. I. Alista, [6]W. Simanjuntak, [7]I. Ilim, and [8]K. D. Pandiangan

[1,2,3,4]Undergraduate student Department of Chemistry
[5]Postgraduate student Department of Chemistry
[6,7,8]Department of Chemistry
Faculty of Mathematics and Natural Sciences, University of Lampung Jl.
Sumantri Brojonegoro No 1, Bandar Lampung-35145, Indonesia
E-mail of corresponding author
[8]Corresponding author: kamisah.delilawati@fmipa.unila.ac.id

In this investigation, transesterification of coconut oil with zeolite-A as a catalyst was carried out. Zeolite-A was synthesized from rice husk silica and aluminium foil food grade by hydrothermal technique without using template, and then subjected to calcination at 550°C for 6 hours. The produced zeolite was then characterized using XRD and SEM to confirm the formation of zeolite-A. The zeolite was the applied as catalyst for transesterification of coconut oil with the objective to study the effect of methanol to oil ratio, and the reaction product was analyzed using GC-MS method. The results of the GC-MS analysis showed the formation of a mixture of methyl esters with methyl laurate as the main component. Practically complete conversion of the oil was resulted from the experiments with the use of methanol to oil ratios of 4:1 and 5:1.

Keywords: Coconut oil; transesterification, catalyst; zeolite-A.

In Vitro Alfa Amilase Inhibitory Activity of Cocoa Pod Husk (*Theobroma cacao* L.)

[1]Muhammad Hanif Amrulloh, [1]Noviany Noviany, [2]Mohamad Rafi, [1]Sutopo Hadi

[1] Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung
Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia
[2]Department of Chemistry, Faculty of Mathematics and Natural Sciences, IPB University
Bogor,16680, West Java, Indonesia
E-mail of corresponding author
noviany@fmipa.unila.ac.id

The trend toward increased cases and diabetes rates need particular attention, especially regarding treatment patterns. Diabetes is a severe chronic disease that occurs when the pancreas does not produce enough insulin. Over a long period causes severe damage to the heart, blood vessels, eyes, kidneys, and nerves. The phytochemical analysis of secondary metabolites contained in cocoa pod husk has identified the presence of alkaloids, flavonoids, terpenoids, steroids, saponins, and phenolics that function as antidiabetic. This study aimed to examine the antidiabetic activity of *n*-hexane, ethyl acetate, and ethanol extracts from cacao pod husk (*Theobroma cacao* L). Antidiabetic activity was evaluated using the alpha-amylase method, while acarbose was used as a positive control. The antidiabetic property of the tested extracts was determined based on the inhibition values that inhibits the activity of the alpha-amylase enzyme. The percentage of inhibition values of *n*-hexane, ethyl acetate, ethanol extracts and acarbose were 73.68%, 89.15%, 96.57% and 80%, respectively. Among all the tested extracts, ethanol extract of cocoa pod husk exhibited the highest inhibition value. Additionally, the inhibition values of ethyl acetate and ethanol extract of cacao pod husk were higher than the inhibition value of acarbose as a positive antidiabetic control. Therefore, from the results of the antidiabetic activity test, it can be concluded that the ethyl acetate and ethanol extract of cocoa pod husk are quite potential as a source of antidiabetic compounds. Hence, the ethyl acetate and ethanol extracts will be selected to be investigated as our continuous research.

Keywords: Alfa amylase; antidiabetic; cacao pod husk; *Theobroma cacao*

Determination of Glucosamine from Shrimp Shell Powder Media by Marine Actinomycetes

[1]Nafila Khansa Salsabila, [2]Andi Setiawan, [3]Aspita Laila, [4]Widyastuti, [5]Ikromudin, [6]Wawan Abdullah Setiawan, [7*]John Hendri

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Jalan Prof.Dr.Ir.Sumantri Brojonegoro No. 1, Gedong Meneng, Rajabasa Kota Bandar Lampung 35141
[2]Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Jalan Prof.Dr.Ir.Sumantri Brojonegoro No. 1, Gedong Meneng, Rajabasa Kota Bandar Lampung 35141
john.hendri@fmipa.unila.ac.id

Osteoarthritis (OA) is ranked 10th as a major contributor to global years living with disability (YLD). It has been reported that more than 300 million people suffer from arthritis. Medications containing glucosamine can be used for people with osteoarthritis (arthritis) because the compound is involved in building tendons, ligaments, cartilage, and the thick fluid that surrounds the joints. In general, glucosamine comes from chitin which can be sourced from the shells of shrimp, crabs, squid, and other arthropods. The process of forming glucosamine monomers from chitin can be carried out through a fermentation process using microorganisms such as actinomycetes. In this study, actinomycetes were isolated and screened from sponges and tunicates from the waters of Bali, Indonesia in 2018. From the isolation results obtained 21 actinomycetes that have the potential to degrade shrimp shells into glucosamine. The screening results showed that the two best isolates were 18D36A1 and 18D36A2, respectively. This study focused on isolate 18D36A2 because it has a clear zone on colloidal chitin agar media which indicates the presence of chitinase enzymes that can degrade chitin into glucosamine monomers. The highest glucosamine measurements were found on the 8th and 10th days, respectively. In the future, this research will continue to determine the study of kinetics and degradation patterns of shrimp shells using actinomycetes

Keywords: Actinomycetes; Chitinase; Glucosamine; Shrimp Shell Waste

The Effect of Moringa Leaf (*Moringa oleifera* Lam) Flour and Tapioca Formulation Toward Physical and Sensory Properties of Corn Tortillas

Novita Herdiana[1*], Susilawati[1], Otik Nawansih[1], Dewi Sartika[1], dan Rani Juniarti[1]

[1]Lecturer at Department of Agricultural Product Technology, Agriculture Faculty,Universitas Lampung

Jl. Prof. Soemantri Brojonegoro No. 1 Bandar Lampung, Lampung 35145

*corresponding email: novitaherdiana1974@gmail.com

The aim of this research was to find out kelor leaf flour and tapioca formulation toward physical and sensor characteristics of tortilla corn chips. This research was arranged in Complete Group Random Design (RAKL) with single factor and four repetitions. Factors tested were total tapioca (T) and kelor leaf flour (DK) including six formulation K1 (30%:0%), K2 (28%:2%) K3 (26%:4%), K4 (24%:6%), K5 (22%:8%),dan K6 (20%:10%) (b/b). Data obtained was tested similarities in variety using Bartlet test. Data were analyzed using variance to obtain error estimator. Analyzing the data was continued using BNJ test with level of 5%. the result of the research showed different formulation of treatment gave differences and it affected color, aroma, texture, taste, hardness of corn tortillas. Appropriate treatment was in tapioca formulation of 28% and tapioca of 2% with color characteristic of 3.73 (yellowish green), aroma of 4.045 (pleasant0, texture of 4.50 (crunchy), taste of 4.46 (not bitter), hardness of 387,41 gF (gram force), water content 1.88%, fat content 28.59%, protein content 28.53%, crude fiber 14.61%, ash content 2.68%, carbohydrate 23.71%, iron 66.87 mg / Kg and calcium 2245.61 mg / Kg.

Keywords: corn tortilla; kelor leaf; kelor leaf flour; hardness.

Kinetics of Adsorption of Crystal Violet Dyes by Algae *Sargassum* sp. Biomass Adsorbent modified with Na$^+$ ion

T. Apriyani[1,2], Buhani[2], and Suharso[2]

[1] Undergraduate School of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung,
Jl. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia

[2] Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung,
Jl. Prof. Soemantri Brojonegoro No. 1, Bandar Lampung, 35145, Indonesia

Email: triapriyani111@gmail.com[1], buhani@fmipa.unila.ac.id[2, *]

In this study, adsorption process was carried out using the *Sargassum sp.* algae biomass adsorbent modified using NaCl solution against crystal violet dye. The adsorbents produced by algae and algae-Na were characterized by Fourier Transform Infra-Red (FTIR) to determine the functional group and Scanning Electron Microscope (SEM) to determine the surface morphology of the adsorbent. The results of modified algae-Na were indicated by the appearance of a peak at wave number 1419.61 cm^{-1}, which showed the presence of O-Na bonds in the FTIR characterization. The presence of refined grains attached and a large surface area in the algae indicate the presence of Na on SEM micrographs. The adsorption results of crystal violet dye are optimum at pH 9 (94.80%) and a contact time of 60 minutes (94.80%). The adsorption rate of crystal violet dye on the algae-Na adsorbent tends to follow the pseudo-second-order kinetic model because the correlation coefficient (R^2) is close to 1.

Keywords: Adsorption; *Sargassum* sp. Algae; crystal violet dye; NaCl.

CHARACTERIZATION AND TESTING OF ANTIDIABETIC ACTIVITY OF SNAKEHEAD FISH (*Channa striata*) ALBUMIN ON MICE (*Mus musculus* L.)

Yuli Ambarwati[1], Valennisa Qunifah[2], Syaiful Bahri[1], Dian Herasari[1]

[1] Chemistry Department, Faculty of Mathematics and Natural Sciences, Lampung University
[2] students of Chemistry Department, Faculty of Mathematics and Natural Sciences, Lampung University
*Coresponding author: yuli.ambarwati@fmipa.unila.ac.id

Diabetes mellitus (DM) is a disease that poses a global health threat as well as in Indonesia. Many researchers have used natural ingredients to treat this metabolic disease, one of the natural ingredients to treat DM is to use cork fish albumin. The content of albumin compounds in snakehead fish functions as an antioxidant that can regenerate pancreatic tissue damaged by alloxan induced. This study aims to obtain snakehead fish albumin by extraction, the albumin obtained was characterized by UV-Vis, IR spectrophotometers and then tested for antidiabetic activity on mice. The research began by extracting snakehead fish using a modified extraction tool that refers to SNI 8074:2014. Albumin extracted in the form of a yellow liquid with a fishy aroma as much as 500 mL, the percentage yield is 27.27%. The result of the freeze dry process is a yellow powder weighing 35.70 grams. Freeze-dried albumin was continued with in vivo testing for antidiabetic activity. Giving the best dose of snakehead fish albumin at a dose of 300 mg/KgBB which can reduce blood glucose levels in mice by 61.28% (227.2 ± 65.71b) so that snakehead fish albumin is proven to reduce blood glucose levels so that it can be used as antidiabetic compounds.

Keyword: Albumin; blood glucose levels; diabetes mellitus; snakehead fish; mice.

Isolation of Steroid Compounds From Extracts Datuan Root Wood (*Ficus vasculosa* Wall. Ex Miq) and Bioactive Test Against Cabbage Pests (*Plutella xylostella*)

[1]Syaiful Bahri, [2]Ari Rahman Hidayat , [3]Yuli Ambarwati, [4]Endah Setyaningrum

[1]University of Lampung, Jl. S. Brojonegoro No.1 Bandar Lampung 35145
syaiful.bahri@fmipa.unila.ac.id

Datuan plant or *Ficus vasculosa* Wall. Ex Miq is a member of the Moraceae family obtained from the Sungkai area of North Lampung. This plant has many benefits and is thought to contain many unknown natural chemical compounds. Various reports state that plant extracts of Ficus species have physiological activities, as drugs, and open opportunities for the discovery of new chemical compounds from natural ingredients. Because of the many uniqueness of these plants, research was carried out to test the bioactive properties and identify the content of chemical compounds in them. In this study, bioactive compounds were purified from the root wood extract of the datuan plant (*Ficus vasculosa* Wall. Ex Miq) which was carried out in several stages. The root wood samples to be worked on are dried and crushed prior to the extraction process. Extraction by maceration was carried out with methanol as solvent. The extract purification process was carried out through repeated vacuum column chromatography and gravity column chromatography, the spot test was carried out using thin layer chromatography with spotting reagents serium sulfate. Bioactive testing was carried out with cabbage pest *Plutella xylostella* showed the extract had antifeedant properties. The purification result is a white amorphous crystalline isolate with a mass of 10 mg which has a melting point of 145-150⁰C. The crystal isolates were then analyzed by IR GC-MS and UV spectroscopy to obtain data on IR absorption, molecular mass and maximum absorption wavelength. Based on the separation data from TLC and analysis data using spectroscopic equipment, it was shown that the crystalline isolate in the non-polar fraction was a stigmasterol derivative, namely -sitosterol from the steroid group. The compound (3β,5α, 24R) stigmasta-7-en-3-ol has a value $M+ = 414$ with the molecular formula $C_{29}H_{50}O$.

Key words : Steroid, datuan root wood, bioactive test, *Plutella xylostella*

Sonication-Assisted Synthesis of Curcumin Analogs Catalyzed by NaOH

[1]Devi Nur Anisa, [2]Ilim [3]Armidla Nadya Kurniati, [4]Antin Sri Prihatin

[1,2,3,4]Department of Chemistry, Faculty of Mathematics and Natural Sciences
University of Lampung, Bandar Lampung 35145, Indonesia
devinur@fmipa.unila.ac.id

Curcumin is a phenolic compound that has many biological activities. However, curcumin has low bioavailability, so it needs to modify its structure to make it more stable and have better pharmacokinetic properties. This study aims to obtain more stable and effective curcumin analogue compounds with a higher yield percentage with the addition of various catalyst concentrations, so that further research can be carried out as a development and investigation of new drug candidate compounds considering the diversity of biological activities that can be utilized. Synthesis of curcumin analogues was carried out using a Claisen Smidht condensation reaction under the sonication-assisted. Synthesis was carried out under the sonication-assisted at room temperature within 30 minutes. The solvent used was n-hexane: ethyl acetate (1: 1). Synthesis of monoketone curcumin analogue compound with NaOH catalyst with various concentrations of 2% and 4% obtained a yield of 77.52%; and 59.65%. The synthesis results were identified using FTIR and UV-Vis. The conclusion of this study showed that the variation of NaOH concentration with a percentage of 2% showed the highest yield of 77.52%.

Keywords: Curcumin Analog Compound,, NaOH, Catalyst, Sonication-Assisted

MATHEMATICS

A review of chaotic Galton board models

Auni Aslah Mat Daud

Faculty of Ocean Engineering Technology and Informatics, Universiti Malaysia
Terengganu, Kuala Nerus, Terengganu, Malaysia
auni_aslah@umt.edu.my

A Galton board, also known as a quincunx, is a device invented by Francis
Galton in 1873 that consists of two upright boards with rows of pins, and
a funnel. This study reviews eight mathematical models of Galton board
in the literature that have been shown to be chaotic. The discussion
includes the description of the models, the important physical processes,
the assumptions employed, the derivation of the governing equations of
the models and the methods used to prove the chaotic nature of the
models. While Galton and many statisticians have suggested that a small
ball falling through a Galton board would exhibit random walk; the
simulations of these models demonstrate that this is not the case. This
study provides evidence that the details of the deterministic models are
not essential for demonstrating deviations from the statistical models.

Keywords: Galton board, chaotic, deterministic, random walk

Forecasting Relative Humidity by SARIMA Model in the Indian Ocean

Miftahuddin[1], Ichsan Setiawan[2], Ananda Pratama Sitanggang[3]

[1,3]Department of Statistics, Faculty of Mathematics and Sciences, Universitas Syiah Kuala, Indonesia

[2]Department of Marine, Faculty of Marine and Fisheries, Universitas Syiah Kuala, Indonesia

E-mail of corresponding author: miftah@unsyiah.ac.id

In the time, it can be felt that weather and climate changes have a significant impact on archipelagic regions in Indonesia, such as the Aceh province. The effects of these changes are strong felt when there are changes in extreme weather and climates. Therefore, it is necessary to forecast for these changes, using the Seasonal Autoregressive Integrated Moving Average (SARIMA) method. This study aims to test the relative humidity forecast for the period January to June 2019 in seasonally. The data used is the National Oceanic and Atmospheric Administration (NOAA) daily data taken at 8°N90°E, a close the point to Aceh Province from 2006 to 2018. Based on the results show that relative humidity using the SARIMA method obtained the optimum model is the ARIMA model $(2,0,0)(1,01)^{30}$ with the MAE, MSE, RMSE, MAPE, and MAD values are 2.8875, 0.8760, 3.9671, 3.7196 and 2.887 respectively. Forecasting results appear to increase at the beginning of the monthly and are constant for the next day which does not have much difference in the relative humidity value of 80%.

Keywords: Relative Humidity, SARIMA, Forecasting, Optimum Model, Accuracy

Numerical Methods of the Quartic B-Spline Collocation for Second Order Linear Hyperbolic of Partial Differential Equation

[1]Chicy Amey Liawati, [2]Sri Maryani, [3]Jajang
[1,2,3]Mathematics Department, Jenderal Soedirman University
Jl. Dr. Soeparno No. 61 Karangwangkal Purwokerto, Central Java, Indonesia
sri.maryani@unsoed.ac.id

This paper consider the solution of the telegraph equation by using quartic B-spline collocation of the numerical methods. The Quartic spline interpolation method is an interpolation to a fourth order polynomial. In addition, collocation method can be used to solve partial differential equations. One of the familiar wave equations as partial differential equations is telegraph equation. By discretizing the telegraph equation and applying B-spline quartic function and collocation methods, we got the solution formula of the telegraph equation in the numerical point of view. In this paper, we also added a simulation of the model problem for some functions and parameters and compared the errors of the quartic B-spline collocation methods to cubic B-spline collocation methods.

Keywords: Quartic B-spline collocation methods, telegraph equation, numerical methods, partial differential equations, interpolation methods.

Multiplicative regression with the moderation of education level on dysfunctional parenting and gratitude for parents of children with special needs

[1]**Asti Meiza**
[1]UIN Sunan Gunung Djati Bandung Indonesia
asti.meiza@uinsgd.ac.id

Education for Children with Special Needs is not easy to carry out. Because currently all activities are centered at home, the special parenting process is carried out entirely by parents. This study investigates how dysfunctional parenting in special children can be reduced if parents increase gratitude. This study uses a quantitative approach to Inferential Statistics with multiplicative regression data analysis techniques because the moderator variable is a stratified categorical variable that is operationally used as a dummy variable. The level of parental education is a moderating variable to determine whether it has a positive role in reducing dysfunctional parenting or not. Subjects are 61 parents who have special children. Data were collected using a Parenting Scale consisting of 30 items, a gratitude scale consisting of 36 items, and the level of parental education. The results showed that the more grateful parents were, the lower the dysfunctional parenting. In addition, the level of education also increases the causal relationship, although it does not have a significant effect. This can be seen from the increase in r-square with the inclusion of the moderator variable education level.

Keywords: children with special needs, dysfunctional parenting, gratitude, education level, multiplicative regression, categorical moderator variable

Ordinal Logistic Regression Model On The Level Of Job Relevance Of Graduates

[1,3] Rahma Faelasofi, [2] Khoirin Nisa

[1]Doctoral School of Mathematics and Natural Sciences, University of Lampung, Indonesia
[2]Department of Mathematics, University of Lampung, Indonesia
[3]Department of Mathematics Education, University of Muhammadiyah Pringsewu, Lampung, Indonesia
E-mail of corresponding author: rahma.faelasofi21@students.unila.ac.id

The ordinal logistic regression model is one of the statistical models used to classify ordinal data. The purpose of this study is to identify the relevance of FKIP Muhammadiyah Pringsewu University Lampung graduates. The population in this study were FKIP Muhammadiyah Pringsewu University Lampung graduates in 2018-2019, 2019-2020, and 2020-2021 academic year. The total of the sample in this study were 445 graduates. There were missing data that was classified as Missing of Random (MAR). The ordinal logistic regression model used an odds proportion model. The result of data processing were 80,3% of graduates had a high level of job relevance, 11,4% of graduates had a moderate level of job, and 8,3% of graduates had a low level of job relevance. The result of the proportional odds model showed that the graduates study period that was taken by Mathematics Education and Indonesian Language and Literature Education, graduates study period that was 4,691 years and 7 years, the waiting time for graduates got job was 6 up to 18 months and they got a job more than 18 months after completion study, and the permanent employment status. The resulting model had a significance influence on the level of job that was relevance to the graduates with a p-value of 0.053.

Keywords: job relevance of graduates, missing data, ordinal logistic regression, proportion odds model, single imputation

Comparison of Spatial Autoregressive (SAR) and Geographically Weighted Regression (GWR) Based on Simulation Study

[1]Hilda Venelia, [1]Khoirin Nisa, [1]Mustofa Usman

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences,
University of Lampung, Lampung, Indonesia
khoirin.nisa@fmipa.unila.ac.id

Spatial regression is an analysis that evaluates the relationship between one variable and several other variables that have spatial effects on several locations. There are two basic spatial concepts, namely spatial dependency and spatial heterogeneity. There are supervised learning techniques for regression that model spatial dependency, one of them is Spatial Autoregressive (SAR). In contrast to SAR, Geographically Weighted Regression (GWR) is a spatial regression method commonly used in data containing spatial heterogeneity. This study will compare which method is better between SAR and GWR for modeling spatial data if the data contains both spatial aspects, namely spatial dependency and spatial heterogeneity using simulation study. The simulation results of this study, based on bias, MSE and AIC of each model, it has been obtained that the SAR method is better than the GWR method for modeling data containing these two spatial aspects (spatial dependency and heterogeneity).

Keywords: Spatial, Dependency, Heterogeneity, SAR, GWR.

Structural equation modeling with generalized structured component analysis on the degree of public health in Indonesia

[1]Wardhani Utami Dewi, [2]Khoirin Nisa, [3]Eri Setiawan
[1,2,3] Universitas Lampung, Jl. Sumantri Brojonegoro No 1 Gedong Meneng, 25145, Lampung, Indonesia.
E-mail of corresponding author: khoirin.nisa@fmipa.unila.ac.id

The multivariate statistical analysis method to analyze the structural relationship between variables is Structural Equation Modeling (SEM). Variant-based SEM is a solution to the deficiency of covariance-based SEM, namely assuming that the sample size does not have to be large, the data must be normally distributed, and the indicators can be reflective. In its development, Generalized Structured Component Analysis (GCSA) which is a variant-based SEM is able to complete the shortcomings that exist in Partial Least Square (PLS), namely the evaluation of the overall model. The GSCA is based on latent variables which are approximated by a weighted composite of indicators. This study uses secondary data on the degree of public health in Indonesia in 2020 with a sample size of 34 provinces. Consists of 21 indicator variables and 6 latent variables. The results of the analysis obtained that the variation in the degree of health variable can be explained by 78% by behavioral and environmental variables and 22% influenced by other variables. The results of the overall model evaluation based on the goodness of fit index values indicate that the model has a good overall fit.

Keywords: SEM, GSCA, Degree of public health.

STRUCTURAL EQUATION MODELING USING *DIAGONALLY WEIGHTED LEAST SQUARE* (DWLS) ESTIMATION METHOD (Case Study: Student Satisfaction of FMIPA University of Lampung on The Performance of Lecturers in The Lecture Process)

E. Setiawan[1,a], A. Melinda, S. Saidi, K. Nisa

Mathematics Department, Lampung University, Indonesia

[a] Corresponding author: erstatis@gmail.com

Structural equation modeling is a statistical technique that is able to analyze pattern of simultan linear relationship between latent variables and indicator variables. In general, there are several estimation methods in the SEM method, in this study the *Diagonally Weighted Least Square* (DWLS) estimation method in used. DWLS is an unbias estimator and complete statistic. The aim of this research to estimate the structural equation model using the DWLS method and analyze the total effects between latent variables in the questionnaire data about student satisfaction of FMIPA University of Lampung on the performance of lecturers in the lecture process. Which consist of 3 latent variables and 16 indicator variables with a sample size of 500. Based on the results obtained that performance of the lecturers affects student satisfaction through intermediate variables that is quality of lectures with a total effect of 0,8564. Using Goodness of Fit test with *Chi-Square* = 352,45, NCP = 251,45, GFI = 0,98, RMSEA = 0,71, AGFI = 0,98, PGFI = 0,73, it shows that the model fits to the data.

Keywords: Structural equation modeling, diagonally weighted least square.

Hierarchical Clustering Method of Lampung Province Human Development Index in 2021

[1]Dira Dini Dian Kemala, [2]Khoirin Nisa, [3]Mustofa Usman
[1,2,3] Universitas Lampung, Jl. Sumantri Brojonegoro No 1 Gedong Meneng, 25145, Lampung, Indonesia.
E-mail of corresponding author: khoirin.nisa@fmipa.unila.ac.id

The Human Development Index (HDI) is an important indicator to measure success in building the quality of human life. HDI is formed by three primary dimensions, namely long and healthy life, knowledge, and a decent standard of living. Therefore, grouping each district/city based on these basic dimensions is necessary. This journal uses the hierarchical cluster method to find out the best hierarchical method based on the silhouette index. Based on the results obtained that the average linkage and ward linkage methods are the best hierarchical methods consisting of 4 clusters, namely Bandar Lampung City and Metro City are in cluster 4, West Pesisir is in cluster 3, East Lampung, Central Lampung, Tulang Bawang, and Pringsewu is in cluster 2. The other areas are in cluster 1, namely West Lampung, Pesawaran, West Tulang Bawang, North Lampung, South Lampung, Tanggamus, and Way Kanan.

Keywords: HDI, Hierarchical Cluster, Silhouette Index, Average Linkage, Ward Linkage.

The Development of The Susceptible, Infected, and Recovered (SIR) Model for Covid-19 Outbreak with Vaccination

Muhammad Is'ad Arifaldi[1, a)], Dorrah Aziz[1, b)], La Zakaria[1, c)], Tiryono Ruby[1, d)]

[1]Departement of Mathematics, Universitas Lampung
Corresponding author: [c)]lazakaria.1969@fmipa.unila.ac.id
a)ihsan.arifaldi2015@gmail.com, b)dorrah.azis@fmipa.unila.ac.id, d
tiryono.ruby@fmipa.unila.ac.id

The Covid-19 pandemic in 2020 has caused severe problems in Indonesia. The Covid-19 virus epidemic can be modeled using the Susceptible, Infected, and Recovered (SIR) model. This modeling aims to look at the dynamics of Covid-19 in order to be able to predict when disease-free and endemic disease occurs and to find the primary reproduction number (R_0) for policy making in suppressing the spread of Covid-19. Modeling S, I, and R with assumptions. Create SIR models. They were finding a balance point between disease-free and disease endemic. Determine the primary reproduction number (R_0). Analyze stability with Routh-Hurwitz criteria. They were making a plot with Covid-19 data at the UPTD of the Batanghari Inpatient Health Center using the Wolfram Mathematica software. Determine the model error percentage with MAE. The SIR Covid-19 model was made using 8 parameters, namely $N, \alpha, \beta, \tau, \mu, \sigma, \delta, \gamma$ and they are all positive. The results showed that the disease-free and disease-endemic equilibrium points were locally asymptotically stable after being analyzed using the Routh-Hurwitz stability criteria. The model trial using data from UPTD Puskesmas Batanghari, obtained a stable condition for up to 100 months with an MAE of 2.8%. From this study, obtained $R_0 = \frac{\beta\sigma}{\alpha+\mu}$. This means that if you want to reduce the rate of spread, then reduce the number of people who are easily infected (σ) and reduce contacts (β) and increase the healing rate (α). The condition of the Batanghari Health Center in East Lampung is stable for the next 100 months, with an MAE of 2.8%.

Keywords: SIR Model, Covid-19, Basic Reproduction Number, Routh-Hurwitz Criteria

Modeling and forecasting data with panel vector autoregessive estimation gmm on economic growth and inflation data in 10 asean countries

[1]Miftahul Irfan, [2]Mustofa Usman
[1]Universitas Lampung, Jl. Prof. Dr. Sumantri Brojonegoro No. 1 Bandar Lampung, 35145, Indonesia.
miftahulirfan311@gmail.com

To analyze economic data, it would be better to use panel data (a combination of time series and cross section) because there is a lot of information obtained. One model that is widely used in panel data analysis is the PVAR model because itable to identify the dynamic effects of the heterogeneity shock of the unobserved variables and their causal effects. PVAR is widely used in data on the economic growth of a region or country. There are many factors that affect economic growth, one of which is inflation. Inflation and economic growth are two things that influence each other. Economic growth itself can be calculated based on the value of GDP. In this study, Granger causality shows that there is a two-way influence of the two variables. The PVAR model shows that the two variables influence each other but the time effect has a greater influence. Where the GDP rate in the previous year had more influence on the current GDP rate than the inflation rate.

Keywords: PVAR, GMM, Economic Growth, Inflation, ASEAN

A Bayesian Approach to Vector Regressive Model in Forecasting the Dynamic Impact of COVID-19 on IDR Exchange to USD and EUR Rates

Juanda[1], Mustofa Usman[2], Dian Kurniasari[2], Widiarti[2], Amanto[2], Warsono[2*]

Graduate Student of Department of Mathematics, Faculty of Science and Mathematics, Universitas Lampung, Indonesia
Department of Mathematics, Faculty of Science and Mathematics, Universitas Lampung, Indonesia
*Email of corresponding author: warsono.1963@fmipa.unila.ac.id

The main purpose of this article is to explore evidences of Bayesian Vector Autoregressive (BVAR) Model in forecasting the dynamic impact of Covid-19 on Rupiah (IDR) exchange to US Dollar (USD) and Euro (EUR) rates. The BVAR model uses Bayesian methods in estimating parameters of the vector autoregressive (VAR) model. This article employs informative Minnesota prior in assessing the BVAR model. Evidences from the BVAR model shows that there is a significant impact of daily data of Covid-19 on IDR exchange to USD and EUR rates.

Keywords: COVID-19, IDR Exchange, BVAR Model, Minnesota Prior

Generalized Space Time Autoregressive (GSTAR) Modeling with Seemingly Unrelated Regression (SUR) for Forecasting Inflation Data in Five Cities on the Island of Sumatra

[1]Indah Suciati, [2]Mustofa Usman

[1,2]Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Lampung,
Bandar Lampung, Indonesia
[2]usman_alfha@yahoo.com

The Covid-19 pandemic and Russia's invasion of Ukraine made food and energy prices in the world soar. This price spike has triggered inflation in various countries, such as Indonesia. One of the most developed forecasting methods today is time series. The development of the multivariate time series, apart from looking at the time element, also involves the location element. One model that involves time and location is the Generalized Space Time Autoregressive (GSTAR). GSTAR is a development of the Space Time Autoregressive (STAR) model, which assumes that locations have heterogeneous characteristics. The purpose of this study was to obtain the GSTAR model with the parameter estimation Seemingly Unrelated Regression (SUR) for forecasting inflation data in five cities on the island of Sumatra. The methods used in this study are, 1) perform descriptive analysis, 2) perform stationarity test, 3) identify the GSTAR model, 4) calculate the distance inverse location weight matrix, and 5) calculate parameter estimates for the GSTAR model using the SUR method. The results of this study are the GSTAR model formed with the inverse distance weight is the GSTAR (1_1) model where the inflation data model for five cities on the island of Sumatra obtained are 1) $\hat{Z}_1(t) = -0.1149133\, Z_2(t-1) - 0.08009106\, Z_3(t-1) - 0.09401994\, Z_4(t-1) - 0.05919774\, Z_5(t-1)$, 2) $\hat{Z}_2(t) = -0.0828954\, Z_1(t-1) - 0.17960670\, Z_3(t-1) - 0.11052720\, Z_4(t-1) - 0.08750070\, Z_5(t-1)$, 3) $\hat{Z}_3(t) = -0.0400284\, Z_1(t-1) - 0.1200852\, Z_2(t-1) - 0.066714\, Z_4\ (t-1) - 0.1067424\, Z_5(t-1)$, and 4) $\hat{Z}_4(t) = 0.2182508\, Z_1(t-1) + 0.3273762\, Z_2(t-1) + 0.29463858\, Z_3(t-1) - 0.25517\, z_4(t-1) + 0.25098842\, Z_5(t-1)$. It is concluded that the inflation model for five cities in Sumatra Island at time t is correlated with inflation data in the previous time and is influenced by inflation data from other cities.

Keywords: multivariate time series, GSTAR, SUR, inflation

Spatial Analysis of the Spread of Coronavirus Disease 2019 (Covid-19) using Getis-Ord Gi* and Local Indicator of Spatial Autocorrelation (LISA)

Sinta Bimantari, Widiarti, Agus Sutrisno, Mustofa Usman
Department of Mathematics, Faculty of Mathematics and Natural Sciences,
University of Lampung, Jl. Sumantri Brojonegoro no 1, Bandar Lampung,
Indonesia
sintabimantari12@gmail.com

Getis-Ord Gi* and Local Indicator of Spatial Autocorrelation (LISA) are a method of local spatial autocorrelation. The case study used in this study is Coronavirus Disease 2019 (Covid-19) in Lampung Province. The results of this study indicate that districts/cities that have high scores (hotspots) are Bandar Lampung, Lampung Tengah, Pesisir Barat, Lampung Selatan, and Lampung Utara using the Getis-Ord Gi* method. Meanwhile, the Local Indicator of Spatial Autocorrelation (LISA) shows that there is a spatial autocorrelation in Bandar Lampung Regency/City in July 2020. From this analysis, it was found that the pattern of spreading Coronavirus Disease 2019 (Covid-19) in Lampung Province tends to be random.

Keywords: Spatial Autocorrelaation, Getis-Ord Gi*, LISA, Covid-19

Estimating the Parameter Value of the SIR Model for the Spread of Covid-19 with FIR Filtering: A Case Study of the Spread of Covid-19 with the Omicron Variant in the DKI Jakarta Province

Zulfikar Fakhri Bismar [1], Aang Nuryaman[1*] and Wamiliana[1]

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences, Jl. Prof. Sumantri Brojonegoro No 1 Gedong Meneng, Bandar Lampung, Indonesia
*Email of corresponding author : aang.nuryaman@fmipa.unila.ac.id

This paper examines the dynamics of the spread of the Omicron variant of the COVID-19 virus in DKI Jakarta Province using the SIR Model. The parameters contained in the model are assumed to change over time according to the daily case empirical data. Based on the available data, the value of these parameters be estimated using FIR filtering and view it as an optimization problem solved by the ridge regression algorithm. The model formed is used to predict the number of cases of the spread of COVID-19 for the next few months. The results obtained indicate that the model can produce stable output and it is predicted that COVID-19 will subside for the next seven months.

Keywords: SIR model, covid-19, FIR filtering, ridge regression algorithm.

On Rough Bimodules

[1]Fakhry Asad Agusfrianto, [2]Fitriani, [3]Yudi Mahatma
[1,3]Mathematics Study Program, Faculty of Mathematics and Natural Science,
Universitas Negeri Jakarta, Indonesia
[2]Department of Mathematics, Faculty of Mathematics and Natural Science,
Universitas Lampung, Indonesia
E-mail of corresponding author: fakhry_asad@yahoo.com

The notion of a rough set is an extension of set theory. The notion of set theory such as intersection and union can be applied in rough sets. The properties of the rough set in detail were introduced by Pawlak in 1982. The construction of notions in algebraic structures is motivated by set theory. This is also done in rough sets so that a notion called rough algebraic structures is obtained. Some concepts on rough algebraic structures that have been constructed include rough groups, rough rings, and rough modules. Furthermore, in multilinear algebra, we know the concept (R, S) − bimodules. Motivated by the relationship of the concept of the rough sets with algebraic structures, this paper aims to provide a definition (R, S) −bimodules in rough algebra, namely by replacing the R and S rings with the rough rings R_1 and S_1. Furthermore, we will give some example of (R_1, S_1) −rough bimodules and it will also be shown that some of the properties (R_1, S_1) −bimodules still apply in (R_1, S_1) −rough bimodules. In the other hand, we will also give the definition of rough bisubmodules and the homomorphism of rough bimodules.

Keywords: Rough Sets, Bimodules, Rough Bimodules

The Isomorphism Theorems for $(R[S], R'[S])$ −Module

[1]Tatang Bahtiar, [2]Ahmad Faisol and [3]Fitriani
[1] Jurusan Matematika, Fakultas Matematika dan Ilmu Pengetahuan Alam,
Universitas Lampung,
Jl. Brodjonegoro No. 1 Bandar Lampung, Indonesia 35145
tatangbahtiar1979@gmail.com, ahmadfaisol@fmipa.unila.ac.id,
fitriani.1984@fmipa.unila.ac.id

Given a semigroup ring $R[S]$ and $R'[S]$, where R and R' are rings, and S is a semigroup. This study applies the concept of M as (R, R') −module to the semigroup-module $M[S]$ structure as $(R[S], R'[S])$ −module. The main result of this study is to prove the Fundamental Isomorphism Theorem on the $(R[S], R'[S])$ −module. These results can be obtained by investigating the relationship between the $(R[S], R'[S])$ −module factor and the Kernel and the mapping image connecting any two $(R[S], R'[S])$ −module.

Keywords: The semigroup-ring, the semigroup-module, homomorphism semigroup-module, Isomorphism semigroup-module, semigroup-module factor.

Estimating Function in Probability Hilbert Space

[1]Bernadhita Herindri S. Utami, [2]Mustofa Usman, [3]Warsono, [4]Fitriani

[1]Doctoral Program of Mathematics and Natural Science, Faculty of Mathematics and Natural Science, University of Lampung, Lampung, Indonesia
[1]Department of Information System, Faculty of Technology and Computer Science, Institut Bakti Nusantara, Lampung, Indonesia
[2,3,4]Department of Mathematics and Natural Science, Faculty of Mathematics and Natural Science, University of Lampung, Lampung, Indonesia
E-mail: ind.indri1245@gmail.com

The concept of estimating function can be considered as an element of a Hilbert space. Moreover, Hilbert space methods give a curiously and complete alternative to the measure-theoretic definition of random variables. This paper is a point to approach shift the starting point away from the sample space and replace it with a Hilbert space whose elements can be variously interpreted as estimating functions. This investigation is quantitative. This research uses the measure theory of modern probability to obtain the properties of conditional expectation. Another reason for creating likelihood and insights from the point of view of Hilbert space is that the hypothesis is understood in numerous standard measurable instruments. The Cramer-Rao lower bound is an application of the Cauchy-Schwarz inequality, which is most actually demonstrated in Hilbert space. As result, the likelihood function and likelihood ratios, which are considered principal to mathematical statistics, can be interpreted as representations of continuous linear functionals via the Riesz representation theorem, whose characteristic setting in Hilbert space.

Keywords: probability, Hilbert space, estimating function, expectation value

Enumerating the Number of Order Seven Disonnected Graphs Labeled Vertices Having an Even Number of Loops

Desiana Putri[1], Muslim Ansori[1,*], and Wamiliana[1]

[1]Dept. of Mathematics, Faculty of Mathematics and Natural Science, Universitas Lampung, Indonesia

muslim.ansori@fmipa.unila.ac.id

A labelled graph is a graph in which each vertex or edge is assigned a value or label. There are many graphs that can be created with *n* vertices and *m* edges, where each vertex is assigned a different label. These graphs can be connected or disconnected, simple or not simple. A graph is said to be simple if it has no loops or parallel edges. A loop is defined as an edge that begins and ends in the same vertex, whereas parallel edges are defined as two or more edges that connect the same pair of vertices. If there is at least one path connecting two vertices in graph G, then G is called a connected graph; otherwise, it is called a disconnected graph. In this paper, how to count the number of connected graphs with labelled vertices of order seven containing eve number of loops without parallel edges will be discussed.

Comparative Analysis of Some Algorithms for the Minimum Routing Cost Spanning Tree Problem

[1,2]Reni Permata Sari, [3*]Wamiliana, [4]Akmal Junaidi, and [1,5]Zaenal Abidin

[1] Doctoral Student, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia

[2] Faculty of Sciences and Technology , Universitas Nahdlatul Ulama Lampung, Indonesia

[3]Dept. of Mathematics, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia

[4]Dept. of Computer Science, Faculty of Mathematics and Natural Sciences, Universitas Lampung, Indonesia

[5] Dept. of. Information System, Faculty of Engineering and Computer Sciences, Universitas Teknokrat Indonesia, Indonesia

Corresponding author[3*]: wamiliana.1963@fmipa.unila.ac.id

A weighted graph's minimum routing cost spanning tree is a spanning tree that minimizes the sum of pairwise distances between its vertices. The goal of the minimum routing cost spanning tree problem is to find a spanning tree with the lowest routing cost. In this study we will discuss some algorithms that already in the literature to solve MRCT and give comparison of those algorithms.

Keywords: graph, spanning tree, minimum cost

A Procedure for Determaining The Locating-Chromatic Number of An Origami Graphs

[1]Agus Irawan, [2]Asmiati & [1]Bernadita Herindri Samodra Utami
[1]Information System, STMIK Pringsewu
Lampung, Indonesia.
[2]Departmen of Mathematics, Faculty of Mathematics and Natural Sciences
University of Lampung, Bandar Lampung, Indonesia.
E-mail : agusirawan814@gmail.com

The concept of locating-chromatic number of graph is a development of the concept of vertex coloring and partition dimention of graph. Suppose $G = (V, E)$ is a connected graph and c is a vertex coloring in G using the k color of G. Suppose $\Pi = \{C_1, C_2, \ldots, C_k\}$ is a partition of $V(G)$ which is induced by coloring c. The color code $c_\Pi(v)$ of v is k-pairs ordered, ... ,$(d(v, C_1), d(v, C_2), \quad d(v, C_k))$ with $d(v, C_i) = \min \{d(v, x)|x \in C_i$ for $1 \leq i \leq k$ If all the dots in c have different color G codes, then it is called k-locating coloring of G. The locating-chromatic number of G denoted by $\chi_L(G)$ is the smallest k such that G has a k-locating coloring. An origami graph O_n on $3n$ vertices is a graph with $V(O_n) = \{u_i, v_i, w_i : i \in \{1, \ldots, n\}\}$ and $E(O_n) = \{u_i w_i, u_i v_i, v_i w_i, u_i, u_{i+1}, w_i u_{i+1} : i \in \{1, \ldots, n-1\}\} \cup \{u_n u_1, w_n u_1\}$. In this paper we will discussed about a procedure for determine the locating-chromatic number of an origami graph using Python programming.

Keywords: locating-chromatic number, graph, origami, python.

The Locating Chromatic Number the Disjoint Union of the Shadow Path

[1]Maharani Damayanti, [2]Asmiati

[1]Department of Mathematics, Institut Teknologi dan Sains (ITS) NU Lampung,
Jl. Dahlia, Labuhan Dalam, Kec. Tj. Senang, Kota Bandar Lampung, Lampung
[2]Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Lampung,
Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[1]maharanidamayanti56@gmail.com

The shadow path $D_2(P_n)$ is a connected graph that is constructed by two paths of P_n, namely P_n^1 and P_n^2. The path P_n^1 is the initial path and P_n^2 is the shadow of the path P_n^1 which is placed under the path P_n^1, where every vertices u_i^1 on the path P_n^1 is connected to a neighboring vertex v_i^2 on the path P_n^2. The disjoint union of shadow path $A = \bigcup_{i=1}^m \left(D_2(P_{n_i}) \right)$ is the union of some connected shadow paths $D_2(P_n)$. The locating chromatic number of a graph is defined as the cardinality of the minimum color classes of the graph. In this research, we determined the locating-chromatic number the disjoint union of the shadow path. The locating chromatic number the disjoint union of the shadow path is 6 for $m = 1,2,\dots,15$.

Keywords: the locating-chromatic number, shadow path graph, disjoint union;

The Locating Chromatic Number for Subdivisions of Barbell Split Path Graphs

Siti Rahmatalia, *Notiragayu, Asmiati

Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Lampung,
Bandar Lampung, Indonesia
Email corresponding author[*]: notiragayu@fmipa.unila.ac.id

The locating chromatic number of a graph combines the partition dimension and vertex coloring of a graph. The minimum number of locating coloring of graph is called the locating chromatic number of the graph. The subdivision graph of a barbell split path graph, denoted by $B^{*w}_{spl(P_n)}$ for $n \geq 3$. Is the graph obtained from the barbell split path graph by inserting $w \geq 1$ vertices on the bridge. The locating chromatic number for subdivision of barbell split graph is 4 for $w = 1$ and 5 for $w \geq 2$.

Keywords: the locating chromatic number, barbell split path graph, subdivision of barbell split path graph.

The Locating Chromatic Number of Sun Graph and Barbell Operation

[1]Wenty Okzarima, [1*]Asmiati, [2]Kurnia Muludi, [3]Suhadi Wido Saputro

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Lampung,
Bandar Lampung, Indonesia
[2]Department of Computer Science, Universitas Lampung, Bandar Lampung,
Indonesia
[1]Department of Mathematics, Institut Teknologi Bandung, Bandung, Indonesia
Email corresponding author*: asmiati.1976@fmipa.unila.ac.id

Chartrand introduced the locating chromatic number of a graphs in 2002, combining two graph concepts: vertex coloring and partition dimension of a graph. The locating chromatic number of graph G is the smallest k, so G has locating k- coloring. In this paper, we discuss the locating chromatic number of sun graph and barbell operation. The locating chromatic number of the sun graph is 4, and the same result is obtained for the barbell operation.

Keywords: the locating-chromatic number, sun graph, barbell operation.

The Locating Chromatic Number for Subdivision of Barbell Some Modified Path with Cycle

Akika Mega Fadillah, *Asmiati, Notiragayu

Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Lampung,
Bandar Lampung, Indonesia
Email corresponding author*: asmiati.1976@fmipa.unila.ac.id

Chartrand introduced the locating chromatic number of a graph in 2002. The locating chromatic number of a graph combines the coloring and partition dimension of a graph. The minimum number of locating coloring of graph G is called the locating chromatic number of graph G. The subdivision of some modified path with cycle is obtained from the barbell graph modified path with cycle by inserting some vertices on the bridge. The locating chromatic number for subdivision of barbell some modified path with cycle, is 4 or 5.

Keywords: the locating chromatic number, subdivision of barbell some modified path with cycle;

The number of Disconnected Graphs Labeled Vertices of Order Six which Contain Odd Number of Pair of Vertices Connected by Parallel Edges

Jani Suparman[1], Wamiliana[1,*], and Fitriani[1]

[1]Dept. of Mathematics, Faculty of Mathematics and Natural Science, Universitas Lampung, Indonesia
wamiliana.1963@fmipa.unila.ac.id

A disconnected graph G is a graph that consists of two or more connected graphs. A graph G is called a connected graph if there is at least one path that connects every pair of vertices in G. In a graph an edge whose starting and ending points are the same is called a loop, while two or more edges that connect the same vertices are called parallel lines. If n points and m edges are given and each vertex is labeled, then many graphs are formed (both connected or disconnected, simple or not). In this study, we will discuss the formula for determining the number of disconnected graphs labeled vertices of order six without loops and containing an odd number of parallel lines connecting pairs of vertices.

INFORMATICS & MATHEMATICS

Performance Evaluation of a Fuzzy-Based Expert System for Diagnosing Various Kidney Diseases

Admi Syarif[1], Amara I. Pancarani[2], Yunda Heningtyas[3], Favorisen R. Lumbanraja[5], Kurnia Muludi[5], Bambang Hermanto[5]

[1, 2, 3, 4, 5]Department of Computer Sciences, University of Lampung, Bandar Lampung

Corresponding author: admi.syarif@fmipa.unila.ac.id

The kidney is known as one of the vital organs of the human. Kidney diseases can cause various severe effects, even the death of sufferers. Each kidney disease often has different symptoms. The treatment of kidney diseases must be started with a proper diagnosis based on the existing clinical symptoms of the patients. Since the symptoms are often imprecise, examining kidney diseases is very complex and challenging. In the early treatment, the classical problem is the limited number of specialist doctors who can accurately diagnose and provide the treatment. One of the efforts is to utilize technology in the form of a medical expert system to diagnose diseases. This study aims to develop a fuzzy logic-based expert system to diagnose various kidney diseases based on the patient's conditions. It adopts the fuzziness (rules, symptom weights, and severity) based on the pieces of knowledge from specialist doctors. We have done some experiments using test problems (patient data) from hospitals. The results have been compared with those of expert. It shows that this system succeeds in all tests.

Keywords: Artificial Intelligence; Expert System; Kidney Disease; Fuzzy.

DEVELOPMENT OF VIRTUAL REALITY OF LAMPUNG TRADITIONAL VILLAGE BY UI/UX DESIGN APPROACH

Ossy Dwi Endah Wulansari[1,2], Johanna Pirker[1], T.M. Zaini[3], Christian Guetl[1]

[1]TU Graz Austria, [2]University of Lampung Indonesia, [3]IIB Darmajaya Indonesia

wulansari@student.tugraz.at

Lampung Province has several tourist attractions and heritages. However, most people especially the young generation, are more interested in visiting tourist attractions than historical places and heritage in the Lampung province. In addition, Lampung culture has local wisdom, namely Piil Pesenggiri. The second element of Piil Pesenggiri is related to the nature of human called 'empathy'. Currently, advances in knowledge and technology are suspected to have the impact of decreasing empathy for children and adolescents. With the rapid development of technological advances, there are several new findings that can be used to facilitate human work. One technology that is currently being discussed is Virtual Reality technology. Based on the advantages of VR technology, which is now increasingly accessible using smartphones, we develop an application that uses VR technology to display and explore traditional Lampung village objects and heritages as a solution to using technology in introducing one of the historic tourist attractions from the Lampung area by UI/UX approaching. We find that UI/UX design method help developer more empathize with the user and stake holder.

Keywords: Traditional Village; Piil Pesenggiri; Virtual Reality; UI/UX design, Empathy.

REAL TIME HUMAN SPERM IDENTIFICATION ON VIDEO USING DEEP LEARNING

Aristoteles, [1,2], Admi Syarif [2,a], Sutyarso [3], Favorisen R. Lumbanraja [2]

[1]Doctoral Program of Mathematics and Natural Sciences, Lampung University, Indonesia
[2]Department of Computer Science, Faculty of Mathematics and Natural Sciences, Lampung University, Indonesia
[3]Department of Biology, Faculty of Mathematics and Natural Sciences, Lampung University, Indonesia
[a] Corresponding author: admi.syarif@fmipa.unila.ac.id

Identification of human sperm in video form is a more difficult challenge compared to other common objects. These challenges are the number of objects in the video frame, very small object size, low contrast, low video resolution, blurry objects. The solution given is to use the YOLO Deep learning technique to solve these problems quickly and accurately. Multiple hyper-parameter settings to achieve better performance. Mean average precision (mAP), confusion matrix, precision, recall, and F1-score were used to measure accuracy. We compare our proposed method with you only look once (YOLO) v4 and YOLOv5. The results obtained for YOLOv4 are 79.58% mAP, while for YOLOv5 the mAP results are 71.70%. The conclusion is that the results obtained are not much different in value. The greatest value is found in YOLOv4 because the training process takes longer so that more data learning is experienced. While the YOLOv5 training process is faster than YOLOv4, but has a smaller mAP result with the difference in the mAP value obtained is only 7.88%.

Keywords: deep learning, mean average precision, you only look once (YOLO)

Detecting Irregular Heartbeat using Deep Forest with Multilevel Discrete Wavelet Transforms

Dodon Turianto Nugrahadi[1], Tri Mulyani[2], Rudy Herteno[3], Dwi Kartini[4], Mera Kartika Delimayanti[5], Irwan Budiman[6], Mohammad Reza Faisal[7]

[1,2,3,4,6,7]Lambung Mangkurat University, Banjarbaru, Indonesia
[5]Politeknik Negeri Jakarta, Depok, Indonesia
dodonturianto@ulm.ac.id

One of the leading causes of death is cardiovascular disease (CVD). This disease is the cause of 31% of deaths worldwide in 2016, and 85% of them are heart attacks. The traditional way to detect CVD is based on medical records and clinical analysis of the patient. Electrocardiogram (ECG) analysis is one way to determine irregular heartbeat or arrhythmia. Computer assistance with implementing specific machine learning algorithms can help recognize irregular heartbeats automatically. However, raw ECG data may contain noise that affects the accuracy of irregular heartbeat detection. In this study, the ECG data used was from the Massachusetts Institute of Technology–Beth Israel Hospital (MIT-BIH) database. The data has four categories: Normal, Atrial Fibrillation, PVC Bigeminy, and Ventricular Tachycardia. ECG raw data processing using multilevel discrete wavelet transforms (DWT) based on Haar and Daubechies wavelet. The process uses various values of mode (i.e., db1 until db10), level (i.e., level 1 and level 2), and filter (low and high pass filter), and the result is 20 data processed. Each data is used to create a model with several classification algorithms, i.e., K-Nearest Neighbor (KNN), Support Vector Machine (SVM), Naïve Bayes, Decision Tree, Random Forest, and Deep Forest. The validation process uses 10-fold cross-validation. The results of this study indicate that Multilevel Discrete Wavelet Transforms improve irregular heartbeat detection accuracy when compared to raw ECG and processed data using a single DWT. While the best detection accuracy is the Deep Forest model with an accuracy value of 64% using processed data with db1 mode values, level 2 and combining high and low pass filters.

Keywords: arrhythmia classification; deep forest; multilevel discrete wavelet transforms; ECG; mit-bih.

Detecting Sarcasm in Public Opinion about COVID19 Using Random Forest Classifier

[1]Debby Alita

Universitas Teknokrat Indonesia, Bandar Lampung, Indonesia
debbyalitaa@gmail.com

Analyzing someone's opinion is not easy because there are so many satire sentences that are delivered directly without good manners, while others use indirect methods in alluding to the points to be conveyed for various purposes using social media platforms, one of which is using twitter. By analyzing the opinion, it can be classified that the opinion is a positive opinion which is an opinion of support, or a negative opinion which is an opinion of ridicule. But there is another opinion called opinion sarcasm.

In this study, we analyze the sarcasm opinions contained in Twitter. For sentiment analysis using unigram, select k-best, and TF-IDF, for the classification is Naive Bayes. Meanwhile, for the classification of sarcasm using the Random Forest Classifier which has 4 features, namely, Sentiment-relate, Puncuation-relate, Lexcial and Syntatic, and Pattern-relare, for classification using a Decission tree. The results of this study obtained an accuracy rate of 76% on the Naive Bayes method and 92% on the Random Forest Classifier method.

Keywords: Detection of sarcasm, covid-19, Random Forest Classifier, Sentiment analysis, Python

The Application of Point Minutiae Method for Tapis Lampung Pattern Recognition

Dedi Darwis[1], Abhisek R Mehta[2], Ahmad Ari Aldino[3], Rani Safitri[4]

[1,3,4]Universitas Teknokrat Indonesia, Bandar Lampung, Indonesia
[2]Parul University, Faculty of IT & Computer Science, Vadodara, Gujarat, India
darwisdedi@teknokrat.ac.id

Tapis cloth is a traditional clothing worn for women from the lampung tribe. Tapis in the form of a woven cloth made from cotton yarn and silk. The pattern tapis on the cloth is embroidered using gold or silver thread. The tapis cloth has many motifs and has characteristic like nature, flora, and fauna motives. İn this research pattern recognition is done using the point minutia method. This method is a poin recognition method that is widely used in fingerprint verification research. Point minutia method will extract the tapis lampung image to get the pattern. This method performs the extraction by detecting the tip of ridge point so that the value of point distribution on the motif is obtained. This application also functions to identify the type of tapis lampung using the euclidean distance and look for its similarity factor method. The test carried out in this study used the R2016a version of the Matlab. The data used in this study are 140 training data and 30 test data for each motif. The result obtained in this atudy are quite goo with the presentage reaching 73%. This study can be useful for many people, especially the Lampung area in the introduction of the tapis Lampung cloth pattern.

Keywords: euclidean distance; pattern recognation; point minutiae; tapis lampung.

Application of Accelerated Learning Method in Educational Games Periodic Table of Chemical Elements

Donaya Pasha[1], Yohana Tri Utami[3], Teddy Azidane[3], M. Hamdan Sobirin[4]

[1,3,4] Departement of Information Technology, Faculty of Engineering and Computer Science, Universitas Teknokrat, Bandar Lampung, Indonesia
[2] Departement of Computer Science, Faculty of Mathematics and Natural Science, University of Lampung,
Bandar Lampung, Indonesia
E-mail of corresponding author: yohana.utami@fmipa.unila.ac.id

One of the subjects in chemistry learning is the periodic system of elements. In the periodic system of elements, some concepts require sufficient understanding and memorization from students. The problem in this study is students' lack of knowledge in memorizing the periodic system of chemical elements. Using media in the form of games is one of the efforts that can provide solutions to improving students' understanding and memorization of these subjects. The method that will be applied in the educational game is the Accelerated Learning method, which is expected to increase students' interest in learning and make learning easier and faster to understand. The tools used are Unity which is run on the Android operating system. The testing method uses ISO 9126 with four aspects: usability, functionality, portability, efficiency, and the paired sample t-test.

The test results of the educational game application for periodic chemical elements using ISO 9126 resulted in a usability aspect of the overall value of 89%, which means it is very feasible. The functionality aspect shows that the application can perform 100% of its functions correctly. The portability results show that the application can be installed on several devices with the KitKat, marshmallow, and nougat versions of the Android operating system. The efficiency aspect with testdroid shows that it does not experience a lack of memory that causes the application to stop. The maximum CPU usage is 37% at the beginning of running the application, and the average CPU generates 9%. Paired sample t-test showed that the average score of students before (pre test) and after (post test) increased, namely (pre test) 19.60 and (post test) 54.53.

Keywords: Accelerated Learning; Periodic System of Elements; Unity; ISO 9126; Paired sample t-test.

Expert System Research for Prostate Cancer in Indonesia: from Research Design to Data Analysis – A Review

Rusliyawati[1], Sutyarso[2], Admi Syarif[3], Akmal Junaidi[4], Agus Wantoro[5]

[1]Doctoral Program of Mathematics and Science Faculty, University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[1]Faculty of Engineering and Computer Science, Universitas Teknokrat Indonesia, Jl. ZA. Pagaralam No. 9 -11 Kedaton, Bandar Lampung, Indonesia
[2]Biology, Faculty of Mathematics and Science, University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[34]Department of Computer Science, Faculty of Mathematics and Science, University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Indonesia
[5]Faculty of Engineering and Computer Science, Universitas Teknokrat Indonesia, Jl. ZA. Pagaralam No. 9 -11 Kedaton, Bandar Lampung, Indonesia
[1]rusliyawati@teknokrat.ac.id, [2]sutyarso.sty@gmail.com,
[3]admi.syarif@fmipa.unila.ac.id, [4]akmal.junaidi@fmipa.unila.ac.id,
[5]aguswantoro@teknokrat.ac.id
sutyarso.sty@gmail.com

Expert systems in computer science have attracted many computer scientists. In recent years, expert systems have been widely used in the medical field so that they have been developed to diagnose and treat various diseases, especially cancer. One of the most dangerous cancers is prostate cancer, which can attack men with a susceptible adult age. Prostate cancer is the most well-known type of cancer that develops in men. In recent times, prostate cancer has grown into an epidemic. To overcome this problem, several researchers have proposed several approaches with different research results. The purpose of this study is to conduct a review of several studies that have been carried out using instruments in the form of aspects and research categories to conduct analysis. This study is to see the extent to which the use of computer technology is used in the treatment of prostate cancer. The results of this study can provide valuable information in the form of (1) the trend of the algorithm used, (2) the type of research (quantitative or qualitative), (3) the type of research data used such as pictures or questionnaires, (4) the design used in system development (5) the instruments used (6) the treatment efforts that have been carried out such as diagnosis or drug recommendations, so that the information on the results of these findings is useful for further research

179

Keywords: Expert System; Prostate Cancer; Design and Analysis; Review.

Fuzzy Rule based System for Classification of Dendronium Montanum Orchids in Liwa Botanical Garden

Arie Setya Putra ¹, Admi Syarif ², Mahfut ³, Warsito⁴, Sri Ratna Sulistiyanti⁵

¹Doctoral Study Program, Mathematics and Natural Sciences, University of Lampung, Lampung, Indonesia
² ³ ⁴⁵Department Mathematics and Natural Sciences, University of Lampung, Lampung, Indonesia
ariesetyaputra@umitra.ac.id, *admisyarif@unila.ac.id

Dendrobium Orchid is an annual plant that has spread all over the world, this study aims to classify Dendrobium Orchid plants which can make it easier to name Dendrobium Orchids. The research was conducted using the Fuzzy Rule Based System method, the determination of the naming of the Dendrobium Orchid using existing software, namely Matlab, the classification of Orchids was carried out based on Morphological Characters. The result of this research is to make a system in checking fruit naming, the use of the Fuzzy Rule Based System on the Dendrobium Orchid classification is very helpful in carrying out orchids. Classification of Dendrobium Orchids can be done by using the characteristics that exist in the Orchid Morphology.

Keywords: Dendrobium Orchid; Fuzzy Rule Based System.

DETERMINATION OF 1-DZULHIJJAH DATE IN HIJRIAH CALENDAR SYSTEM USING ANGLE METHOD MOON-EARTH-SUNSET (MES)

Tiryono Ruby

Mathematics Department, Lampung University, Indonesia

tiryonoruby@gmail.com tiryono.1962@fmipa.unila.ac.id

The difference between the Hijri and Gregorian calendars is on the basis of their calculations, the Hijri year is based on the moon sighting cycle, while the Christian year is based on the solar cycle. To determine the new Hijri moon, one must have an understanding of the relative motion of the Moon, Earth, and Sun as well as mathematical logic skills and strong imagination in understanding the 3rd dimension (space). The Earth, Moon, and Sun all three move with each other, this movement affects in determination of the new Hijri Moon. With mathematical calculations (*hisab* /reckoning) and assisted by the Moon-Earth-Sunset (MES) angle method, it can be predicted that the 1-Dzulhijah date will fall, which is correlated with the Arafah day of 9th and 10th moments of Dzulhijah in the nth year with a forward pattern, namely $Cn = Yes – 11, 02$ (Yn-Yes) and the backward pattern is $Cn = Yes + 11.02$ (Yes- Yn).

Keywords: Calendarization, Moon, Earth, Sunset

DYNAMIC ANALYSIS AND SIMULATION OF SYSTEM SOLUTIONS ON GOODWIN MODEL USING HEUN METHOD

Agus Sutrisno[1*], La Zakaria[1], Dorrah Azis[1]

Department of Mathematica, Faculty of Mathematics and Natural Science,
Universitas Lampung,
Bandar Lampung, Indonesia

[*]Corresponding Author: agus.sutrisno@fmipa.unila.ac.id

The Heun method is one of the numerical methods used to solve problems in the world of mathematics that have initial value problems such as PD. The Heun method is an improvement on the Euler method. In this method the initial solution is taken from the solution obtained from the Euler method (predictor), then this predictor is improved and used as a corrector.

One of the economic models that predicts the economic cycle is the Goodwin's Class Strungle Model (Goodwin's Model). This model tries to show an economic cycle based on the relationship between workers share and employment rate which is usually applied to economic data. This model combines two aspects of economic theory, namely the theory of Harrod Domar's growth model, and the theory of the Phillips Curve model.

This study will construct a model and use Heun's method to analyze dynamics such as determining critical points, critical point stability, and simulating Goodwin model system solutions. Then apply it in the economic field.

Key Word: Heun, Goodwin, cycle, dynamic

A Class of 2D QRT Linear Map For Hidding An Image and Its Histogram Analysis

Agus Sutrisno[1,a) and La Zakaria[2,b)

[1]Department of Doktor MIPA, Universitas Lampung

[2]Department of Mathematics, Universitas Lampung

[a]Corresponding Author: agus.sutrisno@fmipa.unila.ac.id

b lazakaria.1969@fmipa.unila.ac.id

Abstract: Hiding an image can be done by changing the image's pixel values using the mapping concept. This concealment technique is commonly known as image cryptography. It has been found that some mappings have qualitative properties (area preservation properties and mapping inversion properties) that are useful in restoring the pixel value of an image that has been changed through a transformation using a mapping. In this article, we will introduce several linear mappings obtained from 2D QRT mapping, known to have several qualitative properties, including those previously mentioned. In addition, histogram analysis will be used to determine the quality of returning the original hidden image.

Keywords: Cryptography, 2D QRT linear map, Qualitative Property, Histogram Analysis

Application of the Adomian Decomposition Method in solving the initial value problem of the third-order linear ordinary differential equation with constant coefficients

[1]Fathudin, [1]Aang Nuryaman, [1]Ahmad Faisol

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Lampung
Jl. Prof. Soemantri Brojonegoro No 1, Gedong Meneng, Bandarlampung,
Lampung, Indonesia
Corresponding author: aang.nuryaman@fmipa.unila.ac.id

The Adomian Decomposition Method (ADM) has been widely used in solving mathematical models in the differential equations form, both Ordinary Differential Equations (ODE) and Partial Differential Equations (PDE). This method is divided into three core steps. The first step is to decompose the parts F of the operator equation $Fy(x) = g(x)$ into L and R, where L is a linear operator that has an inverse L^{-1} and R is another linear operator. The second step is to operate the L^{-1} in this equation to get $y(x)$ and the third step assumes the solution obtained in the second step is of form $y(x) = \sum_{n=0}^{\infty} y_n$ which provides a recursive relation and then resolves it. Based on the results of the recursive relation, the y_i solution for $i = 0,1,2,3, ...$ so that the solution is a series. This study will apply the Adomian Decomposition Method to the initial value problem of third-order linear ordinary differential equation with constant coefficients. From comparing the exact solution with the solution of the Adomian Decomposition Method up to the fourth term, the results show that the Adomian Decomposition Method agrees with the exact solution.

Keywords: Adomian Decomposition Method, ordinary differential equation, initial value problems.

Counting the Number of Connected Graphs Labelled Vertices of Order Six Containing Odd number of Loops.

Riska Pradita[1], Amanto[1,*], Wamiliana[1], dan Asmiati[1]

A graph G(V,E) is called a connected graph if there is at least one path connecting two vertices in G, otherwise it is called a disconnected graph. A labelled graph is one in which each vertex or edge has a value or label assigned to it. Given *n* vertices and *m* edges, where all vertices are labelled differently, there are many graphs than can be created, either connected or not connected, simple or not simple. Loop is an edge that starts and ends in the same vertex, and parallel edges are two or more edges that connect the same pair of vertices. In this study, the number of connected. In this study how to count the number of connected graphs labelled vertices of order six containing odd number of loops without parallel edges.

Keywords: connected graph, order six, vertices labelled, loops, parallel edges

Medical Report Classification Using BioWordVec Contained on Deep Learning Method

Dian Kurniasari[1, a)] and Mustofa Usman[2, b)], Warsono[3, c)], Favorisen Rossyking Lumbanraja[4, d)]

[1]Doctoral Student of MIPA, FMIPA Universitas Lampung
Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia, 35145.
[2, 3]Department of Mathematics, FMIPA Universitas Lampung
Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia, 35145.
[4]Depatment of Computer Science, FMIPA Universitas Lampung
Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia, 35145.

[a)] dian.kurniasari@fmipa.unila.ac.id
[b)] Corresponding author: usman.alfha@yahoo.com
[c)]warsono.1963@fmipa.unila.ac.id
[d)] favorisen.lumbanraja@fmipa.unila.ac.id

A medical report classification contains a comprehensive and valuable health information on a medical diagnosis and patients' treatment and therapy. However, text data of medical report, for example on leukaemia data are huge in volume and in unstructured format, do not follow natural language grammar. In order to do medical report classification, this study proposes a deep learning method with pre-trained word embedding BioWordVec for balanced and unbalanced data. The main purpose of this study, therefore, is to explore performances of several algorithms of deep learning. The proposed deep learning algorithms in this study are Convolution Neural Network (CNN), Long Short-Term Memory (LSTM), Hybrid CNN-LSTM and Hybrid LSTM-CNN. The results demonstrate that the medical report classification using the Hybrid LSTM_CNN method with pre-trained word embedding BioWordVec using the *k*-Fold cross-validation technique after resampling the data obtained the highest accuracy of 98.05%. At the same time, the average value of precision, recall, and F1-score was 97.33%. Therefore the result using the data splitting technique after resampling the data, the highest accuracy was obtained, namely, 98.83%, while the average value of precision, recall, and F1-score was 100%.

Keywords: Medical Report Clasification, Deep Learning Method, *k*-Fold Cross Validation, Resampling, NLP.

DEEP LEARNING IMPLEMENTATION
FOR HUMAN FACE EXPRESSION DETECTION

Kurnia Muludi[1], Admi Syarif, Dwi Sakethi
Departement Computer Science University of Lampung

Facial expressions, which play an important role in social interactions, are one of the most important non-verbal channels. Current Human Machine Interaction Systems have not yet achieved the emotional and social capabilities necessary for rich and powerful interactions with humans. Automatic Facial Expression Recognition is a challenging problem in computer vision. Despite the many efforts researchers have put in research in this area, the current methods are not yet general in nature, or are mostly still being developed using a feature extraction based approach. In this way, the hyper-classifier parameters are structured to produce the best recognition accuracy on a single database, or only a small set of similar databases. This study proposes a deep neural network architecture to solve the problem of Automatic Facial Expression Recognition on a standard face dataset available at kaggle.com. Specifically, the network will is set up with multiple convolutional layers each followed by maximum pooling and then multiple Inception layers. A generated CNN model on the FER2013 dataset is created and experimented with the architecture were conducted to achieve a test accuracy of 63% and a validation accuracy of 77%.

Keyword: face expresssion detection, deep learning, CNN, kagle.

Implementation High Performance Computing for Medical Plant Classification

[1]Rizky Prabowo, [2]Yunda Heningtyas
[1]Departement Computer Science University of Lampung
rizky.prabowo@fmipa.unila.ac.id

Medicinal plants are plants that are beneficial for health, namely to cure a disease. One of the medicinal plants that are often used is betel leaf and binahong leaf. The shape of the betel leaf and binahong leaf at first glance look similar. To distinguish the shape of the two leaves can be done by way of image or image classification. There are many methods that can be used to classify images. One method that can be used to classify leaf images is the Convolutional Neural Network (CNN) method.

Image classification using the Convolutional Neural Network (CNN) method will require a large number of datasets, if using the Central Processing Unit (CPU) to carry out the training process it will require a long execution time. Therefore, to speed up execution time can be done by using the Graphics Processing Unit (GPU). GPU is one of the techniques of High Performance Computing. GPU can help to speed up execution time because it has a large number of cores. This technique is expected to increase the processing speed without reducing the accuracy of the classification.

Keywords: GPU, CUDA, CNN, HPC

.

A Numerical Solution for A Fully Fuzzy Nonlinear Systems Based On The Broyden Method

[1]Wahyu Megarani, [1]La Zakaria

[1]Mathematics Department, Universitas Lampung

Lazakaria.1969@fmipa.unila.ac.id

Several iterative methods can solve a fully fuzzy nonlinear system. However, the matrix concept is preferred in solving a fully fuzzy nonlinear system of equations to make it straightforward. This article describes a numerical method that involves the idea of a matrix (Broyden's method) in an iterative process of solving a nonlinear system of equations that is fully fuzzy and consists of the arithmetic of fuzzy triangular numbers. We also supplement this article with an algorithm (Pseudocode) and computer programming (MATLAB) to obtain solutions quickly with minimal errors.

Keywords: Fully fuzzy nonlinear system, Broyden method, Pseudocode algorithm, triangular fuzzy numbers, MATLAB programming;

Application of Artificial Neural Network Method to Predict Inflation in Indonesia

[1]Elsa Savenia Kili Kili, [2]Nusyirwan, [3]Muslim Ansori
[1]Faculty of Mathematics and Natural Sciences
Jl. Prof. Dr. Ir. Sumantri Brojonegoro No.1, Gedong Meneng, Rajabasa, Lampung
[1]elsasavenia@gmail.com, [2]nusyir1010@gmail.com, [3]muslim.ansori@fmipa.unila.ac.id

A country's economy can be seen from various macroeconomic indicators, one of which is inflation. Indonesia's inflation data pattern displays non-stationary data due to seasonal fluctuations. After the first differencing, the data is stationary and will utilize one data lag (lag k=1). Prediction of the inflation rate in Indonesia will be done using the Artificial Neural Network (ANN) method with backpropagation algorithm using data lag k = 1 to determine the best network structure that has a minimum error value. Hyperparameter Tuning testing produces the smallest loss value, which is 0.027254, and the best number of dropouts, epochs, and batch sizes are obtained, namely dropouts of 0.2, epochs of 50, and batch size of 16. The evaluation model used is Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE), and Accuracy. The RMSE, MAPE, and Accuracy values are 0.0424 , 0.1611% , and 99.8388%, respectively. The prediction results that have been obtained will be used to determine the forecast for the next nine months.

Keywords: Inflation, Artificial Neural Network, Backpropagation, Data Mining, Prediction

Application of Sillhouette Coefficient Method, Elbow Method and Gap Statistics Method n Determining Optimal K in K-Medoids Analysis

[1]Hilda Lailatul Ramadhania, [1]Widiarti, [1]La Zakaria, [1]Nusyirwan
[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences, University of Lampung,
Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia
hildaramadhania@gmail.com

The *K-Medoids* method is a non-hierarchical cluster analysis method which before conducting a cluster analysis it is necessary to know the exact number of cluster. The data used in this study uses simulation data from reference data on the percentage of households according to drinking water sources. The simulation data used uses a multivariate normal distribution, so that the simulation data allows for negative data. In this study, two options were carried out on negative data results, namely being zero and absolute. The method in determining the optimal number of clusters used the sillhouette coefficient method, the elbow method and the gap statistics method. The average Dunn index value from the data on the zeroed option produces the largest Dunn index value in determining the optimal number of clusters using the gap statistic method, which is 0,125734, while in the second option data, the Dunn index average is greatest in determining the number of clusters optimally using the sillhouette coefficient method, which is 0,113315.

Keywords: K-Medoids; Sillhouette Coefficient, Elbow, Gap Statistic, Dunn index

Development of Language Center University of Lampung using Scrum Framework

Ardiansyah[1], Andhika Kurniawan[2], Anie Rose Irawati[3], Aristoteles[4]

[1,2,3,4]Department of Computer Science, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Sumantri Brojonegoro no 1, Bandar Lampung, Indonesia

[1]ardiansyah@fmipa.unila.ac.id, [2]andhika.smandading@gmail.com, [3]an.irawati@gmail.com, [4]aristoteles.1981@fmipa.unila.com

Language Center is a web-based English certification management information system used by the Language Department of Lampung University to support the English Proficiency Test (EPT) service. The development of the Language Center system is carried out to fix problems that arise in the old system. One of them is the exam registration process and payment verification, where participants need to wait for the exam administrator to send a virtual account number and validate the status of the payment that has been made. In the Language Center system, the registration and payment processes will be automated so that they become faster and more efficient. This system was developed using the Scrum framework with a target duration of 16 weeks. During its development, 16 product backlogs were determined which were divided into 4 sprint iterations.

Keywords: information system; certification; english; scrum.

A Review - Trend of Breast Cancer Expert System Research in Indonesia: from Research Design to Data Analysis

Apri Candra Widyawati[1], Kurnia Muludi[2], Admi Syarif[3], Sutyaso[4], Agus Wantoro[5]

[1]MIPA Doctoral Study Program, University of Lampung, Bandar Lampung
[2,3]Faculty of Computer Sciences, University of Lampung, Bandar Lampung
[4]Faculty of Biology, University of Lampung, Bandar Lampung
[5]Faculty Engineering and Computer Sciences, University of Teknokrat Indonesia, Bandar Lampung
E-mail of corresponding author
kmuludi@fmipa.unila.ac.id

Breast cancer is the leading cause of death and also one of the most invasive types of cancer among women worldwide. This cancer occurs when cells in the breast begin to grow uncontrollably or spread throughout the body. Treatment efforts in the form of early diagnosis are the only salvation to reduce deaths from breast cancer. An expert system that is able to accurately classify breast cancer is an important task in medical diagnosis. Approaches using computing with various approaches and algorithms with different research results have been widely used. The purpose of this study is to review several studies that have been carried out using instruments in the form of aspects and categories to conduct analysis. This study is to see the extent to which the use of computer technology is used to diagnose breast cancer. The results of this study can provide valuable information in the form of (1) the trend of the algorithm used, (2) the type of research (quantitative or qualitative), (3) the type of research data used such as pictures or questionnaires, (4) the design used in system development (5) the instruments used (6) research variable (7) the treatment efforts that have been carried out such as diagnosis or drug recommendations, so that the information on the results of these findings is useful for further research.

Keywords: Analysis and Design; Breast Cancer; Expert System; Review.

Computer Vision in Image Detection Case Study of Tree Damage Type Using Convolutional Neural Network (CNN) Algorithm

Z Nopriyanto[1], R Andrian[2], R Safe'i[3], K Muludi[4]

[124] Dept. Computer Science, Faculty of Mathematics and Natural Science, University of Lampung

[3] Forestry Master Study Program, Faculty of Agriculture, University of Lampung

E-mail of corresponding author: rahmat.safei@fp.unila.ac.id

The identification of 16 types of tree damage so far is still following the guidelines stated in the Forest Health Monitoring method. The types of tree damage can be recognized by human vision, as well as by computers. Computer vision allows computers to be able to recognize things that can be recognized by humans. In an effort to make work easier, in this case study it can be realized with computer vision. The purpose of this study was to identify 16 types of damage in Forest Health Monitoring using image data or photos with computer vision. The stages of this research are image acquisition (image acquisition), image processing (image preprocessing), and feature extraction (feature extraction). The results showed that the computer vision process can identify images in JPG/JPEG (Joint Photographic Experts) format, assisted by the Convolutional Neural Network (CNN) algorithm. The percentage value of success using the CNN algorithm reaches 99.06% and there is an error detection of 0.94%. There are several classes that are not identified properly indicating that the dataset needs to be improved. Thus, it can be concluded that the identification of 16 types of damage using image data or photos with computer vision has been successfully carried out.

Keywords: Forest Health Monitoring; Computer Vision; Tree Damage; Convolutional Neural Network; Deep Learning.

Implementation of Clustering in Analytics Dashboard to Support Teacher in Learning Evaluation

[1]Rahman Taufik, [2]Selly Meliana

[1]Department of Computer Science, Faculty of Mathematics and Natural Sciences, Lampung University, Lampung, Indonesia
[2]School of Computing, Faculty of Informatics, Telkom University, Bandung, Indonesia

Learning evaluation is one of the important processes of learning which aims to improve the effectiveness of the teaching-learning process. During the pandemic season, teachers are adapted to use Learning Management System (LMS) to conduct learning. However, not all LMS have features that help teachers to evaluate learning and the change of learning from synchronous to asynchronous make it difficult for teacher to monitor student learning performances. Learning Analytics Dashboard (LAD) can be a valuable tool by visualizing student learning progress and performance. Unlike previous LAD researches that are mostly focused on the development from the aspect of learning analysis, the proposed of LAD combines learning analysis and clustering method to perform analysis and visualization. In this paper, we discuss the implemented of cluster analysis dashboard to support learning evaluation. We use learning history of Introduction to Programming course in LMS covering 364 first year students and 4 tests including pre-test, exercises, post-test, and mid semester exam. Furthermore, we discuss the result of cluster analysis on student performance and how it is presented and inferred to answer the learning evaluation.

Keywords: Clustering, Educational Data Mining, Learning Analytics Dashboard, Learning Evaluation, Learning Management System

Implementation Decision Support System Using Profile Matching Approach for Career Improvement of Civil Servant (Case Study: Tulang Bawang Barat's Civil Service and Human Resource Development Agency)

E. Amalia[1], A. R. Irawati[2]

[1]Dapartment of Computer Science, Faculty of Mathematics and Natural Sciences, University of Lampung, Jl. Sumantri Brojonegoro No 1, Bandar Lampung, Lampung, Indonesia
[1]egidiah.amalia@gmail.com, [2]anie.roseirawati@fmipa.unila.ac.id

The Civil Service and Human Resource Development Agency is a government organization that has to carry out the preparation and implementation of regional policies in the employment field. One of the Civil Service and Human Resource Development Agency's functions is career development in structural and functional positions. The district of Tulang Bawang Barat had 3,523 civil servants in 2020, making it difficult for the Agency to place them based on their most suitable qualifications. Because of the large amount of data they manage, a decision support system is the right tool to use to assist them in placing an employee on a job according (match) to their qualifications. In this study, the decision support system is implemented with a profile matching approach by comparing job qualifications with employee competencies, so that the gap between the two can be seen. The criteria use in this method are: managerial qualifications, sociocultural qualifications, technical qualifications, education background, job history, performance values, and other individual information. Each criterion has sub-criteria, namely core factors that account for 60% of the assessment or secondary factors that account for 40% of the assessment. The results of system testing in this study indicate that the results of the system calculations are able to produce employee rankings based on 7 criteria with an accuracy of more than 97% compared to manual calculations.

Keywords: Decision Support System; Career Improvement; Profile Matching; Competencies Gap.

SMOTE Oversampling on Imbalanced Dataset of Lampung Handwritten Images for SVM Classification

[1]Akmal Junaidi, [2]Edo Priyono Mualim, [3]Favorisen Rosyking Lumbanraja, [4]Dewi Asiah Shofiana

[1,2,3,4]Department of Computer Science, FMIPA, Universitas Lampung
Corresponding email: [4]dewi.asiah@fmipa.unila.ac.id

Lampung script is one of the cultural wealth owned by the people of Lampung. However, the use of the Lampung script in the daily life of the Lampung people is not dominant compared to the Indonesian language. This is also closely related to the minimum number of Lampung people who can read Lampung script compared to the total Lampung community. One form of preserving Lampung's cultural assets in the current era is by starting to develop a system that can recognize Lampung characters, starting with learning the characteristics of each character and classifying them. This study aims to develop a model that could accurately classify the Lampung dataset using Support Vector Machine (SVM). This research uses traditional characters of the Lampung script that has 20 characters, 12 diacritics, and unique punctuations. Handwritten image datasets in this research consist of 18 Lampung characters, in the form of 32140 grayscale images without diacritics and punctuations. These data however are not evenly distributed among the 18 characters. To overcome the imbalance problem, an oversampling approach is performed by using the Synthetic Minority Oversampling Technique (SMOTE). Lampung image features were extracted, manipulated, and analyzed using various libraries from Python programming language. This research yields an SVM model with an accuracy of 95.76.

Keywords: handwritten image, image classification, Lampung script, SMOTE, Support Vector Machine

PHYSICS, APPLIED SCIENCES & EDUCATION

Flight Mechanical Model Development of a Conventional Twin-Engine Unmanned Aerial Vehicle

[1]Ardian Rizaldi, [1]Prasetyo Ardi Probo Suseno, [1]Satria Arief Aditya, [1]Try Kusuma Wardana, [1]Fuad Surastyo Pranoto, [1]Angga Septiyana, [1]Yusuf Giri Wijaya, [1]Novita Atmasari, [1]Eries Bagita Jayanti
[1]Research Center for Aeronautics Technology, National Research and Innovation Agency
ardian.rizaldi@brin.go.id

Unmanned Aerial Vehicles (UAVs) have been widely used for various purposes. To control UAVs in these activities, Flight Control Laws (FCLs) are required according to their respective missions. The design of the FCL requires a model that represents the actual dynamics motion of aircraft, called the Flight Mechanical Model. Hence, this research aims to develop the FMM of a conventional twin-engine UAV based on a 6-DOF (Degree of Freedom) non-linear mathematical model. This model is supported by several sub-models, such as aerodynamics, weight, and propulsion. This paper discusses the FMM development process from mathematical modelling, conceptual modelling, and verification by performing simulation at certain trim points. The simulation results show that the UAV is stable in both longitudinal and lateral-directional motion.

Keywords: flight mechanical model, aircraft, UAV, twin-engine

The Diversity of Indonesian Medicinal Plants as the Main Ingredients for Supporting-physical-fitness Potion

Lusi Kristiana

Research Center for Pharmaceutical Ingredients and Traditional Medicine - National Research and Innovation Agency of Indonesia, Jl. Raya Jakarta-Bogor Km.46, Cibinong, Bogor, Indonesia

lusi.kristiana@brin.go.id

This study aims to determine and conduct an inventory of the distribution of Indonesian medicinal plants used as the main ingredients of supporting-physical-fitness potions by Indonesian traditional healers. This study uses data from Research on Medicinal Plants and Herbs (Ristoja), which is an nationwide exploration of local knowledge of ethnomedicine and community-based medicinal plants in Indonesia, which was carried out in 2012, 2015 and 2017. The inclusion criteria were plants used as the main ingredients of supporting-physical-fitness potions. The variables analyzed were the scientific name of the plant (species), the family, the distribution of its use in Indonesia, the part used, the method of use, the frequency and duration of use. The data are presented comprehensively and analyzed descriptively. The main ingredients of supporting-physical-fitness potion were 266 species of plants and 93 families. The plant is found in 30 provinces and 158 district in Indonesia. Species with the same purpose of use and most widely distributed among provinces in Indonesia are *Eurycoma longifolia* (in 8 provinces), *Curcuma xanthorrhiza, Phyllanthus niruri and Zingiber officinale* (each used in 7 provinces), and 5 species used in each 6 provinces, namely *Blumea balsamifera, Carica papaya, Centella asiatica, Curcuma domestica and Morinda citrifolia*. The leaves and underground parts (roots, rhizomes, tubers) are the most widely used parts of the plant. Drinking a decoction or liquid plant juice is the most common method of use. In less than a week, the concoction is used one time a day. The results of the study show that medicinal plants still dominate the way people maintain their health to stay fit, and the use of traditional medicine is still an integral part of the socio-cultural life of the Indonesian people.

Keywords: Medicinal plants, Ristoja, Supporting-physical-fitness potion, Traditional medicine

Comparison of Five Accessions of Fennel (Foeniculum vulgare Mill.) from Five Locations with Chemical Parameters

[1]M. Bakti Samsu Adi, [2]Anshari Maruzy

[1,2] Research Center for Pharmaceutical Ingredients and Traditional Medicine, Research Organization for
Health, National Research and Innovation Agency, Kawasan PUSPIPTEK
Serpong, Tangerang Selatan, Banten,15343, Indonesia
E-mail: mbak001@brin.go.id

People in Indonesia have used fennel (F. vulgare Mill.) as a raw material for medicine. As we know, the efficacy of a medicinal plant is related to its active compounds. Genetic, environmental, and technical cultural factors influence the active compounds in plants. The supply of medicinal plant raw materials based on the stock of plants in nature will not guarantee their quality and continuity. For this reason, it must carry a production approach through cultivation technology intervention and discovering the superior accession potential of natural populations. The location of growing affects the quality of medicinal plants. It is due to the different environmental factors that plants respond to during their growth. This study aims to compare fennel plants obtained from five locations. We have conducted research in 2016. Measurements were carried out on four parameters: total ash content, acid insoluble ash content, ethanol soluble extract content, and water-soluble extract content. We compared the parameters measured with the Indonesian Herbal Pharmacopoeia (FHI). Samples from five locations (Karanganyar, Boyolali, Malang, Bandung, and Padang) were analyzed for ash content and extracts in the laboratory. Based on the parameters of total ash and acid insoluble ash content, all samples met the FHI criteria. They were below 13.1% for total ash content and below 2.7% for acid insoluble ash content. Meanwhile, based on the content of ethanol-soluble and water-soluble extract, the fennel from Boyolali did not meet FHI. The ethanol-soluble extract content was less than 8.6%, and the water-soluble extract content was less than 20%. On this parameter, the fennel from Karanganyar has the highest value.

Keywords: fennel, Foeniculum vulgare, accession, chemical.

Evaluation of Eleven Finger Pulse Oximeter Performance Reading

[1]Vera Permatasari, [2]Khusnul Khotima, [1]Irawan Sukma, [1]Siddiq Wahyu Hidayat

[1]Research Center for Testing Technology and Standard, The National Research and Innovation Agency Republic of Indonesia, Banten, Indonesia
[2]Advanced Materials Research Center, The National Research and Innovation Agency Republic of Indonesia, Banten, Indonesia
ve.rha.ps@gmail.com

The results of the pulse oximeter reading are very important for monitor the oxygen saturation level of home care patients with Covid-19. The performance reading of eleven low-cost pulse oximeter brands widely used in the Indonesian market has been functionally tested. The test was carried out by simulating the oxygen saturation level from 70% to 100% with a 1% increment using a pulse oximeter emulator as the input of the pulse oximeter observed. The results of pulse oximeter readings observed are then compared with the values given by the pulse oximeter emulator and analyzed using the Arms formula. The acceptable performance reading limit is set at $\pm3\%$, which refers to Pulse Oximeter Accuracy and Limitations: FDA Safety Communication. Analysis of the oxygen saturation level divided into normal, mild, moderate, and severe hypoxia classification ranges. The experiment results show 1 pulse oximeter brand tested has good readings for all classification ranges, 8 pulse oximeter brands have good readings for the normal, mild and moderate classification ranges, but have performance readings over the threshold limit for the severe hypoxemia range. 1 pulse oximeter brand tested has poor readings for all classification ranges. 90.91% of the sample has a good reading accuracy in normal and mild range according to requirements with an average Arms of 1.94%. 72,73% of the sample has a good reading accuracy in moderate range according to requirements with an average Arms of 2.38%, and only 9,09% of the sample has a good reading accuracy in severe range according to requirements with an average Arms of 6.99.

Keywords: low-cost pulse oximeters performance reading; oxygen saturation level; pulse oximeter emulator; Arms value

Submerged Breakwater Role in Closed Basin's Resonance

[1]Gabriel Jonathan, [1,a]Ikha Magdalena

[1]Faculty of Mathematics and Natural Sciences, Bandung Institute of
Technology, Indonesia 40132
[a]Corresponding Author: ikha.magdalena@math.itb.ac.id

The water wave resonance phenomenon is an occurrence in which the water's elevation is amplified over time. In a closed-basin such as a lake, wave resonance can cause enormous damage to the surrounding environment. The resonance is caused by external forces entering the basin, whose period is similar to the basin's natural period. One way to prevent the resonance is to construct a submerged breakwater in the basin's bottom. We observe the resonance phenomenon in a closed-basin with a block of rectangular submerged breakwater on the basin's bottom. The mathematical model is based on the linear shallow water equation (LSWE). The system of partial differential equations is then transformed into an ordinary differential equation, which used to obtain the basin's natural period analytically. We conduct several numerical simulations to confirm and detect the existence of the wave resonance phenomenon. Following that, we calculate the optimal friction coefficient of the breakwater required to completely prevent the resonance occurrences.

Keywords: resonant period, shallow water equations, finite volume method, closed basin, oscillations

Numerical Study of Wave Damping by Trapezoidal Breakwater

[1]Indriana Marcela, [1,a)]Ikha Magdalena

[1]Faculty of Mathematics and Natural Sciences, Bandung Institute of
Technology, Indonesia, 40132
[a)]Corresponding author: ikha.magdalena@math.itb.ac.id

Submerged breakwaters are frequently utilized to protect coastal areas. In
this research, we evaluate the effectiveness of trapezoidal submerged
breakwaters in reducing the amplitude of incoming waves. The
mathematical model that we use is half linear shallow water equations.
We numerically solve the mathematical model using the finite difference
method. Numerical simulations will be conducted to determine the effect
of submerged breakwater on wave attenuation. To validate our findings,
we compare them to those obtained in the rectangular submerged
breakwater scenario. Furthermore, we examine the effect of altering the
size and shape of the trapezoidal submerged breakwater on wave
attenuation. We anticipate that these findings will contribute to the
creation of a coastal protection system.

Keywords: submerged breakwater, shallow water equations, finite
difference method

The Photoacoustic Imaging Systems Based on Diode Laser and Condenser Microphone for White Cement Phantoms and Polyvinyl Chloride Phantoms

[1]Ahmad Mujtahid Anas, [1]Mohammad Ali Joko Wasono, [1]Mitrayana
[1]Department of Physics, Faculty of Mathematics and Natural Sciences,
Universitas Gadjah Mada, Yogyakarta, Indonesia
mitrayana@ugm.ac.id

Research is concerned about using a photoacoustic imaging system based on a diode laser and a condenser microphone to image white cement phantoms and polyvinyl chloride phantoms. The white cement phantom represents hard tissue, while the polyvinyl chloride phantom represents soft tissue. The white cement phantom was varied in density to represent the osteoporosis phenomenon. The optimal laser modulation frequency system is 19 kHz, and the optimal duty cycle is 60%. The white cement phantom and polyvinyl chloride phantom can be distinguished even though the contrast is not very good. The two phantoms' distribution of acoustic intensity levels is not much different. The acoustic intensity level of the white cement phantom is 16 to 21 a.u., while the phantom PVC-DOTP is 17 to 25 a.u. The average acoustic intensity level of the white cement phantom tends to be higher when the density is also high. The average acoustic intensity level obtained were (18±1), (19±1), and (20±1) a.u.

Keywords: osteoporosis, photoacoustic imaging, phantom, white cement, polyvinyl chloride

A Photoacoustic Imaging System for Simulation of Pneumonia Detection

[1]Caesarany Maqfiroh, [1]Mitrayana, [2]Rini Widyaningrum
[1]Department of Physics, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia
[2]Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia
E-mail: mitrayana@ugm.ac.id

This study investigated the use of photoacoustic imaging to visualize and compare the level of acoustic intensity in pneumonia and healthy lungs. The study used chicken lungs that had been fixed for 24 hours in 10% buffer formalin and embedded in paraffin. The samples were histologically examined for pneumonia diagnosis and then scanned and exposed to a 532 nm diode laser using a photoacoustic imaging system.To determine the optimal system's adjustment for photoacoustic imaging of chicken lungs, we evaluated the optimal frequency and duty cycle combination between 16,000 and 20,000 Hz using duty cycles of 10%, 20%, 30%, 40%, and 50%. The acoustic intensity of pneumonia samples was also investigated and compared to healthy lung samples. In the study, the optimum laser frequency and duty cycle for imaging the chicken lungs was 17,000 Hz with a 30% duty cycle. Pneumonia chicken lungs have an acoustic intensity of -82.54 dB, while healthy chicken lungs have an acoustic intensity of -79.92 dB. This study demonstrated that a photoacoustic imaging system comprised of a diode laser and a condenser microphone could distinguish between pneumonia and healthy lungs. Pneumonia-affected lungs generate less acoustic intensity than healthy lungs, which is consistent with histological findings.

Keywords: photoacoustic, imaging, acoustic, intensity, pneumonia

Fuel Cell Analysis of Gas-Cooled Fast Reactor (GFR) Uranium Nitride (UN) Using OpenMC Software

Nurlaila Septi Choirunnisa[1], Fiber Monado[2,*], Menik Ariani[3], Arsali[4], Idha Royani[5]

Jurusan Fisika Universitas Sriwijaya
Kampus Indralaya, Ogan Ilir, Sumatera Selatan, 30862
Mail: nscnisa16@gmail.com
Correponding e-mail: fibermonado@unsri.ac.id

This study analyzes fuel cells in a Gas-Cooled Fast Reactor (GFR) based on Uranium Nitride (UN) against variations in composition and with the addition of minor actinide using OpenMC. Variations in fuel composition are carried out by changing the percentage of U-235 content from 0% to 10%. The results showed that the greater the composition of U-235, the higher the value of the effective multiplication factor (Keff) and the reaction rate. Meanwhile, the flux distribution in the center shows the distribution of the most neutrons and the fewer as they move away from the center. Furthermore, when the U-235 content was at 5%, minor actinide was added as Am-241 and Cm-244. The addition of Am-241 causes a decrease in the Keff value. In contrast, adding Cm-244 causes the Keff value to increase with increasing burn-up time. The addition of this minor actinide aims to reduce the use of uranium and utilize nuclear waste.

Keywords: effective multiplication factor (Keff), rate of fission reaction, flux distribution, actinide minor, OpenMC.

Effect of Addition Np, Am, and Cm as Minor Actinides on (U-10%Zr) Fuel Cell Design

Ade Ristika[1], Fiber Monado[2], Idha Royani[3], Arsali[4], Menik Ariani[5]

[1]Jurusan Fisika Universitas Sriwijaya, Kampus Inderalaya, Ogan Ilir, Sumatera Selatan, 30862
E-mail: aderistika1104@gmail.com
Correponding e-mail: fibermonado@unsri.ac.id

The research designs a fuel cell based on Natural Uranium Metal (U-10%wtZr) with the addition of minor actinides such as Am-241, Np-237, and Cm-244. The coolant is Helium, and the cladding is Stainless Steel (SS316). This fuel cell is pin-shaped with a diameter of 1,4 cm. The fuel cell was tested with 5% enrichment without minor actinide, and then minor actinide was added alternately. Calculation of fuel cells based on the neutron transport equation using SRAC. The calculation results show that the value of the infinite multiplication factor (K_{Inf}) with the addition of 5% Am-241 and Np-237 with 5% enrichment has not reached a critical state and has decreased in the K_{Inf} value at the beginning of the burn-up time. However, with the addition of Cm-244 with 5% enrichment, the more percent of Cm-244 was added, the K_{Inf} value increased and reached a critical state when 4% Cm-244 was added with a K_{Inf} value of 1,001198.

Keywords: Minor actinide, Stainless steel, Pin, U-10%wtZr, SRAC

Development of Learning Media with Articulate Storylines to Improve Student Learning Outcomes on Virus Materials

Novian Wildan Rosyidi, Nurmiyati, Puguh Karyanto
Universitas Sebelas Maret,
E-mail of corresponding author
novianwildan7@student.uns.ac.id

The virus is one of the most challenging topics in high school since illustration can rarely visualize some complex concepts and principles. The teacher should address the challenge of making visualization to answer the possibility of the low achievement towards the learning outcome. We designed the Virus Mobile Learning (RULLER) media using the articulate storyline platform following the ADDIE model. The prototype has been validated by users and experts, resulting in a great score. The pilot test on the 107-student participant in Indonesia showed that RULLER has effectively enhanced student understanding of the virus concepts and principles, making this media appropriate to be used as a media for teaching about the virus.

Keywords: Teaching Virus, RULLER

Development of Set Textbook with STEM-CBL nuanced integrated Learning Video for Students' Critical Thinking Ability

Adi Satrio Ardiansyah[1,a], Raivo[1], Cici Rayagura Rahmatillah[1], Christin Natalia Ginting[1], Sri Anjayani[2], Fika Merliyanti[3], Destri Saragih[4], Masriah[5], and Muhammad Ainun Niam[6]

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences,
Universitas Negeri Semarang
[2]SMP Negeri 3 Rembang, Rembang
[3]SMP Negeri 10 Merangin, Jambi
[4]SMP Negeri 20 Merangin, Jambi
[5]MTs NU Banat, Kudus
[6]SMP Negeri 1 Karangtengah, Demak
[a]Corresponding author: adisatrio@mail.unnes.ac.id

The ability to think critically is one of the skills that needed in the era of the industrial revolution 4.0. Furthermore, it is necessary to prepare a more innovative learning system so that it can produce competent graduates who have 21st century skills, which is the ability to think critically. Based on the facts, students' critical thinking skills are still low, so they must be improved. Efforts that can be made to improve students' critical thinking skills are to pay attention to the way students are taught. The aim of this study was to examine the development of sets textbooks with STEM-CBL nuances integrated with video learning on students' critical thinking skills. This research uses development research (R&D) methods with modified 4D development models, namely define, design, and develop. Data collection techniques were carried out using a questionnaire. Data analysis technique used descriptive qualitative and quantitative analysis techniques. The results showed that this textbook obtained an average final score on feasibility of 86.17% from expert lecturers and 91.67% from practitioners, so that the representation of teaching materials was very feasible. The results of the readability assessment by class VIII students obtained an average final score of 89.25% so that the represented textbooks were easy to understand and student responses obtained an average final score of 95.5% so that the represented textbooks received a very good response. Thus, this product is declared as a textbook that is very feasible to be implemented in the classroom. It is necessary to conduct an effectiveness test to determine the success of using textbooks on students' critical thinking skills.

Development of Indefinite Integral Textbook that integrated STEM-CBL assisted QR-Code for Students' Critical Thinking Ability

Adi Satrio Ardiansyah[1,a]), Arum Dinasari[1], Faridah Shahwatul Hamidah[1], Nico Caesario[1], Daru Prastiyo[2], Dian Pramudhita Wardani[3], Wahyu Rahmadhani Aji[4], Ajeng Dian Pertiwi[5], and Eny Widyastuti[6]

[1]Department of Mathematics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang
[2]SMA Negeri 4 Semarang, Semarang
[3]SMA Negeri 3 Magelang, Magelang
[4]SMK SMAK Bogor, Bogor
[5]SMA Labschool Kebayoran, Jakarta
[6]SMA Negeri 2 Mranggen, Demak
[a])Corresponding author: adisatrio@mail.unnes.ac.id

This study aims to develop quality textbooks by combining the CBL model with STEM nuances assisted QR-Code on Indefinite Integral material for students' critical thinking skills. This study uses a 4D research method which is adjusted into three stages, namely define, design, and develop. At the develop stage, an assessment is carried out for testing feasibility tests for experts and practitioners, readability tests for 12th grader, and student responses for 11th grader through a questionnaire. The results of the assessment were analyzed using a descriptive percentage technique by converting quantitative data into percentage form, then interpreted with qualitative sentences. The feasibility test was carried out by 10 validators consisting of 5 experts in mathematics education and 5 high school mathematics teachers (practitioners); the readability test was conducted by 15 students of grade 12; and the results of student responses were carried out by 13 students of grade 11. The results showed that this textbook has a good quality where the feasibility value obtained an average percentage of 85.92% with a very decent category, the readability score obtained an average percentage of 87.6% with a category easily understood by students, and student responses to this teaching material obtained an average percentage of 96.5% with a very good category. These results indicate that the product developed is of high quality towards students' critical thinking skills. Thus, the Indeterminate Integral Textbook which is integrated with CBL-STEM assisted by QR-Code can be used in mathematics learning for 11th grade

high school student or 11th grade vocational students to develop students' critical thinking skills.

Voltage Storage Analysis of Galvanic Cells with Silver Coated Cathodes using Sea Water Electrolyte on Power Bank Type Lithium Polymer 4000 mAh and Rechargeable Battery Type NiCD 900 mAh

Gurum Ahmad Pauzi[1], Juwan Andi[2], Sri Wahyu Suciyati[2], Amir Supriyanto[2], Warsito[2], Ahmad Saudi Samosir[3], Sri Ratna Sulistiyanti[3], Wasinton Simanjuntak[4]

(1) Doctoral Student at the Faculty of Mathematics and Natural Sciences, University of Lampung, 35145

[2]Department of Physics, FMIPA, University of Lampung, Bandar Lampung, 35145.

[3]Department of Electrical Engineering, FT, University of Lampung, Bandar Lampung, 35145

[4]Department of Chemistry, FMIPA, University of Lampung, Bandar Lampung, 35145

E-mail: gurum@fmipa.unila.ac.id

The main objective of research on alternative energy sources is how energy sources are produced and how the energy is stored. Power generated by energy sources must be able to have the ability to enter existing energy storage devices. This study aims to analyze the ability to charge voltage from a seawater galvanic cell energy source to a 5 volt 4000 mAh lithium polymer power bank and a 2.4 volt 900 mAh NiCD rechargeable battery. Galvanized cells were made in a series of as many as 20 cells using copper electrodes coated with silver as cathode and zinc as the anode. Real-time voltage and current acquisition system using Arduino-based INA219 sensor. The result of the research is that the charging voltage on the power bank can reach 25% with an average power of 40.09 mW, and the charging voltage on the rechargeable battery can be optimal at 2.61 volts, with an average power of 32,8 mW.

Keywords: Seawater; galvanic cell; Silver Coated Cathodes; INA219 sensor; lithium polymer power bank; NiCD rechargeable battery.

DESIGN AND REALIZATION RUNNING TEXT BASED ON ARDUINO IN REALTIME USING WIRELESS FOR DIGITAL INFORMATION BOARD

Mia Abi Nisa[1], Anita Aprillia[2], Arif Surtono[3], Amir Supriyanto[4], Junaidi[5]

[1]Department of Physics, Faculty of Mathematics and Natural Sciences, University of Lampung, Bandar Lampung, 35145

E-mail of corresponding author: junaidi.1982@fmipa.unila.ac.id

In this research, a real-time Arduino-based digital information board (running text) has been designed using wireless as a data transmission medium. The purpose of the study was to determine the effect of speed when sending data information displayed on the P10 display with a wireless network with variations in distance and baudate based on Arduino. This system uses two arduinos as controllers. The first Arduino is connected to the top three P10 panels that can display the time, date, and running text connected to the RTC DS1307 as a real-time time controller. Furthermore, the second arduino is connected to the bottom 3 panels of the P10 which can display text information connected to the android system and Bluetooth HC-05 as a data transmission medium. The data transmission test is carried out by providing a baudrate variation of 9600 bps, 19200 bps, 38400 bps and a transmission distance variation of 0 to 13.5 meters, each of which has a distance difference of 1.5 meters. The results also show that baudrate has an effect on access speed and the value displayed on the P10 panel. The sensitivity of the HC-05 bluetooth module when given a distance variation of up to 13.5 meters can still be connected and send data information in the form of text with an optimal baudrate at 9600 bps.

Keywords: arduino; running text; wireless; bluetooth; realtime.