PROCEEDINGS OF
MANBIOCONTE II

Managing Biodiversity and Conservation for Sustainable Development in Tropical Ecosystems

Transformation of Biological Study and Research to improve the sustainability of Tropical Biodiversity

DEPARMENT OF BIOLOGY
ANDALAS UNIVERSITY
2023

Department Biology Faculty of Mathematics and Natural Sciences
Andalas University

Proceedings of Managing Biodiversity and Conservation for Sustainable Development in Tropical Ecosystems (MANBIOCONTE) II

Transformation of Biological Study and Research to improve the sustainability of Tropical Biodiversity

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Organized by:
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Preface

The second International Seminar on Managing Biodiversity and Conservation for Sustainable Development in Tropical Ecosystems (MANBIOCONTE) was held at the University of Andalas Campus, Padang City, West Sumatra, on November 19-20, 2022. This seminar brought together biology researchers and conservation practitioners from various regions in Indonesia to discuss research findings, conservation activities, and various issues encountered in the field.

The MANBIOCONTE seminar served as an invaluable platform for intellectual exchange, where participants engaged in profound discussions and shared their research findings, conservation initiatives, and encountered challenges in the realm of tropical biodiversity. Aligned with the seminar's theme, "Transformation of Biological Study and Research to Improve the Sustainability of Tropical Biodiversity," this gathering of esteemed individuals has significantly contributed to our understanding of the urgent need to protect and preserve our precious natural heritage.

I would like to express my utmost gratitude to the Chair of the Department of Biology, the Dean of the Faculty of Mathematics and Natural Sciences, and the esteemed Rector of the University of Andalas for their unwavering support and commitment in making this seminar a resounding success. Their vision and dedication have played a pivotal role in fostering an environment conducive to meaningful dialogue and fruitful collaborations.

I would also like to extend my heartfelt appreciation to the diligent organizing committee, whose relentless efforts ensured the seamless execution of this event. Their meticulous planning, attention to detail, and tireless dedication have

culminated in a truly remarkable seminar that will undoubtedly leave an indelible mark on the advancement of knowledge and sustainable development in the field of tropical biodiversity.

Once again, I extend my sincere gratitude to all the contributors, organizers, and participants for their exceptional contributions to the MANBIOCONTE II seminar. It is my hope that this event will serve as a catalyst for future collaborations and inspire continued dedication towards the conservation and sustainable development of tropical biodiversity.

Yours faithfully,

The Chief of Committee MANBIOCONTE II

It is with great pleasure and honor that I extend my warm greetings as the editor of the proceedings for the International Seminar on Managing Biodiversity and Conservation for Sustainable Development in Tropical Ecosystems (MANBIOCONTE) II. The MANBIOCONTE seminar served as an invaluable platform for intellectual exchange, where participants engaged in profound discussions and shared their research findings, conservation initiatives, and encountered challenges in the realm of tropical biodiversity. Aligned with the seminar's theme, "Transformation of Biological Study and Research to Improve the Sustainability of Tropical Biodiversity," this gathering of esteemed individuals has significantly contributed to our understanding of the urgent need to protect and preserve our precious natural heritage.

I would like to convey my deepest gratitude to all the delegates and participants who contributed their valuable insights and presented their research through engaging presentations and thought-provoking posters. Your presence and active participation have enriched the seminar, making it an invaluable forum for the exchange of ideas and the exploration of innovative approaches in biodiversity conservation. As the editor of the proceedings, I am confident that this collection of scholarly works will serve as a lasting testament to the intellectual rigor and unwavering commitment of all those involved in this esteemed seminar. May the research findings and invaluable discussions contained within these pages inspire further research, drive policy changes, and contribute to the collective efforts aimed at securing a sustainable future for our planet's diverse ecosystems.

With warm regards,

Editor of Proceedings

Introduction

Background

Biodiversity, the remarkable diversity of life forms on our planet, serves as a paramount resource with profound implications for both humanity and the environment. Its significance cannot be overstated, as it provides not only direct but also indirect benefits that are essential for our well-being. Acknowledging the critical role of biodiversity in sustaining human life, it becomes imperative to adopt a wise and sustainable approach in its utilization.

In the wake of rapid and intensive development in our nation, it is undeniable that these advancements have brought about significant repercussions on biodiversity. Furthermore, as we navigate through the currents of the global revolution, we are faced with a myriad of challenges, conflicting interests, and conservation endeavors intertwined with the preservation of our country's precious wildlife. These complexities necessitate a delicate and apt response. In this context, the field of biology assumes a pivotal role, as it dynamically engages with the ongoing developments and seizes opportunities presented by the rapid advancement of technology.

In harmony with the fundamental vision and mission of the Department of Biology, which encompasses the assessment and preservation of tropical natural resources, coupled with the institution's commitment to the three pillars of higher education, the Department of Biology, Faculty of Mathematics and Natural Sciences at the University of Andalas, proudly announces the convening of the second International Seminar on Managing Biodiversity and Conservation for Sustainable

Development in Tropical Ecosystems (MANBIOCONTE). This momentous event serves as a vibrant platform for the dissemination and deliberation of cutting-edge research findings in biology and their practical applications. The ultimate aspiration is to channel this wealth of knowledge into tangible solutions that address real-world challenges, thereby fostering the advancement and prosperity of our nation.

Objectives and Purposes of this seminar are; 1) the foster an intellectually stimulating environment that facilitates comprehensive discussions, fosters knowledge exchange, and showcases the latest scientific breakthroughs in the realms of biodiversity, tropical ecology, bioprocesses, and Integrated Natural Resource Management. 2) Cultivate robust networks and promote interdisciplinary collaborations among esteemed higher education institutions, eminent researchers, dedicated observers, and key stakeholders. By nurturing these collaborations, we aim to initiate a profound exchange of ideas and establish a foundation for future research endeavors.

Through the pursuit of these objectives, the seminar aspires to ignite fruitful partnerships, encourage interdisciplinary approaches, and amplify the dissemination of cutting-edge scientific knowledge. By bridging the gap between academia and stakeholders, it endeavors to ensure the translation of research outcomes into tangible actions and policies. With enhanced networking and collaboration, this seminar aims to make significant contributions to the advancement of biodiversity conservation and sustainable development practices, thereby creating a brighter future for our planet.

Organizer, Participants, Time and Place

The MANBIOCONTE II seminar in 2022 was organized by the Department of Biology, Faculty of Mathematics and Natural Sciences, University of Andalas, in collaboration with the Biology Student Association (HIMABIO), Faculty of Mathematics and Natural Sciences, University of Andalas. The seminar featured four distinguished keynote speakers and 28 presenters in parallel sessions. The seminar took place on Saturday and Sunday, November 19-20, 2022, at the Plaza of the Faculty of Mathematics and Natural Sciences, University of Andalas, located in Limau Manis Campus, Padang, West Sumatra. The event was conducted in a hybrid format, allowing for both offline and online participation.

Keynote Speakers

1. Matthew J. Lacchei, PhD
   Topic: *Kids Characterizing Coastal Communities: a Collaborative Approach to Monitoring Nearshore Fish Diversity on Hawaii Island Using Environmental DNA(eDNA)*.
2. Prof. Takashi Yashiro MD, PhD
   Topic: *Current Research Methods in the Fields of Medical Biology*.
3. Prof. Kazuhito Fujiyama
   Topic: *Analysis for Lipid Production in Thermotolerant Oleaginous Yeast Rhodotorula Mucilaginosa*.
4. Dr. Henny Herwina
   Topic: *Urban and Beneficial Insect Study in West Sumatra with Special Note to Meliponiculture*.

Antioxidant Effect of the Methanol Extract of Dragon Scales Leaves (*Drymoglossum piloselloides* [L.] Presl.) on Urea and Creatinine Level in Blood Serum of Lead-Exposed Albino Rats

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

Keywords : Lead, Creatinine, urea, Leaf of Dragon Scales (*Drymoglossum piloselloides* L) Presl.

Abstrak. Keberadaan timbal masih banyak di lingkungan terutama di area industri. Timbal merupakan salah satu zat yang bersifat oksidatif. Salah satu efek fisiologis yang mungkin timbul adalah peningkatan kadar ureum dan kadar kreatinin pada serum darah. Untuk mengurangi keracunan timbal bisa menggunakan bahan alami yang mengandung antioksidan. Berdasarkan hal demikian, telah dilakukan penelitian mengenai Efek Protektif Antioksidan Ekstrak Metanol Daun Sisik Naga (*Drymoglossum piloselloides* L) Presl. Terhadap Kadar Ureum dan kreatinin serum darah Tikus Putih Yang Dipapar Timbal. Penelitian ini menggunakan metode Rancangan acak lengkap (RAL) dengan 5 perlakuan dan 5 kali ulangan dengan konsentrerasi Timbal 0,4 % dan tingkatan dosis ekstraks daun sisik naga sebesar 48,51 mg / Kg BB 97,02 mg / Kg BB 194,04 mg / Kg BB selama 6 minggu. Dari hasil perlakuan terlihat bahwa pemberian ektrak metanol Daun Sisik Naga (Drymoglossum piloselloides L) Presl. Bisa menurunkan kadar kreatinin dan ureum serum darah pada tikus yang terpapar timbal.
Kata kunci: Timbal, Kreatinin, ureum, Daun Sisik Naga (*Drymoglossum piloselloides* L) Presl.

Introduction

Lead (Plumbum or Pb) is one of the heavy metals that still pollute the environment, especially in industrial area. The presence of lead in environment generally comes from lead manufacturing factories, metal ore mining products, tin mining, smelting factories, plastic factories, paint factories, printing on soil and dust. In urban areas, sources of lead poisoning can be from motorized vehicles containing lead, toys, jewelry, ceramics and even food and drinking water [1].

Human body can be exposed to lead through food and drink contaminated with lead. Lead in drinking water comes

from contamination induced by water pipes, solder, and water faucets coated with lead and dissolved in the water through time. In polluted spaces such as highway areas and around lead factories, exposure can penetrate body through respiration [2].

Lead disposal from body is a slow process, resulting in lead accumulation in the body. Hematopoietic tissues, nerves and kidneys are the main targets for lead. In addition, the liver, lungs, heart, muscles and testes are also tissues where high lead accumulation is found [3].

Lead accumulation in kidneys will be excreted through glomerulus. In the process, heavy metals including lead that are filtered through the glomerulus can be reabsorbed by the tubular cells which can cause damage. Lead can cause renal tubular dysfunction, irreversible nephropathy, vascular sclerosis, tubular cell atrophy, fibrosis and glomerular sclerosis. Lead also increased urea and creatinine level, dysfunctional kidney was marked by decrease in urine creatinine, increased levels of malondialdehyde (MDA) and reduced level of glutathione (GSH) [4].

The mechanism of lead toxicity stems from inhibition of the activity of the δ-ALAD (delta aminolevulinic acid dehydrogenase) enzyme which causes an increase in ALA (aminolevulinic acid) level. Increased ALA level leads to the formation of hydrogen peroxide, superoxide radicals and also the interaction of the two produces hydroxyl radicals, the most reactive free radical. The δ-ALAD enzyme is the main enzyme in heme biosynthesis, which in turn synthesize hemoglobin. It is also important in the biosynthesis of catalase enzyme needed to decompose H2O2 (ROS, Reactive Oxygen Species) [5].

The effects of free radicals can be mitigated by the body by forming antioxidant compounds in the form of enzymatic antioxidants, such as the enzymes superoxide dismutase (SOD), catalase, glutathione peroxidase (GSH-PX), and

glutathione reductase (GSH-R). In conditions of oxidative stress, a balancing method is needed. oxidants and antioxidants by adding exogenous antioxidant compounds from outside the body. These compounds can be obtained from plants that contain antioxidant compounds in the form of phenolic or polyphenolic compounds, namely flavonoids such as isoflavones [6].

To reduce the effects of free radicals on the body due to lead, anti-oxidants from plants are needed. One of the Indonesian plants that has the potential as a source of antioxidants is dragon scales (Drymoglossum pilloselloides L.). Dragon scales are epiphytic plants from the Polypidiaceae family that live on other trees, firmly attached to large, moist trees such as coconut and mango trees.[7] Dragon scales leaves contain alkaloids, flavonoids, essential oil polyphenols, triterpenes, tannins, sugars and saponins It also contains glycosides [8].

Based on research that has been done on dragon scales leaves (*Drymoglossum piloselloides* L) Presl. has antioxidant activity with an IC50 value of 100.76 mcg/ml in the medium category.[9] with an IC504.299 ppm value in the high category [10] and with an IC value of 5038.29 µg/mLppm in the high category.[11] For this reason, a study was conducted on the effect of antioxidant methanol extract of dragon scales leaves (*Drymoglossum piloselloides* L.) Presl on blood serum urea and creatinine levels exposed to lead.

Research Methodology

Materials

Dragon scales leaf (*Drymoglossum piloselloides* L) Presl samples were obtained from woody trees that function as hosts. The research sample was 25 male wistar rats (*Rattus norvegicus* L.) selected by simple random technique.

Method

This study used a completely randomized design (CRD) with 5 treatments and 5 replications. Grouping of animals based on the treatment given to each group.

The grouping of these treatments is as follows; C-Group of rats that were only given 0.5% CMC during treatment. T1-Group of rats treated with Pb Acetate concentration of 0.4% during treatment. T2-Group of rats treated with Pb Acetate concentration of 0.4% and dragon scales leaf methanol extract 48.51 mg / Kg BW during the treatment. T3-Group of rats treated with Pb Acetate concentration of 0.4% and dragon scales leaf methanol extract 97.02 mg / Kg BW during the treatment. T4-Group of rats treated with Pb Acetate concentration of 0.4% and dragon scales leaf methanol extract 194.04 mg / Kg BW during the treatment.

The lead given to the treated animals was in the form of acetate lead mixed with aquadest with a concentration of 0.4% lead acetate. Dragon scales leaf methanol extract was administered orally about 1 hour before administration of Pb acetate.

Measurement of Blood Urea Levels

0.1 mL of sample and standard were put into each test tube. Add 1 mL of reagent (a mixture of buffer and urease, 100:1) into sample tubes, standards and blanks. Shake and incubate at room temperature (20-25oC) for 5 minutes, then add 1 mL of reagent 2. Shake and incubate at room temperature (20-25oC) for 10 minutes. Sample concentrations and standards for blanks are read using a photometer

Measurement of Blood Creatinine Levels

Measurement of plasma creatinine levels was carried out using the Jaffe method in which standard creatinine and plasma samples were added to an alkaline picrate solution. Previously, plasma samples were blood, standard solution and blank solution. A total of 100 ul of plasma was mixed with 2 ml of alkaline picrate solution and immediately measured at 30 seconds (At30) then repeated again at 90 seconds (At90) using a spectrophotometer with a wavelength of 515 nm. The same thing was done for the standard solution and blank solution,

Result

To determine kidney function, urea and creatinine are normal metabolic wastes that are excreted through the urine, so that under normal conditions their levels are low in the blood. However, if there is a change in kidney function, the amount of urea and creatinine excreted by the kidneys decreases so that there will be an accumulation of levels of these compounds which results in increased levels in the blood. Therefore, the levels of urea and creatinine in the blood can be used as parameters of kidney function.

The high levels of urea and creatinine in the P1 treatment indicated a disturbance in the kidneys, especially in the glomerular membrane which disrupted the filtration process. As a result, urea and creatinine cannot be excreted out of the body and will return to the blood circulation and accumulate in the blood plasma so that the levels of urea and creatinine increase [12].

The presence of Pb in the kidney causes excessive production of free radicals. Increased free radicals and ROS can cause damage to cell structures and cause mitochondrial dysfunction, so that glycine amidino transferase decreases which causes the change of glycine to guanidoacetate also

decreases. This will cause damage to blood vessels so that the glomerular membrane is damaged and glomerular filtration rate (GFR) is disrupted, which in turn will return creatinine to the blood circulation and accumulate in blood plasma so that serum creatinine levels will increase.In the treatment with dragon scales leaf methanol extract (*Drymoglossum piloselloides* L) Presl. There was a decrease in serum urea and creatinine levels.

Table 1. Average blood urea and creatinine levels of rats exposed to lead and given dragon scales leaf methanol extract (*Drymoglossum piloselloides* L) Presl

Treatment	Ureum (mg/dl)	Creatinine (mg/dl)
T0	32,138 [a]	0,694 [a]
T1	41,968 [b]	1,092 [b]
T2	21,332 [c]	0,802 [a,b]
T3	19, 184 [cd]	0,62 [a]
T4	13,448 [d]	0,766 [a]

The mechanism for decreasing urea and creatinine levels is due to the presence of flavonoids which can inhibit oxidative stress in cells due to lead by acting as a scavenging agent in neutralizing free radicals directly by donating free electron pairs. Flavonoids can also reduce inflammation and maintain normal cell cycle regulation by stopping the cycle of damaged cells. This causes the body to have time to repair or destroy these damaged cells before proliferating. Giving flavonoids can increase the glomerular filtration rate (GFR). An increase in GFR in the kidneys will increase the excretion of urea and

creatinine so that blood urea and creatinine levels decrease [13].

Decreased levels of urea in the treatment of dragon scales leaf methanol extract (*Drymoglossum piloselloides* L) Presl. which was much lower than the urea levels in the T0 treatment, possibly due to the animals being exposed to Uremia, a condition in which the body experiences a lack of protein intake but does not interfere with the health condition of the rats. Urea levels in all treated animals were within the limits of normal levels except T1. Normal urea levels were 13.20 – 27.10 mg/dL [14]. The normal value of creatinine in rats is 0.2 – 0.8 mg/dL [15].

Conclusion

Based on the results of the research that has been done, it shows that administration of dragon scales leaf methanol extract (*Drymoglossum piloselloides* L.) Presl can reduce blood serum urea and creatinine levels of albino rats exposed to lead.

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Family Yard Plants in Kanagarian Koto Gadang Koto Anau District of Lembang Jaya Solok West Sumatera

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Abstract. *Nagari Koto Gadang Koto Anau the district of Lembang Jaya, Solok, West Sumatra with an average of 500 to 800 meters elevation at the foot of Talang Mountain. This nagari comprises about 4800 hectares is within 57 km distance from Padang City. This Nagari includes hilly areas and valleys with slopes ranging from gentle to steep, ambient temperatures ranging from 20 to 25°C. Its potential agricultural sector including rice plantations and ecotourism. A community service activity was carried out in this nagari by some academics from Universitas Andalas from July until August 2022, in which preceded by observations on home garden plants within several villages therein. The result from observation noted around 152 species of home garden plants consisting of 42 species of fruit and vegetable plants, 33 medicinal plant species and 77 species of ornamental plants.*
Keyword: *Nagari Koto Gadang Koto Anau, Family Garden Plant, Medicinal Plant.*

Abstrak. Nagari Koto Gadang Koto Anau terletak di Kecamatan Lembang Jaya Kabupaten Solok Sumatera Barat berada di ketinggian 500- 800 m dpl. di kaki gunung Talang. Nagari yang luas wilayahnya sekitar 4800 hektar berjarak 57 km dari kota Padang. Nagari ini merupakan daerah perbukitan dan lembah- lembah dengan kemiringan mulai dari landai hingga curam, dengan suhu lingkungan berkisar 20-25^{o}C. Potensi utama Nagari ini adalah di sektor Pertanian yaitu tanaman padi; serta sektor Pariwisata. Dari kegiatan PKM (Pengabdian Kepada Masyarakat) yang dilakukan bersama antara DPL (Dosen Pengawas Lapangan) dan mahasiswa KKN (Kuliah Kerja Nyata) di Nagari Koto Gadang Koto Anau pada Juli-Agustus 2022 didahului dengan observasi berupa pendataan tanaman pekarangan keluarga di beberapa titik lokasi jorong. Hasil dari kegiatan yang diuraikan di atas maka tercatat sekitar 152 jenis tanaman pekarangan keluarga yang terdiri dari 42 jenis tanaman buah dan sayur, 33 jenis tanaman Obat, serta 77 jenis tanaman hias.
Kata kunci: Nagari Koto Gadang Koto Anau, Tanaman Pekarangan Keluarga, Tanaman Obat

Introduction

Home garden plants include all types of plants that are deliberately planted in the yard of residents houses for the purpose of fulfilling the need for fruits, vegetables, as well as spices and traditional medicines and also as ornamental plants. Home garden plants can be used to meet family needs and increase family income if they are deliberately designed properly [1]. Optimal use of home garden plants (Tanaman Pekarangan Keluarga, TPK) in the health sector has many advantages, namely TPK can act as living stalls, live pharmacies and barns life.

To add to the public's insight into information about the importance of family medicinal plants (TOGA) and information on their potential in creating a healthy and intelligent society, Community services Program (PKM) was carried out by Supervisor (DPL) and Community services students (KKN student) at the Kanagarian Koto gadang Koto Anau location during July - August 2022 period [2].

This activity was preceded by the observation and initial data collection of the family's garden plants by KKN students with directions from DPL. Then PKM was carried out in the form of counseling about TOGA and handing over several family medicinal plants to the wali nagari then passed on to PKK mothers then planted in the home garden.

Given the importance of the benefits of home garden plants (TPK), it is necessary to have activities that collect data information in the form of types of home garden plants which are included in the group of fruit plants, vegetable plants (TBTS); medicinal plants, spices (TOR) and ornamental plants (TH) in the home garden in the Koto Gadang Koto Anau district. Lembang Jaya, Solok Regency.

Research Methodology

Place and Time

This research held on July-August 2022 at Nagari Koto Gadang Koto Anau Kec. Lembang Jaya Solok Regency with exploration points are several sub districts. This area located at 500 to 800 m above sea level. with an ambient temperature of 20-25^{o}Celsius.

Method

The tools used for this activity are cameras, mobile phones and hand books as a reference in determining species names, home garden plants. Data collection on the types of TPK was carried

out by taking a photo of the TPK and then checking the scientific name with the help of a hand book, using Google search, then the types currently obtained were grouped according to the benefits expected by the family when planting TPK, including the purpose of fulfilling the need for fruits, vegetables (TBTS), as well as spices and traditional medicines (TRO) and also as ornamental plants (TH).

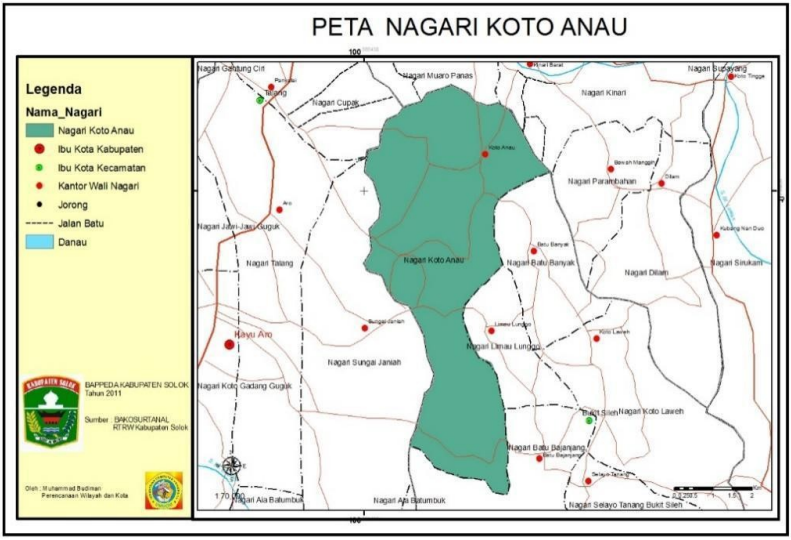

Figure 1. Map of Nagari Koto Gadang Koto Anau

Result And Discussion

From the activity in the form of collecting data on the plants in the home garden, the results are shown in Table 1. From Table 1. above it can be seen that the people of Koto Gadang Koto Anau utilizes the home yard by planting fruit and vegetable plants by 27.63%, then medicinal plants and spices by 21.71% and ornamental plants by 50.66%. The figures for the Yard

plant group are higher when compared to data collection conducted by Kadarsah and Susilawati [3] about in the area in Pesisir Pantai, Tanah Laut Regency, which noted that medicinal plants were 17.3%, ornamental plants were 16.2% and vegetable plants were 11.6%.

The high percentage of ornamental plants (50.66%) followed by fruit and vegetable plants (27.63%) and medicinal plants (21.7%) growing in the yard shows: (1) the enthusiasm of the people who support and highlight the potential of the area in the tourism sector, (2) high community intelligence in utilizing the yard for food security and as a living pharmacy.

Table 1. Home garden Plantations in Kanagarian Koto Gadang Koto Anau Kec. Lembang Jaya Kab. Solok West Sumatra

No.	Local name	Species	fruits, vegetables	spices and traditional medicines	Ornamental plants
1	Nangka	*Arthocarpus integra*	v		
2	Mangga	*Mangifera indica* L./	v		
3	Manggis	*Garcinia mangostana*	v		
4	Kelapa	*Cocos nucufera*	v		
5	Rambutan	*Nephelium lapaceum*	v		
6	Sirsak	*Annona muricata*	v		
7	Sarikayo/ Nona	*Annona squamosa*	v		
8	Alpokat	*Persea americana*	v		
9	Belimbing	*Averrhoa carambola*	v		
10	Jambu Air	*Syzygium aquaeum*	v		
11	Jambu Batu/	*Psidium guajava*	v		
12	Jambu bol jamaika	*Syizygium malaccense* (L.) Merr & Perry	v		
13	Pisang	*Musa paradisiaca*	v		
14	Nenas	*Ananas comusus*	v		
15	Pepaya	*Carica papaya*	v		

16	Mengkudu	*Morinda citrifolia*		v	
17	Cokelat	*Theobroma cacao*	v		
18	Buah Naga	*Hylocereus polyrhizus*	v		
19	Belimbing Wuluh	*Averrhoa bilimbi*	v		
20	Kedondong	*Spondias dulcis*	v		
21	Ambacang	*Mangifera foetida*	v		
22	Jeruk kesturi	*Citrus x microcarpa*	v		
23	Jeruk nipis	*Citrus nobilis*	v		
24	Sawo	*Menilkara zapota*	v		
25	Jeruk Manis	*Citrus x sinensis*	v		
26	Jeruk Purut	*Citrus hystrix*	v		
27	Peria	*Momordica charantia* L.	v		
28	Timun	*Cucumis sativus*	v		
29	Gambas/Pitulo	*Luffa acutangula*	v		
30	Labu siam/ Japan	*Sechium edule*	v		
31	Labu Air/ Kundur Batang	*Lagenaria siceraria* L.		v	
32	Laos/langkueh	*Alpinia galanga* (L.) Willd		v	
33	Kacang Pagar	*Canavalia ensiformis* L.	v		
34	Cabai merah	*Capsicum annuum* L.	v		
35	Cabai Rawit	*Capsium frutescens* L.	v		

36	Terong	*Solanum melongena L.*	v		
37	Rimbang	*Solanum torvum* L.	v		
38	Bawang merah	*Allium cepa*	v		
39	Kunyit	*Curcuma domestica*		v	
40	Jahe	*Zingiber officinale*		v	
41	Sereh	*Cymbopogon citratus*		v	
42	Sirih	*Piper betle* L.		*v*	
42	Sirih merah	*Piper crocatum*		v	
43	Pandan	*Pandanus amarillifolius*		v	
44	Mawar	*Rosa hybrida*			v
45	Melati	*Jasminum sambac*			v
46	Asoka	*Ixora acuminata*			v
47	Kenanga	*Cananga odorata* (Lam.)			v
48	Teratai kecil	*Nymphaea lotus*			v
49	Anggrek Merpati	*Dendrobium crumenatum*			v
50	Tapak Dara	*Catharanthus roseus*			v
51	Kembang sepatu	*Hibiscus rosasinensis*			v
52	Kamboja	*Plumiera indica*			v
53	Mawar Gurun	*Adenium sp*			v
54	Bunga kertas	*Bougainvillea spectabilis*			v
55	Palem merah	*Cyrtostachys renda*			v

56	Palem kuning	*Dypsis ltescens*			v
57	Pacar air	*Impatiens balsamina*			v
58	Cocor bebek	*Kalanchoe pinnata*		v	
59	Pakis Ekor kuda	*Equisetum rasissimum*			v
60	Lidah mertua mini	*Sansevieria trifasciata golden hahni*			v
61	Lidah buaya	*Aloe vera*		v	
62	Lili hujan pink	*Zephyranthes rosea*			v
63	Bakung	*Amaryllis belladonna*			v
64	Kenikir	*Cosmos bipinnatus*		v	
65	Tebu merah	*Saccharum officinale*		v	
66	Pakis haji	*Cycas rumphii L.*			v
67	Pulai	*Alstonia scholaris*			v
68	Lavender	*Lavandula angustifolia*			v
69	Oleander	*Nerium oleander*			v
70/	Kaktus	*Sedum sp*			v
71	Ruku ruku	*Ocimum tenuiflorum*		v	
72	Adas	*Foeniculum vulgare*		v	
73	Melati costa	*Brunfelsia uniflora*			v
74	Keladi Tengkorak	*Alocasia suhimania*			v
75	Kincung	*Etlingera elatior*		v	

76	Daun Katuk	*Sauropus androginus*		v	
77	Kelor	*Moringa oleifera*	v		
78	Kemumu	*Colocasia gigantea*	v		
79	Tomat	*Solanum lycopersicum*	v		
80	Seledri	*Apium graveolens*	v		
81	Bayam	*Amaranthus hybridus*	v		
82	Vanili	*Vanilla planifolia*		v	
83	Daun Dewa	*Gynura sp*		v	
84	Kumis kucing	*Orthosiphon aristatus*		v	
85	Daun mutiara	*Anredera cardifolia*		v	
86	Kitolod	Isotoma longifolia		v	
87	Meniran	*Phyllanthus neruri*		v	
88	Puding hitam	*Graptophyllum pictum*		v	
89	Empedu tanah	*Andrographys paniculata*		v	
90	Binahong	*Anredera cordifolia*		v	
91	Malua	*Brucea javanica*		v	
92	Pinang sirih	*Areca catechu*		v	
93	Strawberi	*Fragaria x annassa*	v		
94	Rosela	*Hibiscus sabdariva*		v	
95	Jarak	*Jathropa curcas*		v	
96	Cengkeh	*Syzygium aromaticum*		v	

97	Keladi hias	*Caladium bicolor*			v
98	Ubi jalar	*Ipomea batatas*	v		
99	Kayu Manis	*Cinnamommum verum*		v	
100	Alokasia Ungu	*Alocasia longiloba*			v
101	Lili damai/ Peace lily	*Spathiphyllum commutatum*			v
102	Panah Asmara	*Anthurium andreanum*			v
103	Gelombang cinta	*Anthurium plowmanii*			v
104	Lili Bola Api	*Scadoxus multiflora*			v
105	Pletikan	*Ruella tuberosa*			v
106	Lili hujan putih	*Zephyranthes candida*			v
107	Alamanda	*Allamanda catartica*			v
108	Kembang bokor	*Hydrangea macrophyilla*			v
109	Sente Giant Taro	*Alocasia macrorhizos*			v
110	Sri rejeki	*Aglaonema commutatum*			v
111	Sri rejeki beras tumpah	*Aglaonema costatum*			v
112	Asparagus ekor bajing	*Asparagus densiflorus*			v
113	Begonia	*Begonia masoniana*			v
114	Begonia	*Begonia hirtela*			v

115	Begonia	*Begonia heracleifolia*			v
116	Begonia	*Begonia isoptera*			v
117	Bunga Iris	*Aristea ecklonii Backer/ Iridacea*			v
118	Daun marantha	*Calathea zebrina*			v
119	Ganyong/ Bunga Tasbih	*Canna indica*			v
120	Sukulen ekor keledai	*Sedum morganianu*m			v
121	Sedum emas	*Sedum maximconum*			v
122	Yuka belati	*Yucca alaifolia*			v
123	Kaktus pipa baja	*Stenecereus stellatus*			v
124	Lidah mertua kanali	*Sansevieria canaliculata/ Asparagaceae*			v
125	Lidah mertua perak	*Sansevieria trifasciata*			v
126	Peperomia cinta	*Peperomia scanden*s			v
127	Peperomia daun bulat	*Peperomia obtusifolia*			v
128	Kaktus kuping kelinci	*Opuntia mycrodasys*			v
129	Palem kipas	*Licuala grandis*			v

130	HelikoniaCakar lobster	*Heliconia rostrata*			v
131	Lili kuning	*Hemerocalis lilioasphodelus*			v
132	Bakung Pantai	*Hymenocalis littoralis*			v
133	Bunga Bintang	*Hyppobroma longifera*			v
134	Jahe merak	*Kaempferia elegans*			v
135	Kencur	*Kaempferia galanga*		v	
136	Aster Putih	*Leuchantemum maximum*			v
137	Lily leophard	*Iris domestica*/			v
138	Iris kuning	*Neomarica longifolia*			v
139	Begonia rambat	*Pellionia repens*			v
140	Jawer kotok	*Plectranthus scutellaroides*			v
141	Lily Ambon	*Proiphys amboinensis*			v
142	Pedilanthus zigzag	*Pedilanthus tithymaloides*			v
143	Ekor naga	*Epipremnum aureum*			v
144	Bunga wijaya kesuma	*Epiphyllum anguliger*			v
145	Bunga Ipomea	*Ipomea violaceae*			v
146	Bunga Flamboyan	*Delonix regia* (Hook.) Raf.			v

147	Bunga putri salju	*Senecio ceneraria*			v
148	Kembang sungsang	*Gloriosa superba*			v
149	Kembang merak	*Caesalpinia pulcherrima*			v
150	Bunga krokot mawar	*Portulaca grandiflora*			v
151	Kembang pukul empat	*Mirabilis jalapa*			v
152	Bunga euphorbia	*Euphorbia milii*			v

Conclusion

From the data collection of home garden plants in the Koto Gadang Koto Anau district. Lembang Jaya, Solok Regency, it can be concluded that: there were around 152 types of family garden plants (TPK) consisting of 42 types of fruit and vegetable plants (TBTS), 33 types of medicinal and spice plants and 77 types of ornamental plants (TH).

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The Effect of Combination of Liquid Organic Fertilizer with Pineapple Peel (*Ananas Comosus*) and Kepok Banana Peel (*Musa Paradisiaca* L.) on the Growth and Yield of Eggplant (*Solanum Melongena* L.) as a Supporting Plant Physiology Course Material on Growth and Development

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Abstrack. *This study aims to examine the effect of a combination of liquid organic fertilizer pineapple peel and banana peel kepok on the growth and yield of eggplant purple bulat (Solanum melongena L.) and assess the right amount of concentration of a combination of liquid organic fertilizer pineapple peel and banana peel kepok on the growth and yield of purple eggplant plants round (Solanum melongena L.). The method used in this study is a quantitative method and using a random design group consisting of 5 treatments and 5 replications with the parameters of the study are plant height, number of leaves, leaf length, leaf width and wet weight of eggplant. The results of observations of growth and yield of eggplant plants on the 70th day after planting at plant height with Fhitung value (3.19) > Ftable (3.01), the number of leaves with Fhitung value (3.05) > Ftable (3.01), leaf length with Fhitung value (9.05) > Ftable (3.01), leaf width with Fhitung value (11.22) > Ftable (3.01), and the wet weight of eggplant fruit with Fhitung value (3.72) > ftable (3,01). From the results*

of the analysis it can be concluded that the combination of liquid organic fertilizer pineapple peel and banana peel kepok effect on the growth and yield of purple eggplant plants characterized by an increase in plant height, number of leaves, leaf length, leaf width and wet weight of the fruit. The right concentration for the combination of liquid organic fertilizer pineapple peel and banana peel kepok for eggplant plants purple round is at a concentration of 40%.
***Keywords**: Liquid Organic Fertilizer, Pineapple Peel, Kepok Banana Peel, Eggplant (Solanum melongena L.)*

Introduction

Indonesia is one of the regions that has an increasing amount of vegetable growth every year. Vegetable production can be carried out by various groups while ensuring the conditions for growing these vegetables. There are some types of vegetables that can only grow on certain soil conditions and require to be given some special treatment. But there are also types of vegetable crops that can grow well and adapt to their environment without certain conditions.

Vegetables are a source of vitamins, minerals and also dietary fiber. Vegetables have many benefits such as weight control, preventing gastrointestinal, preventing colon cancer, diabetes prevention because in this food fiber can absorb water and also bind glucose (Ichsan, 2015).

Eggplant crop production can be said to be easy because it can grow and can adapt well to the environment. Many types of eggplant are marketed today with different sizes and colors. In Indonesia, especially in Samarinda, East Kalimantan, purple and round eggplant types are rarely found in the market and mostly only long purple eggplants. If the two types of eggplant are compared, the overall morphology of the

growth produced is mostly the same, differing only in The Shape of the fruit.

One way that can be used in increasing the growth of vegetables one of them is to use fertilizer. Fertilizer is a material that contains one or more nutrients both organic and inorganic. Fertilization is the act of providing additional nutrients to the soil complex, either directly or indirectly so as to contribute food to plants or crops.

One type of fertilizer that can be used and is one type of fertilizer that is classified as safe is organic fertilizer. The composition of this organic fertilizer generally utilizes organic wastes that are not used as they should. One of them is like waste from the skin of fruits. Pineapple has many benefits and good nutrition for the body so favored by most Indonesian people. But in the midst of so much pineapple consumption, not everyone uses this pineapple waste Well, one of which is the pineapple skin. In fact, if used properly, pineapple skin can be used as one of the organic fertilizer because it contains elements that can help the process of plant growth.

In addition to pineapple skin waste, many other types of organic waste can be used as material from liquid organic fertilizers, such as bananas. The part of the banana that can be consumed is only the flesh, the rest will be discarded. Banana skin is one type of organic waste that is often found around us, and it makes the environment dirty and banana skin contains polysaccharide follicle gel, causing when stepped on this banana skin becomes slippery and makes it fall if not used properly.

Based on the description, one way to suppress or reduce the use of chemical fertilizers in plants is to use organic fertilizers. This organic fertilizer is made from the basic ingredients of pineapple peel and banana peel kepok, by utilizing pineapple peel and banana peel kepok left over from

the market traders. Before use, pineapple peel and banana peel kepok will be processed into fertilizer and added starter then given to the plant purple eggplant round (*Solanum melongena* L.). With this it is necessary to conduct research on the effect of a combination of liquid organic fertilizer pineapple peel and banana peel kepok on the growth and yield of eggplant purple round (*Solanum melongena* L.).

Research Methodology

Tools and Materials

The tools used in this study are hoes, machetes/Sickles, rulers, ropes, roll meters, spray tools, measuring cups, plastic barrels, cell phone cameras and blenders. While the materials used are pineapple peel (*Ananas comosus*), banana peel kepok (*Musa paradisiaca* L.), water, brown sugar, rice washing water, and round purple eggplant seeds (*Solanum melongena* L.)

Research Methods

Time and Location Of Research

This research is expected to be carried out for 3 months, with the location of the study is located on Jl. The Great Garden, Gg. Andhika, RT. 11, Lempake, Samarinda, East Kalimantan.

Manufacture Of Liquid Organic Fertilizer

How to make liquid fertilizer from pineapple peel and banana peel kepok namely pineapple peel and banana peel kepok that have been collected as much as each 6 kg mashed using a blender or pounded beforehand to be crushed. Then the water as much as 15 L inserted into the plastic barrel then pineapple skin and banana skin kepok that has been finely inserted into the plastic barrel, and inserted a starter in the form of brown sugar as much as 2 kg and rice washing water as much as 2

liters and then stirred until well blended. Then the plastic barrel is tightly closed and allowed to stand for 3 to 4 weeks

Land Preparation, Planting and Maintenance
The land to be used is first cleared of grasses and weeds using machetes or Sickles and loosened using hoes. Made 5 bendengan with a height of 30 cm, and the distance between bendengan 30 cm eggplant seedlings that have aged 1.5 months or have the number of leaves 3 or 4 strands transferred to bendengan that has been prepared with spacing in rows 50-70 cm and the distance between rows 80-90 cm. Plant maintenance is carried out by doing watering for 2 times a day (morning and evening) adjusted to weather conditions. Weeding is done to clean the plants from weeds that are around and done regularly for 1 or 2 times a week. Application of liquid organic fertilizer to plants begins at the age of 7, 14, 21, 28, 35, 42, 49, 56, 63, and 70 days after planting (HST). The application of liquid organic fertilizer is done by sprinkling on the plants evenly which is done in the morning.

Research Design
In this study, quantitative research methods will be used and using a randomized block design with 5 times treatment including control and also 5 replications. The following concentrations will be used in this study:
P0 = control (0% fertilizer + 1000 ml of water)
P1 = 10% concentration (100 ml fertilizer + 900 ml water)
P2 = 20% concentration (200 ml fertilizer + 800 ml water)
P3 = 30% concentration (300 ml fertilizer + 700 ml water)
P4 = 40% concentration (400 ml fertilizer + 600 ml water)

Results And Discussion

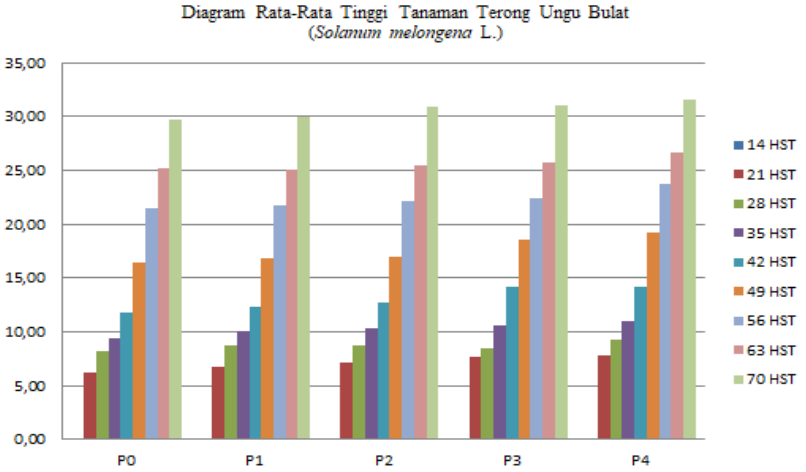
Observations were made when the plants were 14 days after planting, 21 days after planting, 28 days after planting, 35 days after planting, 42 days after planting, 49 days after planting, 56 days after planting, 63 days after planting and 70 days after planting (harvest). In the plant height parameter, plant height measurements are made starting from the base of the stem to the apical bud of the plant when it is old by using a measuring instrument in the form of a ruler. Based on the results showed that the highest average plant height purple eggplant round (*Solanum melongena* L.) found in plants treated with a combination of liquid organic fertilizer with a concentration of 40%, while for the lowest average found in control treatment (P0) was not given a combination of liquid organic fertilizer kepok banana peel. Giving a combination of liquid organic fertilizer pineapple peel and banana peel kepok with a concentration of 40% has the highest yield allegedly due to the provision of liquid organic fertilizer with higher doses it will have high nutrient levels and sufficient for plants. By doing the addition of organic matter containing nitrogen it will affect the total nitrogen levels so that the growth of plant height can be influenced. This is confirmed by the results of Saragih's research (2016) in Yulianti (2022, 3) that the kepok banana peel contains 0.031% nitrogen, 0.0155% phosphorus and 0.0437% potassium, with this content it proves that the kepok banana peel contains nutrients that can affect plants to grow properly and optimally. According to Kartiko (2021,144) in the manufacture of liquid organic fertilizer with pineapple peel ingredients, several nutrients are contained such as phosphorus, potassium, organic carbon, nitrogen, calcium, magnesium, sodium, iron, manganese, copper and zinc. Based on this, it is known that the liquid organic fertilizer pineapple peel and banana peel kepok both contain nitrogen elements, so it can

help plants to grow well. The Diagram of the average plant height is presented in picture 1.

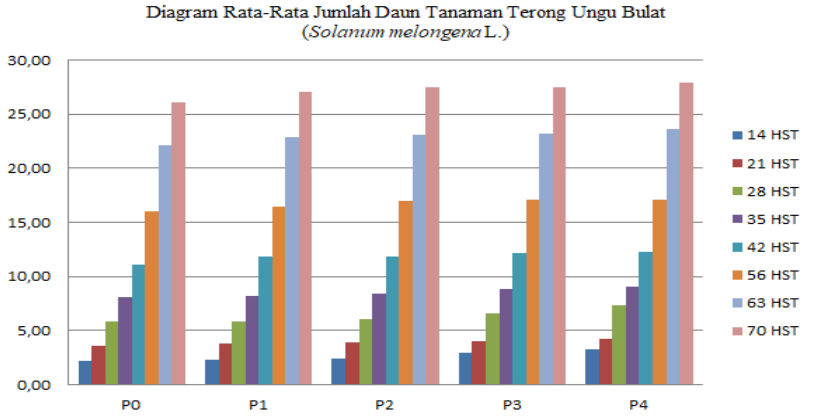
The second Data taken is the number of leaves obtained from counting the number of leaves of round purple eggplant plants (*Solanum melongena* L.) Leaves are one of the organs of vegetative growth and have an important role in plants because they function as a place for photosynthesis and a place to store food reserves. The results showed that the highest average for the number of leaves contained in the treatment P4 treatment given a combination of liquid organic fertilizer pineapple peel and banana peel kepok with a concentration of 40%, while for the lowest average contained in the treatment P0. Treatment P4 has the highest number of leaves among other treatments because it has the highest concentration dose so that it can provide a better increase in the number of leaves. The presence of nutrient elements N (nitrogen) in the liquid organic fertilizer used to provide the growth of the number of leaves for the better, because these nutrients play an important role to stimulate vegetative growth of plants. This is in line with the opinion of Mulyono (2014) in Afianto (2020) who said that the nutrient that affects the growth and development of leaves is the nutrient. Satriawi (2019) states that the growth of the number of leaves is related to the length or height of the plant, so the higher the plant grows. In the previous plant height parameter, P0 treatment also has the lowest average so that this also makes the number of leaves affected. The Diagram of the average number of leaves is presented in Picture 2.

The third Parameter examined in this study is the length of the leaves. Leaf length Data was obtained from measuring the length of the leaves of eggplant plants purple round (*Solanum melongena* L.) using a measuring instrument in the form of a ruler and then taken the average length of the whole

leaf. Based on the results of these studies can be seen that the highest average leaf length is found in the treatment of P4 is the treatment with liquid organic fertilizer concentration of 40% while for the lowest average leaf length is the treatment of P0 is the control treatment. The combination of nutrients contained in the pineapple peel and banana peel kepok that makes the plants given P4 treatment has sufficient nutrients as well as the treatment is also given this liquid organic fertilizer. In the treatment of P0 is not given liquid organic fertilizer plants grow well and the length of the leaves also grow well but unlike plants given a combination of liquid organic fertilizer. The leaf length Diagram is presented in picture 3.



Picture 1. Diagram of the average plant height of round purple eggplant fruit (*Solanum melongena* L.)

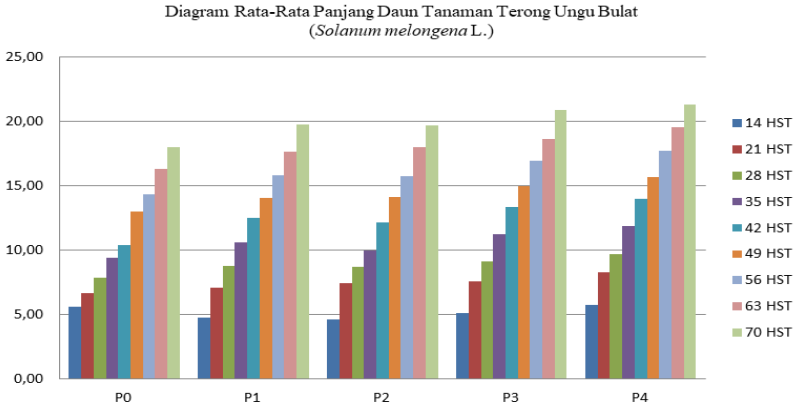


Picture 2. Diagram of the average number of leaves of round purple eggplant fruit (*Solanum melongena* L.)

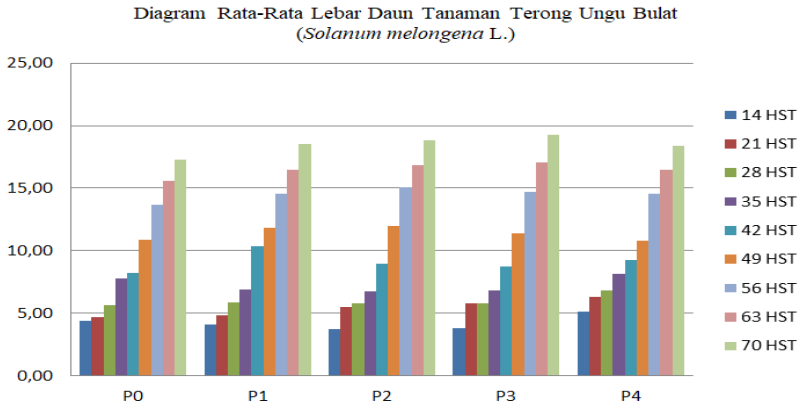
Leaf width Data is the next parameter studied. Based on the results of the study, it can be seen that the highest average leaf width of purple eggplant plants is P4 treatment with a concentration of 40% while the treatment with the lowest average leaf width is P0 treatment is a control treatment that is not given a combination of liquid organic fertilizer. P4 treatment is known to have the highest average value, this is because the content of liquid organic fertilizer pineapple peel and banana peel kepok has nutrients that can help increase plant growth. Leaf width is very influential for plants, because the leaves have a very important role as a place where the process of photosynthesis takes place, then by increasing the width (area) of the leaves, the photosynthesis process will take place properly. This is in line with the opinion of Wibowo (2012) in Puspadewi (2016) which states that the leaf area is a picture of the photosynthesis process that takes place, the larger the leaf area, the photosynthesis process will also be higher so that the photosynthesis formed in the leaves will be more[5].

The Diagram of the average leaf width is presented in picture 4.

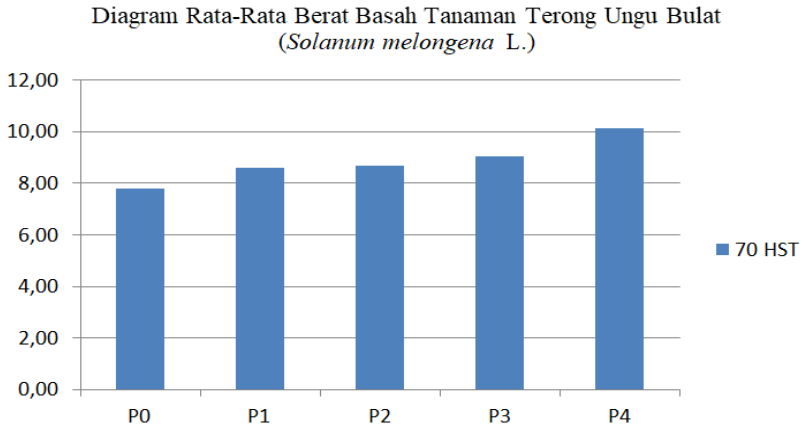
Wet weight is the last parameter observed in this study. This Parameter is very important because the purpose of this study in addition to knowing the growth of eggplant plants, also to find out how the results of eggplant plants given a combination of liquid organic fertilizer pineapple peel and banana peel this kepok. P4 treatment has better results when compared with other treatments because P4 treatment provides a combination of liquid organic fertilizer pineapple peel and banana peel kepok with a concentration of 40%. P4 treatment is able to provide sufficient nutrients for plants so that plants can grow well as in the previous parameters were observed. According to Prasetya's opinion in Pramitasari (2016) the fresh weight of the plant is influenced by the height and leaf area, so the higher and wider the leaves of the plant, the fresh weight produced will also be higher. This is the P4 treatment as the treatment with the highest average wet weight because it is also supported by the average of the previous parameters of plant height, number of leaves, leaf length, and leaf width of the highest average found in P4 treatment. The P0 treatment also follows from the average results in the previous parameters, therefore the P0 treatment has the lowest average value in the wet weight of round purple eggplant fruits (*Solanum melongena* L.). The wet weight diagram of eggplant fruit is presented in picture 5.



Picture 3. Diagram of leaf lenght of round purple eggplant fruit (*Solanum melongena* L.)



Picture 4. Diagram of the average leaf width of round purple eggplant fruit (*Solanum melongena* L.)



Picture 5. Diagram of wet weight of round purple eggplant fruit (*Solanum melongena* L.)

Conclusion

Based on the research that has been done, it can be concluded that the combination of liquid organic fertilizer pineapple peel (*Ananas comosus*) and banana peel kepok (*Musa paradisiaca* L.) significant effect on plant growth purple eggplant round (*Solanum melongena* L.) this can be evidenced by the increase in plant height, number of leaves, leaf length, leaf width and yield purple eggplant round (*Solanum melongena* L.). Concentration of liquid organic fertilizer pineapple peel (*Ananas comosus*) and banana peel kepok (*Musa paradisiaca* L.) for round purple eggplant plants (*Solanum melongena* L.) the right one is at a concentration of 40%, that is, 600 ml of water and 400 ml of liquid organic fertilizer.

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Vegetation Analysis of Tree-Level and Sapling on the Habitat of Rafflesia arnoldii R.Br. in the Bukik Pinang Mancuang Forest, Kamang Mudiak, Agam

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Abstract. *The forests of West Sumatra are one of the habitats for an endemic species, namely Rafflesia arnoldii R. Br. Besides being found in the Batang Palupuh Nature Reserve, this species is also found in areas where community forest products have been utilized, namely the Bukik Pinang Mancuang Forest, Kamang Mudiak, Agam. This study aims to determine population conditions and identify tree and sapling-level plant communities that support the life of R. arnoldii in the Bukik Pinang Mancuang Forest, Kamang Mudiak, Agam. Data collection was carried out in the Bukik Pinang Mancuang Forest, Kamang Mudiak, Agam from October to December 2021. Data processing was carried out at the Andalas Plant Ecology and Herbarium Laboratory, Department of Biology, FMIPA Andalas University. This research was carried out by way of a field survey using the squared plot method. Data processing uses the Indriyanto vegetation analysis formula. The results of this study found the presence of R. arnoldii in the form of 1 individual blooming flower and 2 individual rotting flowers after blooming and the results of identification of the host plant were found to be Tetrastigma leucostaphylum (Dennst.) Alston. The plant community consists of tree groups*

(33 species; 15 families) and sapling groups (37 species; 15 families). The highest important value for the tree group was Palaquium gutta (Hook.) Baill (33.27%), and the sapling group was Coffea canephora Pierre ex A. Froehner (61.31%) and became a species that was able to adapt well to the habitat and support the life of R. arnoldii.
Keywords: habitat, Bukik Pinang Mancuang Forest, Rafflesia arnoldii, tree, sapling

Abstrak. Hutan Sumatera Barat menjadi salah satu habitat spesies endemik yaitu *Rafflesia arnoldii* R. Br. Selain ditemukan di Cagar Alam Batang Palupuh, spesies ini juga ditemukan di daerah yang telah dimanfaatkan hasil hutannya oleh masyarakat yaitu Hutan Bukik Pinang Mancuang, Kamang Mudiak, Agam. Penelitian ini bertujuan untuk mengetahui kondisi populasi dan mengidentifikasi komunitas tumbuhan tingkat pohon dan sapling yang mendukung kehidupan *R. arnoldii* di Hutan Bukik Pinang Mancuang, Kamang Mudiak, Agam. Pengambilan data dilaksanakan di Hutan Bukik Pinang Mancuang, Kamang Mudiak, Agam pada bulan Oktober sampai Desember tahun 2021. Pengolahan data dilakukan di Laboratorium Ekologi Tumbuhan dan Herbarium ANDA Departemen Biologi, FMIPA Universitas Andalas. Pada penelitian ini dilakukan dengan cara survei ke lapangan dengan menggunakan metoda plot kuadrat. Pengolahan data menggunakan rumus analisis vegetasi Indriyanto. Hasil dari penelitian ini adalah ditemukan keberadaan *R. arnoldii* berupa kuncup sebanyak 1 individu dan bunga busuk setelah mekar sebanyak 2 individu dan hasil identifikasi terhadap tumbuhan inangnya diketahui merupakan jenis *Tetrastigma leucostaphylum* (Dennst.) Alston. Komunitas tumbuhan terdiri dari kelompok pohon (33 jenis; 15 famili) dan kelompok sapling (37 jenis; 15 famili). Nilai penting tertinggi untuk

kelompok pohon adalah *Palaquium gutta* (Hook.) Baill (33,27%), dan kelompok sapling adalah *Coffea canephora* Pierre ex A.Froehner (61,31%) serta menjadi spesies yang mampu beradaptasi dengan baik dengan habitat dan menunjang kehidupan *R. arnoldii.*
Kata kunci: habitat, Hutan Bukik Pinang Mancuang, Rafflesia arnoldii, pohon, sapling

Introduction

Indonesia is one of the countries which is the center of biodiversity with the richest tropical forests in the world, so it is called a mega biodiversity country [1]. The distribution of tropical rain forests in Indonesia is in large islands such as Sumatra, Kalimantan, Sulawesi, and Papua. The diversity of flora and fauna in Indonesia is among the highest in the world. Diversity value diversity biological this is much higher than in South America and Africa which also have tropical climates.

One of the forest areas that has been explored and utilized by the community for its forest products is the Bukik Pinang Mancuang Forest area, Kamang Mudiak. This forest is managed by the community and is adjacent to a limestone hill which is the mining area of PT. Bakapindo. According to data from BPLH Agam Regency, the Kamang Mudiak area is located in Kamang Magek with a forest area of 7.235 ha. Even though it's located in the vicinity of residential areas and their forest products have been utilized, the level of biodiversity in them is still very high.

Based on a survey conducted in the Bukik Pinang Mancuang forest area, rare flora species were found that needed to be preserved inside. The flora in question is the *Rafflesia arnoldi*. *R. arnoldii* is categorized as a rare flora by Ministerial Regulation No. 20 of 2018 concerning Type Protected Animals and Plants. One important factor for the

preservation of *Rafflesia* is the availability of suitable habitat so that it can support its life [2]. *Rafflesia* is included in the group of holoparasites, plants that cannot do anything the process of photosynthesis is itself, as befits other flowering plants, and very dependent on the host [3]. *Rafflesia* lives and grows with its host, *Tetrastigma*.

Tetrastigma is woody vines that creep into the canopy tree big for get light sun to get to do photosynthesis. There are 2 ways lianas could reach the canopy tree, way first is to utilize puppies or youth trees as pedestals to reach the canopy more trees high, meanwhile method second is to use a tree neighbor nearby, lianas creeping and using stem main base for reach canopy trees [3].

To carry out efforts to preserve the rare flora of *R. arnoldii*, it is necessary to conduct research on the composition and structure of the vegetation at the tree and sapling level that shelters the rare flora of *R. arnoldii* in the Bukik Pinang Mancuang Forest, Kamang Mudiak, Agam.

Research Methodology

Tools and Materials

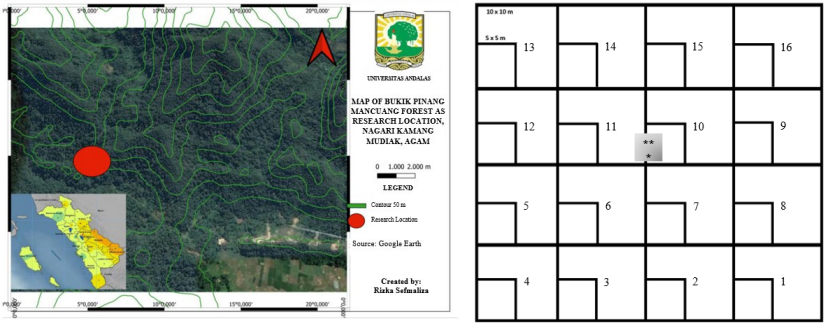
Tools used in this research are a meter, GPS, stake, and rope for plotting. Paper, hanging labels, clear plastic packing size 5 kg, scissors plants, tools write, and duct tape for collecting field samples. Digital camera, binoculars, DBH meter, thermometer, hygrometer, and lux meter. Whereas the necessary material is 70% alcohol.

Method

Plot creation

This research was started by conducting a field survey to know the habitat of *Rafflesia arnoldii* and the field conditions where the samples were taken. After getting the location counted

amount individuals *R. arnoldii* was found as well as the condition. Then proceed with making plots measuring 40x40 m, in which there is a subplot measuring 10x10 m for analysis of vegetation level tree and 5x5 m subplots for sapling vegetation analysis. Furthermore, observations were made on all levels of vegetation trees and saplings on all subplots.



(a) **(b)**

Figure 1. (a) Location map research and (b) Layout of research plots in the center of the plot there is population *Rafflesia arnoldii* and plot numbering begins from 1 to 16

Diameter Measurement

Parameters observed were plant species in the plot, DBH (Diameter at Breast Height) 1.3 m high from the ground [4], number of individuals found, common name, supporting features of each species, and documentation on each type of species for identification purposes.

Samples were collected using hanging labels containing sample numbers for species whose scientific name or unknown common name, then the specimen is preserved using 70% alcohol. Measurement of environmental factors is carried out

directly in the field, the parameters measured are ambient temperature using a thermometer, air humidity using a hygrometer, and the amount of light intensity using a Lux meter. Followed by the species identification process in ANDA Herbarium. The data analysis was carried out at the Ecology Laboratory, Department of Biology, Andalas University to see the composition and structure of the vegetation at the sapling level found.

Family Dominant and Co-dominant

Dominant and co-dominant families are searched using the formula:

$$Dominant\ family = \frac{Number\ of\ individuals \in a\ family}{The\ total\ number\ of\ individuals} \times 100\,\%$$

Family is said to be dominant if the percentage value is >20%, and is said to be co-dominant if the percentage value is 10-20% [5].

Important Value Index

An importance value index is a number that describes the level of dominance of a species in vegetation, obtained by adding up the percentage of relative density, relative frequency, and relative dominance [6] with the following equation:

$$Density = \frac{Number\ of\ species}{Total\ area\ sampled}$$

$$Relative\ density = \frac{Density\ of\ a\ species}{Total\ density\ of\ all\ species} \times 100\,\%$$

$$Frequency = \frac{Total\ of\ plots \in which\ a\ species\ occurs}{Total\ number\ of\ plots\ used}$$

$$Relative\ frequency = \frac{Frequency\ of\ a\ species}{Total\ frequency\ of\ all\ species} \times 100\,\%$$

$$Dominance = \frac{Basal\ area}{Total\ area\ sampled}$$

$$Relative\ dominance = \frac{Dominance\ of\ a\ species}{Total\ dominance\ of\ all\ species} \times 100\,\%$$

Important Value Index (IVI) = RDe + RF + R Do

Remark:

RDe = Relative Density

RF = Relative Frequency

RDo = Relative Dominance

Results And Discussion

Based on the condition moment study found *Rafflesia arnoldii* from various conditions in 3 individuals were found (Table 1), with results identification the host originated from the species *Tetrastigma leucostaphyllum*.

Table 1. Circumstances *Rafflesia arnoldii* in the region Bukik Pinang Mancuang Forest

Rafflesia arnoldii	Circumstances
Individual 1 (bloom)	Dead
Individual 2 (bud)	Life
Individual 3 (bloom)	Dead

On location research, *Rafflesia arnoldii* was found in the state of 1 bud that is still alive and 2 flowers blossom in circumstances die. In the study, [7] knob the death of *R. patma* before flowering was caused by high air humidity high, which in the end could damage buds, and cause dead roots. On location study, this obtained belonging humidity tall namely 79.22%. This could become a threat to the bud yet the blossom will die before blooming and little amount of individuals in the

population this is also caused because of several factors abiotic which is not by location one of the research is soil pH [8].

Figure 2. Position of *Rafflesia arnoldii* and *Tetrastigma leucostaphyllum.* (a) *Rafflesia arnoldii* (b) *Tetrastigma leucostapyllum*

Rafflesia arnoldii buds found live on its host which is lianas is *Tetrastigma leucostaphyllum*. Plant these vines on trees Gadog (*Bischofia javanica*) is species that many found in location studies. Proven on value density relatively have score tallest (Figure 3) and has a diameter of 32.7 cm. Next composition data vegetation from family dominant and co-dominant families in Bukik Pinang Mancuang Forest (Table 2) differ in the level of trees and saplings.

The most dominant family of level trees in the area Bukik Pinang Mancuang Forest is the family Phyllanthaceae. This show that of the 15 families found family this is the most influential in arranging vegetation area forest there. The magnitude percentage dominance family can be caused by his height level distribution and capabilities of a good adaptation family to the conditioning environment there. Family Phyllanthaceae spread all over the world area, especially in the

tropics, comprises more than 1,200 species, among them including 58 genera [9]. The family usually lives at an altitude of 20 meters above sea level up to 1,050 mdpl and can live in climate moderate [10].

Table 2. Composition of vegetation level trees and saplings in the Bukik Pinang Mancuang Forest, Kamang Mudiak, Agam

No	Level	Family	Genus	Species	Individual	(%)	Ket
1	Tree	Phyllanthaceae	5	5	14	26.42	**
		Moraceae	2	6	9	16.98	*
		Lauraceae	4	6	7	13.21	*
		Meliaceae	1	4	6	11.32	*
2	Sapling	Rubiaceae	3	3	21	28.00	**
		Lauraceae	8	10	13	17.33	*
		Euphorbiaceae	3	3	11	14.67	*
		Moraceae	2	5	8	10.67	*

Previously, Phyllanthaceae is part of the family Euphorbiaceae, however, because characteristic features some don't exist in the family, make both of them Becomes two different family. The second family this have a very easy similarity to adapt across a wide range of conditions and environments [11]. Family Phyllanthaceae are found in various forest habitat types open nor closed. Most species families this too often found associated with limestone or limestone and sometimes also can grow on a substrate that has condition extreme or less nutrition as in the species Sauropus and Phyllanthus [12].

Subsequent data on the dominating sapling vegetation came from the Rubiaceae family of 3 genera, 3 species, and 21 individuals with a composition of 28%. The co-dominant families are the Lauraceae family, the Euphorbiaceae family, and the Moraceae family. Family Rubiaceae is family-

distributed plants in a manner cosmopolitan worldwide, except in the region's poles and desert sand. Diversity's biggest family this located in the area tropical and subtropical. Height diversity family Rubiaceae is one type lots of plants used by the community. The family includes that family tolerant to various conditions and environments (type of soil, elevation, structure community, etc.)[13]. For co-dominant families with a percentage of 10–20%, namely in the families Lauraceae, Euphorbiaceae, and Moraceae According to [14] state that in the tropics the families Moraceae, Euphorbiaceae, and Lauraceae are families that have a wide distribution due to the suitability of these families. with environmental and climatic conditions in the tropics.

The index score important level the tallest tree in the *Rafflesia arnoldii* habitat in the Bukik Pinang Mancuang Forest is *Palaquium gutta* of 33.27%. Index score important species plant in something biome is one of the parameters indicating role species plant in the biome. Existence species plants in the area show ability to a wide range of habitat adaptations and tolerance to condition environment [15]. Plants that have scored important and show a level of mastery highest in the community can be called species dominant [16]. Species *Palaquium gutta* on location study this not have the highest RDe and RF values although so score RDo species this get score highest of 23.35% so create IVI species this be the highest. This shows that on location study this score RDo is very influential something species has the highest IVI [8].

Palaquium gutta in Indonesia is scattered in Sumatra and Kalimantan. Species usually live in the primary forest as well as secondary, sometimes found on the edge of a river, land sandy or soil alluvial. Species with this capable life reach 45 m high and 120 cm in diameter [17]. *Palaquium gutta* became species dominant in the forest plains low with a minimum

temperature of 22°C and a maximum of 27°C and also has bulk rain per the year of 2178 mm [18]. On location study, it also has an average temperature of 23.1°C and bulk rain ranging from 2520 – 2939 mm/year. because factor the same environment that caused it species this capable survive and dominate the community in the region.

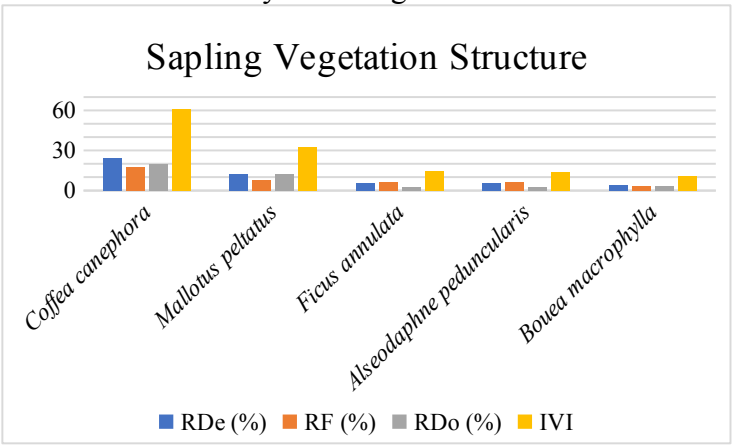


Figure 4. Five values structure vegetation sapling rate in Forest Bukik Pinang Mancuang, Kamang Mudiak, Agam

Based on research that has been conducted on the habitat of *R. arnoldii* in the Bukik Pinang Mancuang Forest, index data obtained an important value (Figure 4). The highest importance value index is found in *Coffea canephora* species. Height species IVI value *C. canephora* could be influenced by several factors such as having high adaptation to anthropogenic factors such as human activities that clear plantation land around the study site. The soil in the research location with the inceptisol type has a pH of 7.28, even though this type of soil is classified as soil that is just starting to develop and is poor in nutrients. However, some species are still able to grow well and are abundant due to their high level of adaptation and tolerance.

Location this research has an average temperature of 23.1°C with air humidity of 79.22%, and intensity light yes an average of 9.06% [19].

C. canephora is one of the strata sapling vegetation with the highest important value found in the habitat area of *R. arnoldii* which can adapt well to the environment around the habitat of *R. arnoldii* and has an important role compared to species others in the area. The highest importance value indicates that the species can adapt well to the surrounding environment and has the biggest role compared to other species in composing a vegetation community [20].

Conclusion

The vegetation composition of trees and saplings each consists of 15 families, with the Phyllanthaceae family as the tree family in the dominant level and the Rubiaceae family as the dominant family in the second family of saplings which means it supports the life and habitat of *Rafflesia arnoldii*. The structure of tree vegetation at the plant and sapling level indicates that the species *Palaquium gutta* for trees, and *Coffea canephora* for saplings are species that have good adaptation and resistance to the environment.

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Effect of Biopriming with Padina minor Seaweed Extract with Amino Acid Addition on Germination of several varieties of Rice (Oryza sativa L.)

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Abstract. *Seed germination is a crucial step in plant propagation, as it controls seedling production, stand establishment, and crop yield. The current study evaluated the effect of seaweed extract (Padina minor) with the addition of amino acids biopriming on the seed germination of three (Cinta, Banang Pulau, and upland rice UNSOED 1) rice varieties. This study used a Randomized Completely Factorial Design consisting of 2 factors and four replications. Factor A (Biostimulant) consisting of a0) distilled water, a1) P.minor extract, a2) P.minor extract + amino acid (Glycine 250 ppm, Alanine 20 ppm, Cysteine 50 ppm, Arginine 50 ppm). Factor B (Rice variety) consists of b1) upland rice Unsoed 1, b2) Cinta (Solok local varieties) , and b3) Banang Pulau (Solok local varieties) The germination responses of the bio-primed seeds were measured using six parameters, including the percentage of germination, vigor index, maximum growth potential, hypocotyl, and root length. This study showed that P. minor extract is effectively used as bio-priming for several rice varieties. Upland rice variety Inpago UNSOED 1 gave the best response to priming treatment compared to Solok rice varieties Cinta and Banang Pulau.*

Keywords*: seed priming, seaweed extract, Amino Acid, Germination, Rice.*

Abstrak. Perkecambahan benih merupakan langkah penting dalam perbanyakan tanaman, karena mengontrol produksi bibit, pembentukan tegakan, dan hasil panen. Penelitian ini mengevaluasi pengaruh ekstrak rumput laut (*Padina minor*) dengan penambahan asam amino sebagai biopriming perkecambahan benih tiga varietas padi (Cinta, Banang Pulau, dan padi gogo UNSOED 1). Penelitian ini menggunakan Rancangan Acak Lengkap dalam Faktorial yang terdiri dari 2 faktor dan 4 ulangan. Faktor A (biostimulan) terdiri dari a0) akuades , a1) ekstrak *P.minor*, a2) ekstrak *P.minor* + asam amino (Glycine 250 ppm, Alanine 20 ppm, Cysteine 50 ppm, Arginine 50 ppm). Faktor B (varietas padi) terdiri dari b1) padi gogo Inpago Unsoed 1, b2) varietas Cinta (varietas lokal Solok) , and b3) Banang Pulau (varietas lokal Solok). Respon perkecambahan benih hasil biopriming diukur dengan menggunakan lima parameter, meliputi persentase perkecambahan, indeks vigor, potensi tumbuh maksimum, hipokotil, dan panjang akar. Penelitian ini menunjukkan bahwa ekstrak *P.minor* efektif digunakan sebagai bio-priming untuk beberapa varietas padi. Padi gogo varietas Inpago UNSOED 1 memberikan respon terbaik terhadap perlakuan priming dibandingkan dengan padi Solok varietas Cinta dan Banang Pulau.
Kata kunci : priming biji, ekstrak rumput laut*, asam amino, perkecambahan, padi.*

Introduction

Priming is a pre-soaking treatment that helps the physiological process, so that seeds germinate faster [1]. It is known that there are several kinds of seed priming methods, one of which is biopriming. Biopriming is a seed treatment utilizing biological assimilation and physiological aspects that are useful

for increasing seed germination, and seedling vigor, as mobilization of soil macro and micro elements [2] [3]. Some research results related to seed priming provide positive results in increasing plant germination. The use of seaweed extract as seed priming is reported to increase germination in wheat, pea, and corn plants [4][5][6]. Seaweed extracts contain essential plant macro and micro nutrients and several plant growth regulators, such as IAA, kinetin, zeatin, and GA3, which play a significant role in seed germination [7][8]. The application of *Sargassum liebmanni* seaweed extract increased the germination percentage of *Trigonella foenum-graecum* seeds [9]. Then, priming *Phaseolus vulgaris* seeds using *Ascophyllum nodosum* also increased the germination speed index [10].

Besides seaweeds, amino acids have been widely used for seed priming as they act as hormone precursors, nitrogen sources, and stress reducers [11]. Applying seed priming with amino acids can result in better plant development, as the molecules can act as signals of plant physiological processes [12]. The application of seed priming with amino acids has been carried out on wheat and pepper plants [13] [14]. In this study, biopriming of 3 rice varieties was carried out with *Padina minor* extract with the addition of amino acids. This study aimed to examine the effect of *P. minor* extract with the addition of amino acids as biopriming in increasing the germination of 3 rice varieties, namely Cinta, Banang Pulau (local varieties) and upland rice UNSOED 1.

Research Methods

Tools and Materials

This research was conducted at the Plant Physiology Laboratory, Andalas University, Padang, West Sumatra. The research was conducted in July 2022. This study used a

Randomized Completely Factorial Design consisting of 2 factors and four replications. Factor A (Biostimulant) consisting of a0) distilled water, a1) *P.minor* extract, a2) *P.minor* extract + amino acid (Glycine 250 ppm, Alanine 20 ppm, Cysteine 50 ppm, Arginine 50 ppm). Factor B (Rice variety) consists of b1) upland rice Unsoed 1, b2) Cinta (Solok local varieties) , and b3) Banang Pulau (Solok local varieties).

Methods

Seaweed was collected in Nirwana Beach, Padang, West Sumatra, Indonesia. Seaweed was cleaned with seawater to remove sand and impurities and stored in a polythene bag during transport. Upon arrival at the laboratory, samples were thoroughly washed with tap water, drained, cut into small pieces, dried for four days, and crushed into powder. Thirty grams of seaweed powder were added to 300 ml of distilled water and left for two days. The filtrate was centrifuged at 4250 rpm for 15 minutes and filtered through Whatman No. 1 filter paper. Priming treatment was carried out by soaking rice seeds with 50 ml *P. minor* extract and adding amino acids according to the treatment. Parameters observed included germination rate, vigor index, maximum growth potential, root length, and hypocotyl length. Analysis of variance (ANOVA) was used to analyze the observation data, followed by Duncan's New Multiple Range Test (DNMRT) to determine if the treatment had a significant effect.

Results And Discussion

The effect of biopriming treatments conducted with *P. minor* extract with the addition of amino acids on the germination of several rice varieties (*Oryza sativa* L.) is presented in Table 1.

The results of the germination tests (Table 1) showed that the effects of priming treatments, variety of rice and the

interaction of these two factors on percentage of germination, vigor index, maximum growth potential, hypocotyl and root length were statistically significant ($p < 0.05$).

Cinta and Banang Pulau varieties showed no statistically significantly different responses from the bio priming treatment. In contrast, Inpago Unsoed 1 variety gave quite different responses on the parameters of the percentage of germination, vigor index, and maximum growth potential (Table 1). The percentage of germination, vigor index, and maximum growth potential of the Inpago Unsoed 1 variety was best with *Padina minor* extract compared to distilled water extract.

P.minor extract contains phytohormones such as auxins, gibberellins and cytokinins that function to stimulate and accelerate cell division, elongation, differentiation and protein synthesis [15, 9]. Auxin plays a role in triggering amylase activity and facilitating the biosynthesis of gibberellic acid. Gibberellic acid will encourage the germination process [16]. At the same time, Gibberellin plays a role in activating hydrolytic enzymes in embryo development in seeds and mobilizing food reserves contained in the endosperm to increase germination in rice [17]. In addition, the exogenous application of gibberellin acid affects the process of physiological changes in seeds, such as embryo maturation which is a response to growth regulators contained in *P.minor* extract. Gibberellin will encourage the activity of hydrolytic enzymes in the germination process of developing seeds. Gibberellin will go to the aleurone layer to form α-amylase and protease enzymes and enter the endosperm to hydrolyze starch and food reserves that help embryo development. Priming of *Capsicum annum* seed with 8% *Padina gymnospora* extract can increase the germination process and the presence of phytochemicals in *C.annum* [19].

Table 1. Average Percentage of Germination, Vigor Index, and Maximum Growth Potential, Hypocotyl and Root length of Rice treated with *P.minor* extract with amino acid addition.

Treatments	Germination Parameters				
	G (%)	VI (%)	MGP (%)	Hypocotyl Length (cm)	Root length (cm)
Aquadest x Inpago UNSOED 1	70 a	70 a	70 a	1,72 ab	3,96 bc
Aquadest x Cinta Variety	90 ab	90 ab	90 ab	2,75 d	5,89 c
Aquadest x Banang Pulau Variety	80 ab	80 ab	80 ab	2,26 bcd	2,36 ab
P.minor x Inpago UNSOED 1	100 b	100 b	100 b	2,75 d	5,43 c
P.minor x Cinta Variety	95 ab	95 ab	95 ab	2,24 bcd	5,65 c
P.minor x Banang Pulau Variety	80 ab	80 ab	80 ab	1,82 abc	1,09 a
P.minor + AA x Inpago UNSOED 1	95 ab	95 ab	95 ab	2,34 bcd	5,74 c
P.minor + AA x Cinta Variety	95 ab	95 ab	95 ab	2,47 cd	4,77 c
P.minor + AA x Banang Pulau Variety	80 ab	80 ab	80 ab	1,37 a	1,32 a

Noted : Values with different letter are significantly different from each other according to DNMRT at $p \leq 0.05$. AA = Amino acid, G = Germination, VI = Vigor Index, MGP = Maximum Growth Potential.. Means within a column with different letters are significantly different from each other according to DNMRT at $p<0.05$

Biopriming treatment with *P. minor* extract and adding amino acids to three rice varieties statistically affect hypocotyl and root length. Observation data on hypocotyl length and root length parameters Banang Pulau variety showed the lowest response compared to Cinta and Inpago UNSOED 1 varieties.

The character of each rice variety is one of the factors causing biostimulants not to affect the root and hypocotyl length of the sprout. Cinta variety has thinner skin, making it easier to break the dormancy process. The composition of cotyledons, such as protein, skin thickness, and fat, influences the inhibition process. The thicker the seed coat, the slower the water process to fill the rice husk layer cavity. The permeability of the seed coat associated with the seed coat influence the inhibition process [20].

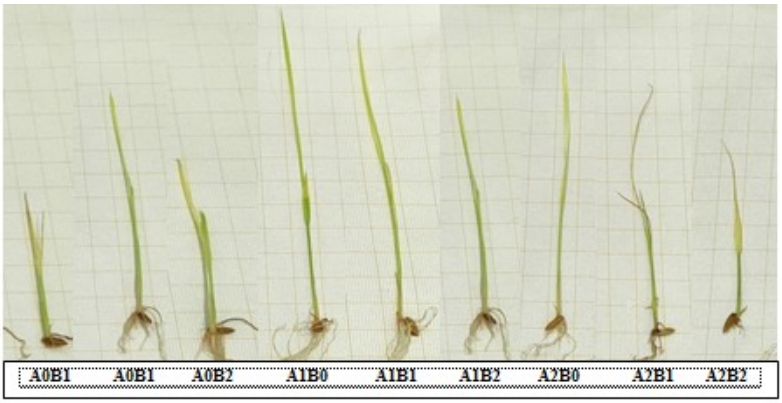

Figure 1. Effect of seed priming with *P.minor* extract and amino acids on germination of three rice varieties. A0 = Aquadest, A1 = *P.minor* extract A2 = *P.minor* extract + amino acids. B1) upland rice Unsoed 1, B2) Cinta (Solok local varieties), and B3) Banang Pulau (Solok local varieties)

Conclusion

This study showed that *P. minor* extract is effectively used as bio-priming for several rice varieties. Upland rice variety Inpago UNSOED 1 gave the best response to priming treatment compared to Solok rice varieties Cinta and Banang Pulau. Given that seed biopriming may exert a carry-over

effect on the seedling growth and yield and biochemical parameters, the further investigation remains pertinent.

Acknowledgment
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Toxicity Test of Kumpai Grass Weed Extract (*Hymenachne Amplexicaulis*) on Mortality And Histology of Gill Damage in Carp (*Cyprinus Carpio* L)

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Abstract. *This study aims to determine the toxicity of kumpai weed extract (Hymenachne amplexicaulis) on mortality and changes in the structure of the gill structure of common goldfish (Cyprinus carpio* L.*). This research was carried out using a quantitative method consisting of 4 treatments of extract concentration doses of 20%, 40%, 60% and 80%. Positive control using liquid detergent and negative control without treatment. The treatment was carried out in 4 repetitions. Preparation of gills was carried out by paraffin method using Hematoxylin-Eosin staining. Based on the results of the ANOVA test with a significance level of <0.05, it was found that kumpai grass extract had an effect on mortality and gill damage in goldfish (Cyprinus carpio* L.*) in the form of inflammatory cells, edema and necrosis. The research results showed that the most fish mortality occurred at a dose of 80% extract and the lowest occurred at a dose of 20%, this shows that the administration of kumpai grass extracthas an effect on the occurrence of mortality and gill damage in common goldfish (Cyprinus carpio* L.*).*

Keywords *: Toxicity Test, Kumpai Grass Weed (Hymenachne amplexicaulis), Goldfish (Cyprinus carpio L), Histology*

Introduction

In the waters in the territory of Indonesia, you can find kumpai grass which is one of the weeds that can live in swamps. This weed has a shape like grass in general with a size that is longer than ordinary grass. This grass is a type of weed, usually this grass forms a collection with other kumpai grasses. Generally, in a waters, the number of kumpai grass is very large and forms a collection of kumpai and can cover the surface of the water. Kumpai grass has a habitat in swamp areas, this grass has a high level of productivity but low nutrient content (Riswandi, 2014: 44)[7].

In the waters in the East Kalimantan region, to be precise, on the Mahakam River, many weeds are found, one of which is the kumpai grass weed (*Hymenachne amplexicaulis*). The large number of kumpai grass weeds (*Hymenachne amplexicaulis*) in the waters of the Mahakam River can cause the bangar phenomenon caused by weed decomposition. Bangar water events in the Mahakam River can occur 1 to 2 times a year, where this phenomenon will cause a decrease in pH and dissolved oxygen levels in the water, causing fish that live in these waters to rise to the surface of the water. Kumpai grass (*Hymenachne amplexicaulis*) which has been screened for phytochemical tests using Kumpai powder. The phytochemical test was carried out using the phenol test, the flavonoid test and the saponin test had positive results containing flavonoid compounds and saponin compounds (Febrianti, *et al* , 2019: 20)[3].

The large amount of kumpai grass (*Hymenachne amplexicaulis*) in the waters greatly influences the condition of the waters, because it can affect the life of organisms that are in these waters, an example is the occurrence of bangar water, where fish will rise to the surface of the water. Goldfish (*Cyprinus carpio* L.) is an example of fish that live in rivers.

Therefore, research is needed on extracts of kumpai weed (*Hymenachne amplexicaulis*) content to find out whether these ingredients can affect fish life and how to deal with them if the extract affects the lives of other organisms, so that it can be a solution as an effort to reduce mortality. in fish living in the water. The solution that can be done is to clean the kumpai and other weeds from the water area.

Goldfish (*Cyprinus carpio* L.) is a type of freshwater fish that has a very wide distribution in Indonesian waters. Goldfish is also a fish with a fairly high protein content. Goldfish *(Cyprinus carpio* L.) has a high protein content, so it is of great interest to the public and is widely cultivated (Sihite, *et al* , 2018: 11)[8].

The difference between this study and other studies is that this study aims to determine the substances contained in kumpai weed (*Hymenachne amplexicaulis*) which can cause mortality in fish that live in waters, one of which is carp (*Cyprinus carpio* L.) and to to determine whether there was a change in the histological structure of the gills of carp (*Cyprinus carpio* L.) that died as a result of administration of kumpai weed (*Hymenachne amplexicaulis*) extract.

Research Methodology

Tools and Materials

The tools used in this study included blenders, ponders, plastic containers, pipettes, and stationery. The materials used in this study were kumpai grass (*Hymenachne amplexicaulis*) and goldfish (*Cyprinus carpio* L).

Research Method

The type of research used in this study is the experimental method. Experiments were carried out by observing the effect of kumpai weed extract (*Hymenachne amplexicaulis*) on

mortality in carp (*Cyprinus carpio* L.) and also the histological condition of the gills of carp (*Cyprinus carpio* L.). This study used a completely randomized design (CRD) with 6 treatments and 4 repetitions.

Preparation of Kumpai Grass Extract (Hymenachne amplexicaulis)

The stages of the extraction process are carried out, namely, the kumpai grass weed (*Hymenachne amplexicaulis*) to be used is prepared, then cleaned. Kumpai grass weed (*Hymenachne amplexicaulis*) which has been cleaned is cut into small pieces. After that, the pieces of kumpai grass (*Hymenachne amplexicaulis*) are blended or crushed. The results of kumpai weed (*Hymenachne amplexicaulis*) are squeezed, this juice will be used as an extract. Kumpai grass weed extract (*Hymenachne amplexicaulis*) was then diluted using a solvent according to the concentration to be used according to each treatment. The finished extract solution is given to the container where the treatment will be carried out at doses of 20%, 40%, 60% and 80%.

Preparation of Test Animals, Administration of Extracts

The test animals to be used in this study were goldfish (*Cyprinus carpio* L.), 120 fish were taken from their habitat, goldfish (*Cyprinus carpio* L.) were transferred to 24 containers, each container filled with 5 fish. Fish that have been transferred to the container will then be acclimatized for 4 days. After the acclimatization process, the fish will be given kumpai grass extract (*Hymenachne amplexicaulis*) with different concentrations, and a container will be used as a control. There were 24 containers used in this study, consisting of 4 treatments and 2 controls, so some extracts were not given because they were controls, and other containers were given

kumpai weed extract (*Hymenachne amplexicaulis*) with different concentrations. Each container was observed for 5 days. The changes that occurred in the goldfish (*Cyprinus carpio* L.) were recorded whether there was death in the fish. According to Andiwawang (2020, 31) the percentage of mortality is calculated using the formula for the number of dead fish / number of incoming fish x 100%[9].

Preparation of Goldfish (Cyprinus carpio L.) Gill preparations
Preparation of gill preparations begins with the stage of harvesting the gill organs, then the organs are washed using 0.9% NaCl to clean the organs from the blood. After that, the organs were placed in a plakon bottle containing fixation solution for 3 hours. Then the organs were washed from the fixation solution using 70% alcohol for 1 hour and carried out until the organs were clean from the fixation solution. The dehydration stage uses 70% alcohol for 2 hours, 80% alcohol for 1 hour, 90% alcohol for 1 hour, 96% alcohol for 1 hour, and absolute alcohol for 30 minutes. During the dehydration stage the solution is replaced every 30 minutes. The clearing stage uses toluol which is left for 24 hours. Infiltration in an oven at 60° using paraffin toluol for 30 minutes, pure paraffin 1 for 50 minutes, pure paraffin 2 for 50 minutes, and pure paraffin 3 for 50 minutes. Embedding or implanting organ tissue in paraffin into small blocks. Trimming paraffin close to the organ. Organ sectioning using a microtome with a thickness of 5 to 6 µm. Affixing uses Meyer's albumen when attaching the organ to the glass slide. Deparaffinized using xylol for 5 minutes. Staining using Hematoxylin and Eosin dyes, starting with dipping the step preparations into 96%, 90%, 80%, 70%, 60%, 50%, 30% alcohol, then distilled water and then hematoxylin dye for 3 to 7 seconds. The preparations were washed using running water for 10 minutes, after which the preparations were dipped in

distilled water, alcohol 30%, 50%, 60%, 70%, eosin dye for 1 minute. The preparations were dipped in 70%, 80%, 90%, 96% alcohol, then dried. After that, soaked using xylol for 10 minutes, and covered using Canada Balsam.

Data analysis technique

The results of the mortality data that have been obtained will be analyzed using the SPSS application, using the normality test, homogeneity test, ANOVA with an accuracy level of $p < 0.05$, and Duncan's test. Histological structure of carp (*Cyprinus carpio* L.) gills was analyzed using descriptive analysis which was carried out by observing and comparing normal carp (*Cyprinus carpio* L.) gill structures with treated carp (*Cyprinus carpio* L.) gills .

Results And Discussion

Goldfish (*Cyprinus carpio* L.) reacted to the given kumpai grass extract (*Hymenachne amplexicaulis*), the reaction that occurred was a change in fish behavior to become more aggressive. This treatment was observed for 5 days and then it was seen whether there was death in carp (*Cyprinus carpio* L.) which was marked by the body of carp (*Cyprinus carpio* L.) floating to the surface of the water. After that, the number of deaths that occurred during the study period was recorded.

Mortality that occurred in carp (*Cyprinus carpio* L.) as a result of giving kumpai weed extract (*Hymenachne amplexicaulis*) after 5 days of observation can be seen in the image below. Mortality in treatment 1 dose was 20%, there were 7 deaths fish. Mortality in treatment 2 doses was 40%, there were 9 fish deaths. Mortality in treatment 3 doses was 60%, there were 12 fish deaths. Mortality in treatment 4, there were 18 fish deaths. Mortality in the positive control treatment using detergent resulted in the death of 20 fish, and mortality in

the negative control occurred in the death of 1 fish. Most common carp (*Cyprinus carpio* L.) mortality occurred at 80% dose of kumpai grass extract (*Hymenachne amplexicaulis*).
common carp (*Cyprinus carpio* L.) mortality occurred at a dose of 80% kumpai grass extract (*Hymenachne amplexicaulis*) . This shows that the greater the concentration of the extract given, the more deaths that occur and the greater the dose of the extract, the more toxic the concentration given. In the opinion of Leuwol *et al*, (2018, 195-196), the mortality that occurred in common carp (*Cyprinus carpio* L.) increased with increasing concentration given and the length of time the test was carried out. The level of concentration given and the time of exposure are also factors that affect the mortality that occurs in fish [5].

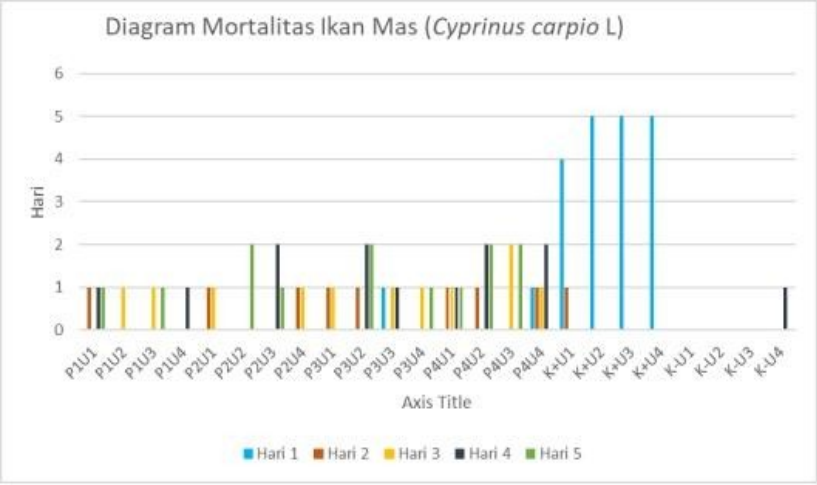

Figure 1 . Goldfish Mortality Diagram (*Cyprinus carpio* L.)

Differences in the occurrence of carp (*Cyprinus carpio* L.) mortality in each treatment could occur due to the influence of the water used as a living medium for carp during the study,

this could be because the pH of the water used was not in accordance with the pH tolerance of carp (*Cyprinus carpio* L.). The differences that occur can also be influenced by the dosage of extracts that are not the same or not right, so this is also one of the factors that influence the difference in the occurrence of mortality. Mortality can also be affected by environmental factors, this is reinforced by the theory by Alfayeat, *et al* (2020, 7), this environmental influence can be in the form of the influence of the temperature of the environment where the fish live, the amount of weeds and natural mortality can occur due to disease, predators , and also the age of the fish[1]. Based on research by Pratama, *et al* , (2020, 99), the optimal temperature for the growth of goldfish (*Cyprinus carpio* L.) ranges from 27 to 29°C[6]. This, also based on the theory by Basri, *et al* , (2019: 85) , death is closely related to changes in temperature, and has the concept that the higher the ambient temperature, the higher the natural death rate that occurs[2].

One Way Anova test results obtained an ANOVA significance of 0.000. The calculated F value obtained in the *One Way Anova test* is 121,137 and the f table value is 3.92, where the calculated F value is greater than the F table value and the significance value is 0.000 <0.05, so it can be concluded that the extract variable of kumpai grass (*Hymenachne amplexicaulis*) has a positive effect to the occurrence of mortality in carp (*Cyprinus carpio* L).

The results obtained from Duncan's test, namely in subset three there is treatment 3, and treatment 5 which are in the same subsets, which means there is no significant difference between the two treatments, but treatment 3 and treatment 5 are significantly different from treatment 1, treatment 2, treatment 4, and treatment 6. Treatment 1, treatment 2, treatment 3, treatment 4, treatment 5 and treatment 6 are significantly different from each other.

Gill Histology of Goldfish (Cyprinus carpio L.)

Histological preparations of goldfish (*Cyprinus carpio* L.) gills were made using the animal microtechnical paraffin method and using hematoxylin eosin staining and using a magnification of 100 times on a microscope. Observations were made with the aim of knowing whether there was an effect of giving kumpai weed extract (*Hymenachne amplexicaulis*) on the condition of the gills of carp (*Cyprinus carpio* L.). Observation of histological preparations of carp (*Cyprinus carpio* L.) gills was carried out by comparing the condition of normal carp (*Cyprinus carpio* L.) gills and those of carp (*Cyprinus carpio* L.) that died as a result of administration of kumpai weed extract (*Hymenachne amplexicaulis*).

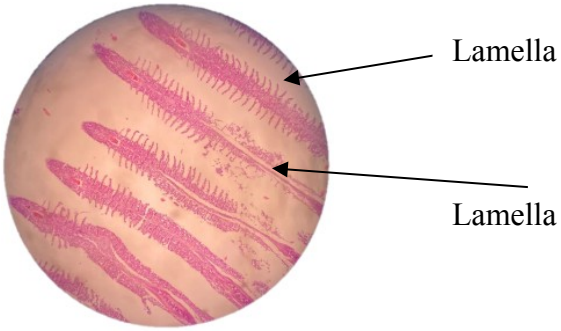

Figure 2. Normal goldfish (*Cyprinus carpio* L.) gills.

The results obtained from histological examination of the normal goldfish (*Cyprinus carpio* L.) gills without treatment showed the primary lamellae and secondary lamellae without any damage or disease occurring in the cells.

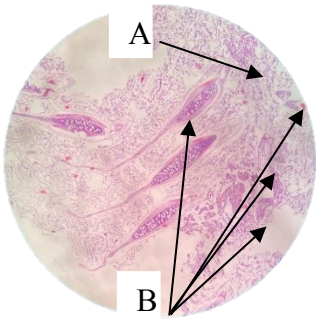

Figure 3. Goldfish (*Cyprinus carpio* L) gills die as a result of treatment. There is Edema in the Secondary Lamella (A) and Edema in the Primary Lamella (B)

The results seen in this histological preparation are edema of the primary lamellae and secondary lamellae. Edema that occurs in the secondary lamella is indicated by arrow A and edema in the primary lamella is indicated by arrow B. Edema or swelling is indicated by swollen cells in the gill tissue.

The visible results of this histological preparation are disease or damage that occurs, namely, among others, the occurrence of necrosis or tissue damage that occurs in the primary lamella to the secondary lamella which is characterized by tissue damage so that the structure of the primary lamella and secondary lamella cannot be seen clearly. Necrosis that occurs in the preparation is indicated by arrow A. In addition to necrosis, there are also inflammatory cells that are round in shape like cysts that occur in the primary lamella section indicated by arrow B in the preparation.

The results obtained from observations of carp gill preparations (*Cyprinus carpio* L), there are inflammatory cells that look like round cysts on the primary lamella and gill secondary lamella. Based on research conducted by Jumria, *et al* (2017, 21)[4], inflammatory cells show that there is an infection that occurs in parts of the organ that are experiencing

inflammation. Inflammatory cells are one of the body's defense responses to disease or injury. Necrosis is damage or cell death that occurs due to the entry of toxic substances which is characterized by cell swelling or cell death. The occurrence of necrosis begins with the occurrence of inflammation in the cells in the form of swelling and tissue death. The results obtained from observations of carp (*Cyprinus carpio* L) gill preparations showed necrosis or tissue death, which was characterized by damage to the shape or structure of the carp (*Cyprinus carpio* L.) gill tissue. The results of microscopic observation of the gills of carp (*Cyprinus carpio* L.) which were treated with kumpai grass weed extract (*Hymenachne amplexicaulis*), edema occurred in the secondary lamella and also the primary lamella, which was characterized by swelling of the tissue in that part. The swelling that occurs in edema is caused by the accumulation of fluid that occurs in the tissue cells.

The death of goldfish (*Cyprinus carpio* L.) is caused by tissue damage and disease in the gills of the fish. Fish gills are very important organs because they function as respiratory organs in fish. If the gills on the fish are damaged, it can affect the fish's life and can even cause death to the fish.

Conclusion

Based on the results of the research that has been done, it can be concluded that administration of kumpai grass weed extract (*Hymenachne amplexicaulis*) has a significant effect on the occurrence of mortality in carp (*Cyprinus carpio* L.). This is evidenced by the most common carp (*Cyprinus carpio* L.) deaths occurring in the treatment with an 80% dose of kumpai grass extract. With this it is known that the extract of kumpai weed grass (*Hymenachne amplexicaulis*) is toxic. Giving kumpai weed extract (*Hymenachne amplexicaulis*) has an

effect on the occurrence of gill damage in carp (*Cyprinus carpio* L.). It is known from histological examination of the gills of carp (*Cyprinus carpio* L.) that there is disease in the gills of carp (*Cyprinus carpio* L.), among others, namely edema, necrosis or tissue damage, and inflammatory cells.

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Forests and Tigers: Future Fate of Tiger Habitat

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Abstract. *Every year, Indonesia experiences a reduction in forest cover, including West Sumatra. It is strongly affect the sumatran tiger habitat and population. We designed the assessment modeling using the IDRISSI TerrSet to predict forest cover between 2030 and 2050 with initial forest cover data in 2000 and 2015 by elevation and slope variables. The projection of habitat suitability of sumatran tiger in 2050 was calculated by the Maximum Entropy using presence point data of sumatran tiger and environmental variables issued by WorldClim 2.1, and predicted forest cover and elevation data. The results showed that forest cover by 2000 to 2050 is decline 44.72% with details of a reduction of 280,776.53 Ha by 2000-2015, 229,571.98 Ha by 2015-2030, and 254,201.40 Ha by 2030-2050. It also predicted that the reduction impacts sumatran tiger habitat as much as 276,520.56 Ha until 2050. Forest cover reduction extremely affect the Sumatran tiger habitat. The forest degradation is also influenced by the steepness of a landscape, so it might change forest to non-forest occur more quickly in the area that is gently sloping.*

Keywords: *Future, Landscape, Endangered species, Degradation, Remaining forest.*

Introduction

Indonesia is the largest archipelago country in the world, which allocates 63% or an area of 120.6 million hectares of land, as Forest Areas, while the remaining 37% is Areas for Other Uses (APL). In addition, around 5.3 million hectares of Indonesian territorial waters have been designated as Marine Protected Areas whose management is mandated by the Ministry of Environment and Forestry. Thus it is very reasonable if natural resources in Indonesia are preserved from destruction[1].

From 2009-2018 there was a reduction in forest cover due to deforestation of 9,06 Ha. The type of forest that experienced the greatest decrease in the area was a secondary forest with a percentage of 71.2% of the total forest area lost. The conversion of forest areas into plantations and other open land is a cause of loss of forest areas in addition to natural causes, namely natural disasters[2]. The impact of reducing forest cover in addition to diversity is a global disaster. Changes in forest land to non-forest land cause global warming due to frequent forest fires[3]. Global warming is an important issue that occurs as a result of economic activities carried out without regard to the environmental impact which has caused an increase in the temperature on earth in recent years.[4].

Sumatran tigers live from the lowlands to the highlands [5]. The home range of the male Sumatran tiger is known to be around 110 km2 and the female range is between 50-70 km^2[6]. The Sumatran tiger has the smallest body size among other tiger subspecies and is very difficult to observe with the naked eye in nature. In general, potential prey animals for tigers include wild boar (*Sus scrofa*), sambar deer (*Cervus unicolor*), barking deer (*Muntiacus muntjak*), napu (*Tragulus napu*), mouse deer (*Tragulus javanicus*) and pig-tailed macaques (*Macaca nemestrina*)[5].

On the other hand, reduced forest cover can cause ecological problems of conflict between wild animals and humans, which causes animals to often leave the forest to look for food sources because forest reduction causes less prey for carnivores. In addition, human activity on the edge of the forest that has been cleared also triggers animals to enter residential areas[7]. Deforestation rates, conversion of forest areas, and high levels of poaching threats have resulted in a decline in the Sumatran tiger population in nature. As a result, the Sumatran tiger is categorized as a "critically endangered species" or a critically endangered animal which is the highest category of threat of extinction.[8]. For this reason, it is necessary to make future projections regarding the forest as a habitable habitat for Sumatran tigers in this study.

Research Methodology

Tools and materials

This study uses raster data needed in running the modeling. Two tools are used in modeling, namely IDRISI TerrSet and MaxEnt. Data used in TerrSet namely; forest cover raster files 2000 and 2015, Digital Elevation Model (Elevation and Slope). Meanwhile, for MaxEnt, the environment variable (Bioclime) is used; Rainfall, maximum temperature and minimum temperature, Sumatran tiger encounter point, elevation, and results of running data from TerrSet. Then Quantum GIS ver. 3.2 is used in analyzing the modeling results map.

Method

The method used is modeling related to land change analysis using TerrSet. The modeling will use LCM, the existing variable data is processed using the MLP (Multilayer Perceptron) Neural Network. Previously, the data will be seen which parts will be used for conversion of changes in the

Change Analysis, after that a transition potential is carried out to see the potential for land change based on the classification that has been carried out. Furthermore, variable data will be inputted to see how much influence these variables have on land change. Then do the Transition Sub-Model, using the MLP Neural Network. In carrying out this process iterations are carried out, the higher iteration, the accuracy of the modeling will be higher. On the Change prediction tab, the prediction year will be determined, which we will see changes to in the Change demand modeling section for input in 2025 and 2050, then modeling will be carried out according to the results of the previous MLP Neural Network which will produce output in the form of a soft prediction and prediction year according to the year that has been determined in the Change allocation section[9].

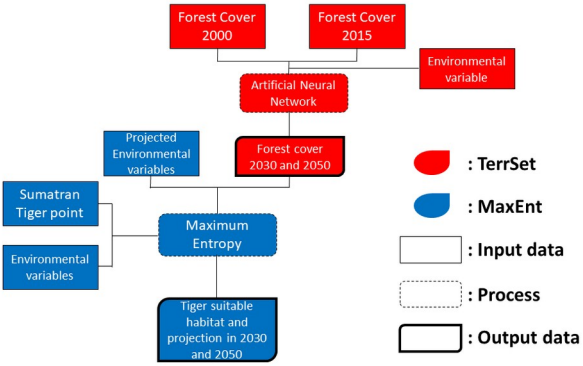

Figure 1. The flow chart used during the study.

Then for the estimation of habitable habitat for tigers, modeling is carried out using MaxEnt by projecting habitable habitat in 2030 and 2050. MaxEnt provides an output on environmental variables that are considered to contribute to the prediction model. Which will affect the results of the Jackknife

test in 3 sections, namely training gain, test gain, and area under curve (AUC). So that the variables that have been tested will produce outcomes in the form of predictive models[7].

Results And Discussion

Conditions of Forest Cover from 2000 to 2050

Based on the modeling that has been carried out using the IDRISI TerrSet, the results obtained are a reduction in the area of forest cover within a period of 50 years starting from 2000 to 2050 which is presented in the figure below.

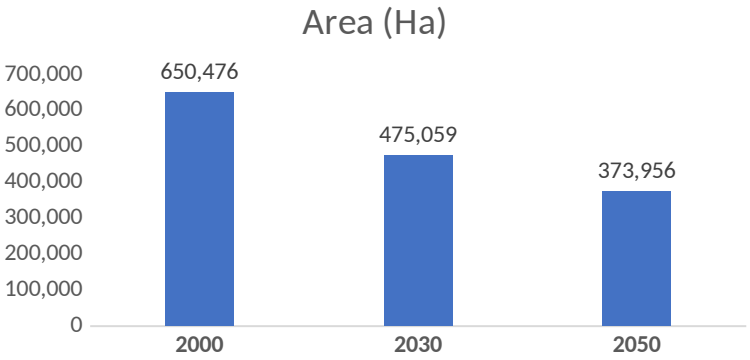

Figure 2. Diagram of reducing the area of forest cover in West Sumatra.

In a span of 50 years, West Sumatra experienced a reduction in forest cover of approximately 775,160 ha. This process each region in West Sumatra has its differences in experiencing this process. This is influenced by several factors, one of which is the slope level of the land (slope). In the western region, the rate of forest cover reduction is slower than in the eastern region of West Sumatra. This is due to the natural conditions of the western region are steep hills. The sloping land conditions trigger large-scale forest clearing with easy access[10].

The West Sumatra region that experienced the largest reduction in forest cover in the 2000 – 2050 range was Pesisir Selatan district, with a total forest cover loss of 161,931 Ha. This figure represents 21% of the total area lost over 50 years, this is due to changes in land cover from forests to plantations.

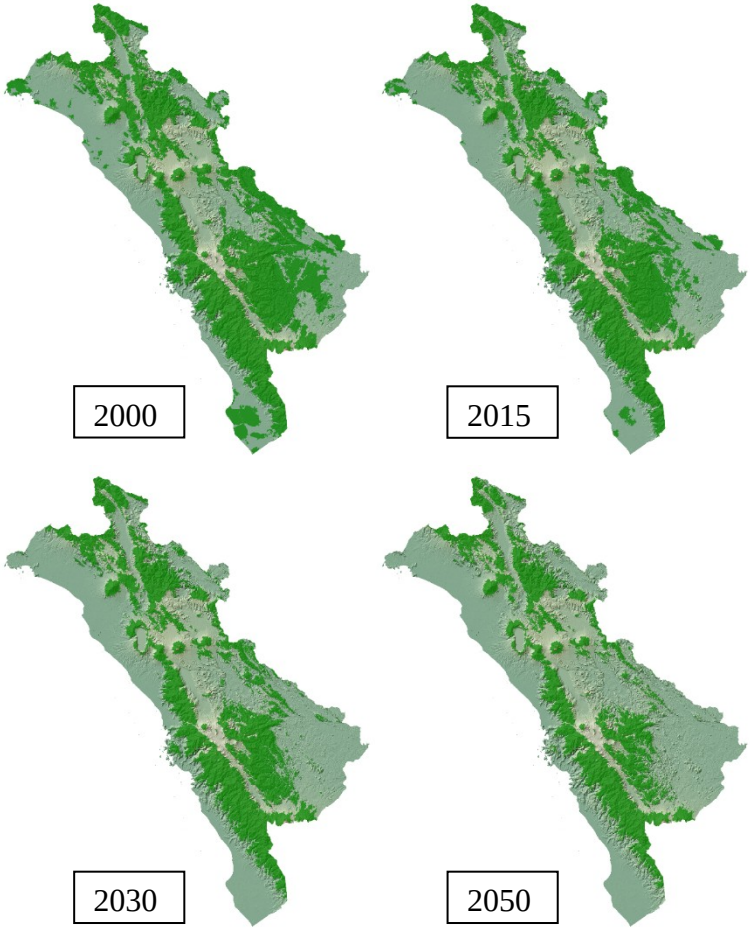

Figure 3. Changes in forest cover in West Sumatra from 2000, 2015, 2030, and 2050.

Suitable Habitat Conditions for the Sumatran Tiger from 2000 to 2050

In 2000 the area for suitable habitat for tigers was 650,476 hectares of the total forest area at that time. This is obtained based on the position of the Sumatran tiger finding point and associated with environmental data contained at that point position. Then the point data and environmental conditions will be distributed to areas that have similar characteristics with similar environmental conditions where there are no finding data. This is what the resulting matched location predictions are. For projections in 2030, the remaining suitable habitat area is around 475,059 Ha, this is due to the influence of the variable forest cover in 2030 which will also decrease. Then in 2050, the area of suitable habitat remaining will be 373,955 Ha, so the reduction in suitable habitat for the Sumatran Tiger from 2000 to 2050 is 276,520 Ha.

In reducing the area of tiger habitat, the most influential variable is forest cover, which has an impact of around 41-42% of all variables, this is because all the finding points are located in the forest area. Temperature also influences distribution projections, the dominant temperature range suitable for habitation by tigers is obtained from the range of 17ºC - 25ºC, in previous studies regarding habitat temperature ranges from 11-33.4ºC[11]**.** For elevation, the resulting altitude from 1000-1500 MASL is an area suitable for tiger habitat, which related to the distribution of tigers can be found from altitudes with a range of 0-2000 MASL [5]**.** Then the rainfall is at a value of 180 – 260 which is categorized in a forest with a wet level from wet to very wet [11].

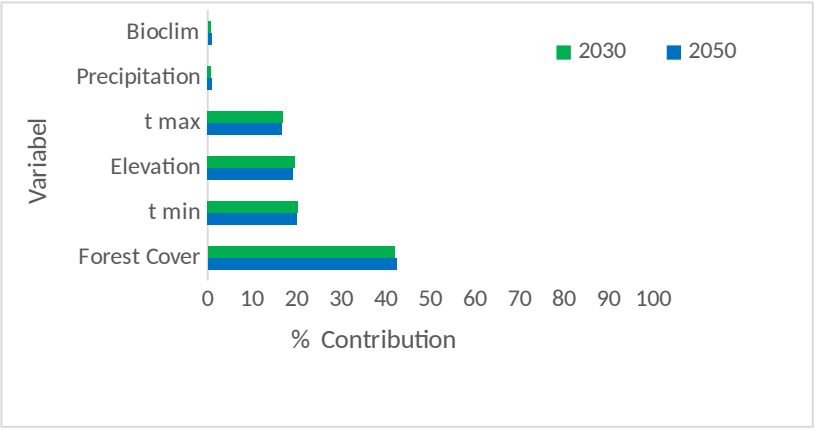

Figure 4. Reduction in suitable habitat for the Sumatran tiger from 2000 to 2050.

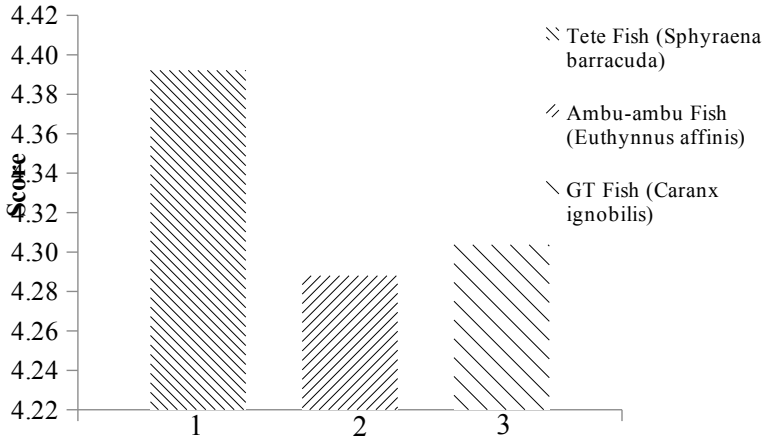

Figure 5. The percentage contribution of variables to the model.

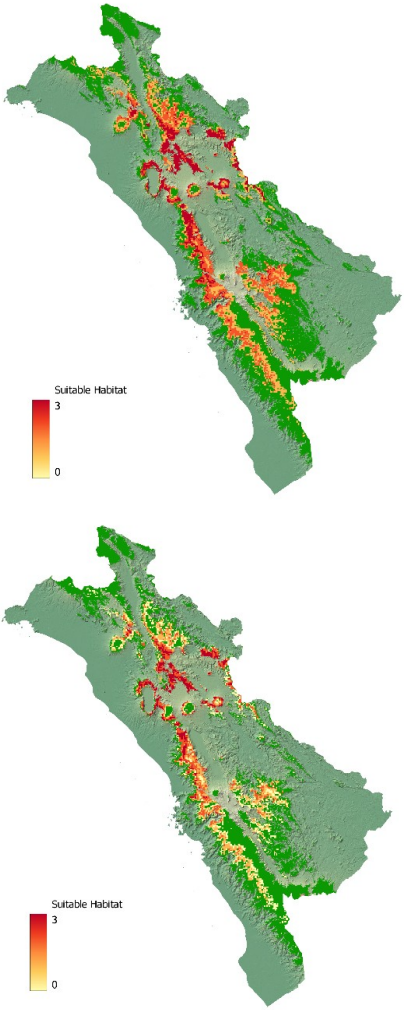

Figure 6. Sumatran tiger suitable habitat conditions in 2000 (top left), and projections in 2030 (top right), and 2050 (bottom) with a scale of 0 to 3 explaining from low to high.

In 2030, the reduction in the area of sumatran tiger habitat is predicted to be around 175,416 hectares. The northern part of West Sumatra, including the Pasaman and 50 Koto districts experienced the high loss of tiger habitat. Then in the southern region, the Solok Selatan Regency area also experienced a significant reduction in habitat area. A new suitable habitat area was formed in the northern part of the lost area, this is due to changes in forest cover in the South Solok area and this is also in line with projections of environmental conditions such as rainfall and temperature. Changes in composition, structure and even forest loss can affect the climate in a region[1].

In 2050, the sumatran tiger's habitat is projected to decrease to an area of 373,955 hectares. This is due to forest cover that is getting thinner in the predicted year. In Pesisir Selatan District, which had more Habitat Suitability in 2000, it will be lost in 2030 and 2050 due to the enormous loss of forest cover which was converted into the plantation. Land conversion causes individual competition for the availability of food and space in forest areas that are thinning and have been divided into small patches[12]

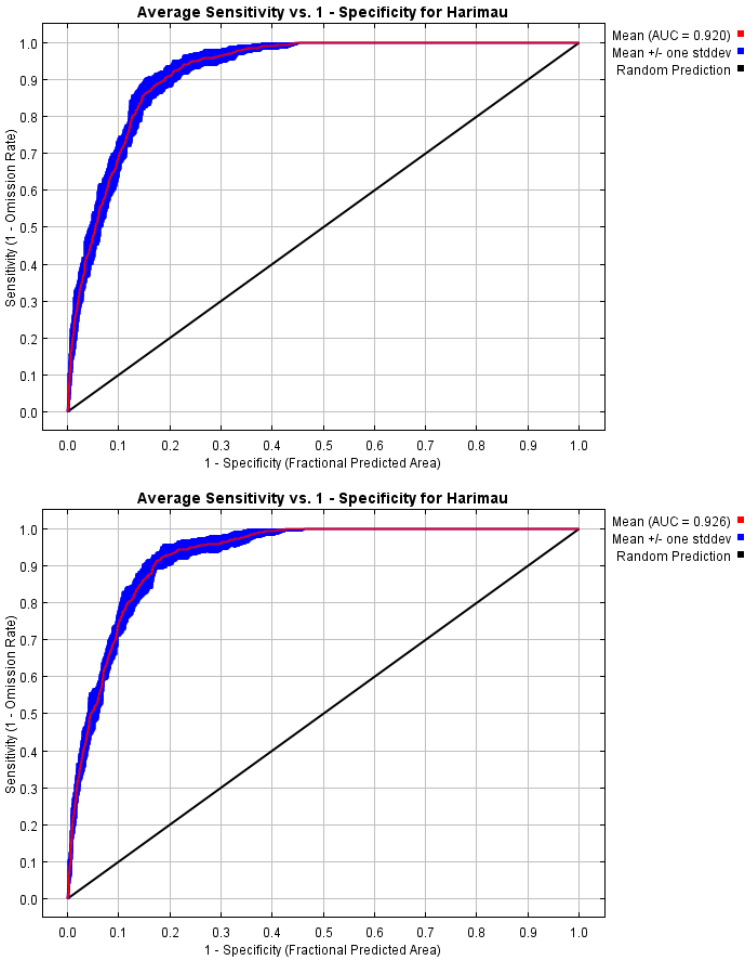

Figure 7. Prediction validation for projected models with receiver operator characteristic curve with MaxEnt model. AUC mean Area Under Curve for (top) 2030 and (below) 2050.

Conclusion

The effect of forest loss is very strong on the condition of the animals in it. This is because the forest is a place for wild animals to find shelter and breed to maintain their existence. In the study, the results showed a reduction in both aspects, which means that the loss of forest area is directly proportional to the loss of habitat for the Sumatran tiger. In the future, it is hoped that there will be a study related to the projection of the presence of prey on the habitat distribution of the Sumatran tiger in the predicted land cover in the future.

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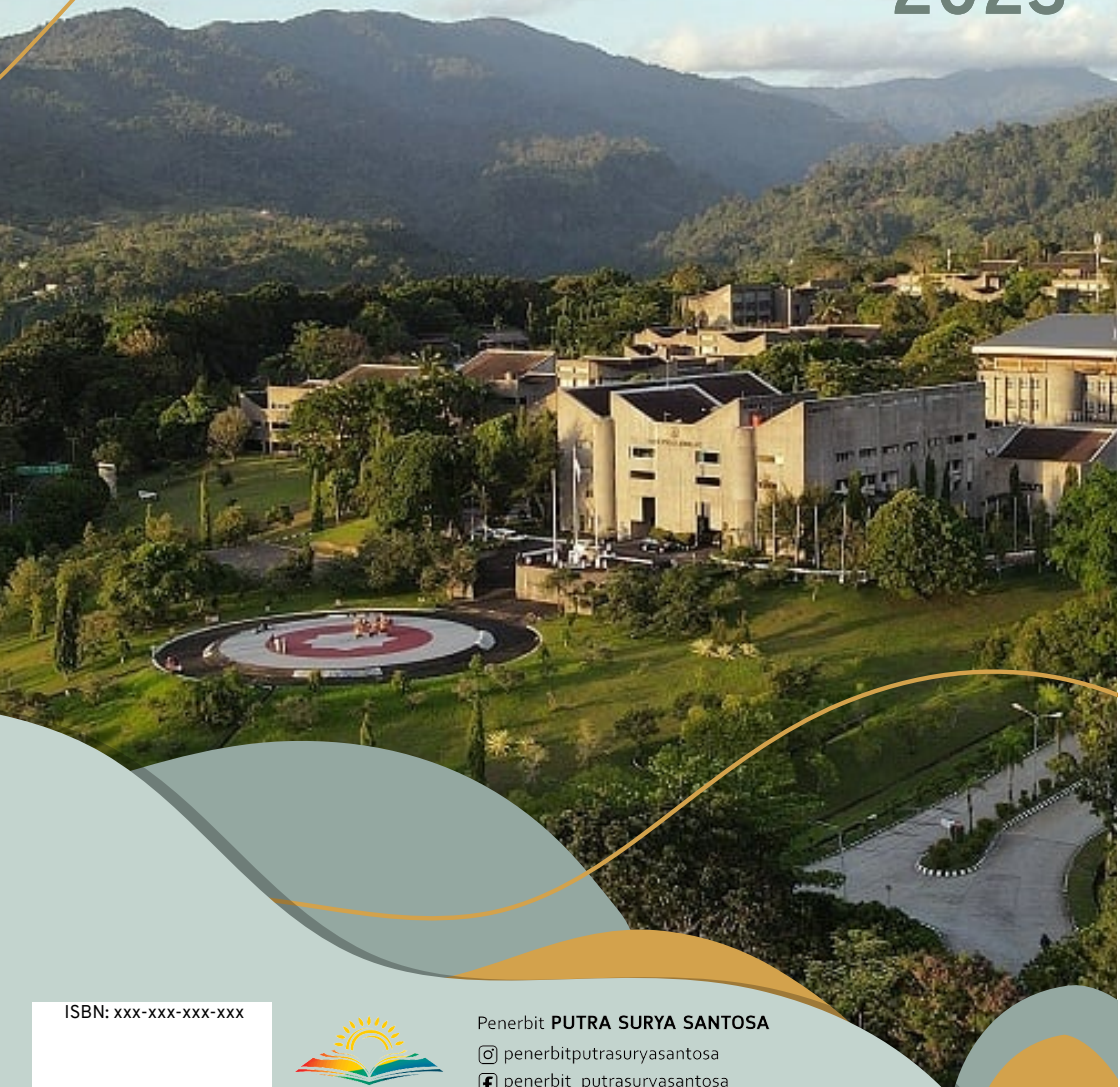

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