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ANTIMICROBIAL ACTIVITY OF GOOSEGRASS (*Eleusine indica*) PARTS (ROOTS, STEMS, AND LEAVES) AGAINST *Escherichia coli* AND *Staphylococcus aureus*

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CERTIFICATE OF PANEL APPROVAL

This paper is entitled **ANTIMICROBIAL ACTIVITY OF GOOSEGRASS (*Eleusine indica*) PARTS (ROOTS, STEMS, AND LEAVES) AGAINST *Escherichia coli* AND *Staphylococcus aureus*** prepared and submitted by **Princess Hyacinth P. Balderama, Nona Rose G. Chupuico,** and **Divine Grace V. Molde** in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY,** has been examined and recommended for acceptance and approval for ORAL EXAMINATION.

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ABSTRACT

The increasing prevalence of antibiotic resistance has underscored the urgent need for alternative antimicrobial therapies. This study investigated the antimicrobial efficacy of Eleusine indica, a traditionally used medicinal plant, against Escherichia coli and Staphylococcus aureus. This research aimed to assess the antimicrobial properties of E. indica extracts at different concentrations (50%, 70%, and 100%) and compare their effectiveness with conventional antibiotics. The study utilized a laboratory-based experimental design, measuring the inhibition zones to evaluate the plant extracts' microbial activity. Results showed that tetracycline exhibited the most potent antimicrobial activity, with significant inhibition zones observed against both bacterial strains. Among the E. indica extracts, the stem extract exhibited moderate antimicrobial effects, especially at the 100% concentration, where it demonstrated an 11 mm inhibition zone against E. coli and 2 mm against S. aureus. However, higher concentrations (70%) of the plant extracts were less effective, indicating that further optimization in extraction techniques is necessary. The findings suggest that E. indica has promising potential as an alternative antimicrobial agent. Further research is required to isolate and identify the specific bioactive compounds responsible for these effects and evaluate their safety and toxicity profiles for potential pharmaceutical development.

Keywords: antimicrobial agents, antibiotic resistance, medicinal plants, plant extracts, traditional medicine

DEDICATION

This research paper is humbly dedicated to Almighty God, whose divine guidance and blessings have made this endeavor possible. To our families, whose unconditional love, support, and encouragement have been our foundation throughout this journey. To our friends, for their constant motivation and understanding during moments of difficulty. To our instructors, for imparting invaluable knowledge and fostering in us the discipline necessary for academic and personal growth. To our adviser, for the unwavering guidance, insightful advice, and support that greatly contributed to the success of this study. And to all the individuals who believed in our potential, your trust and encouragement have been a source of strength and inspiration. This work stands as a testament to all your contributions.

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INTRODUCTION

Background of the Study

The botanical name of *Eleusine indica*, commonly known as goosegrass, is a widespread perennial herb found in tropical and subtropical regions worldwide. This plant has been historically utilized in traditional medicine for various ailments, including respiratory issues, fever, and gastrointestinal disorders (Amin et al., 2020). With its significant prevalence, *E. indica* has been highly prized in many cultures for its medicinal uses, including its antimicrobial, anti-inflammatory, and antioxidant activities, which have made it well-known as a treatment for several ailments (Ibrahim et al., 2021; Rathinavel et al., 2020).

Despite its widespread application in traditional medicine, scientific evidence to justify these assertions is still limited, and the disconnect between ancient knowledge and contemporary pharmacological proof continues to present a challenge for incorporating this plant into modern therapeutic regimes (Ali et al., 2020). Recent studies have highlighted the presence of bioactive compounds like flavonoids, alkaloids, and phenolic acids in *E. indica*, which are thought to contribute to its antimicrobial properties, specifically in combating pathogenic bacteria such as *Escherichia coli* and *Staphylococcus aureus* (Abbas et al., 2020; Yusuf et al., 2020). However, further research is needed to elucidate the precise mechanisms behind its antimicrobial activity and explore its full potential as a natural alternative in treating bacterial infections (Santos et al., 2020).

The roots, stems, and leaves of *E. indic*a all contribute to its therapeutic potential, though their comparative efficacy in treating bacterial infections remains less understood.

While *E. indica* has shown promise in traditional medicine as a remedy for various conditions—including asthma, urinary tract infections, and flu symptoms—there is still a need for scientific validation of its effectiveness and the specific mechanisms by which its different parts (roots, stems, and leaves) exert antimicrobial effects against *E. coli* and *S. aureus* (Patel et al., 2020). More studies comparing the antimicrobial properties of these plant parts may give helpful information on how to best use *E. indica* as a natural substitute in the fight against bacterial infections. Yet, much must be discovered to fully realize this plant's clinical potential and therapeutic value in contemporary medicine.

Eleusine indica's therapeutic applications are not limited to Southeast Asia alone, where it has been a drug of very long standing used to treat a variety of conditions. In other tropical regions, including Africa, India, and Latin America*, E. indica* is also an integral part of traditional medicine. In South India, for example, it is commonly used to treat respiratory disorders, gastrointestinal issues, and skin infections (Suresh & Selvamani, 2020).

Additionally, while *Eleusine indica* is widely used in developing countries, particularly in the Philippines, for treating a variety of common ailments such as infections, and inflammation, and even as a potential anticancer agent, there is a noticeable lack of rigorous clinical studies to validate these claims (Nas et al., 2020). This research will play a crucial role in bridging the knowledge gap between traditional use and modern scientific understanding, potentially paving the way for the plant's inclusion in modern pharmacological practices.

Objectives of the Study

The general objective of this study was to evaluate the antimicrobial effects of the *Eleusine indica*'s roots, stems, and leaves against *Escherichia coli* and *Staphylococcus aureus*. Specifically, it aimed to determine which part—root, stem, or leaves—exhibited the most potent antimicrobial activity when extracted using ethanol at three different concentrations: 100%, 70%, and 50%.

Significance of the Study

This study held significant value as it provided insights into natural, plant-based antimicrobial agents against *Escherichia coli* and *Staphylococcus aureus* and presented potential alternative treatments or preventive measures for bacterial infections. Through an examination of the antimicrobial activity of *Eleusine indica*, the research filled the gap between conventional knowledge and scientific use, paving the way for innovative approaches in fighting bacterial infections from natural resources.

Scope and Delimitation

The study was conducted from December 2024 to April 2025, focusing on the antimicrobial activity of each plant part of *Eleusine indica* specifically against *Escherichia coli (E. coli)* and *Staphylococcus aureus (S. aureus).* The study was limited to *E. coli* and *S. aureus* and does not include an assessment of the plant's effects on other bacterial strains, which may restrict the generalizability of the findings to other organisms. Additionally, the study was limited to using ethanol as the sole solvent at concentrations of 100%, 70%, and 50% to evaluate its effectiveness.

MATERIALS AND METHODS

Research Design

This study employed an experimental research design to investigate the medicinal uses of *Eleusine indica*. The quantitative component included laboratory-based analyses which is the antimicrobial testing, to assess the plant's efficacy against the pathogens *Escherichia coli* and *Staphylococcus aureus*. Descriptive statistics was employed to determine relationships between specific compounds and their medicinal activities.

Research Setting

The study was conducted in Misamis University laboratories, the College of Medical Technology and at the Department of Natural Science and the plant collection was done in Barangay Aguada, Ozamiz City, located in the province of Misamis Occidental, Northern Mindanao, Philippines. Ozamiz City is famous for its rich biodiversity and diverse flora, making it an ideal location for ecological and botanical studies. The area is characterized by favorable climate and soil conditions, which support a wide variety of native and cultivated plant species.

Plant Materials and Extract Preparation

Mature, green leaves of *Eleusine indica* were identified and collected from the botanical site in Barangay Aguada, Ozamiz City (Figure A). Following the authentication of the plant species, the specimens were stored at room temperature to preserve their integrity. The collected plant material was thoroughly washed with distilled water to remove impurities, then cut into small, uniform pieces. The plant parts were air-dried in

the shade for a period of four weeks to ensure that moisture content is minimized without compromising the integrity of the phytochemicals. Once dried, the plant material was finely ground into a powder using an electric grinder to increase surface area for extraction (Magadelin et al., 2023).

Figure A. Goosegrass (*Eleusine indica*) collected from the sites

A 100g sample of the powdered plant material was placed in a conical flask, and maceration was carried out using 500 mL of a chosen solvent. The mixture was stirred at intervals and left to macerate at room temperature for 72 hours. Maceration is a process that helps break down plant cell walls, making it easier for soluble bioactive compounds to be released (Handa et al., 2008). After maceration, the solution was filtered, and the obtained supernatant was dried and concentrated using a rotary evaporator at low pressure under a temperature of 50°C. This step ensured the efficient recovery of the plant's bioactive constituents for subsequent analysis (Figure B).

Conceptual Framework

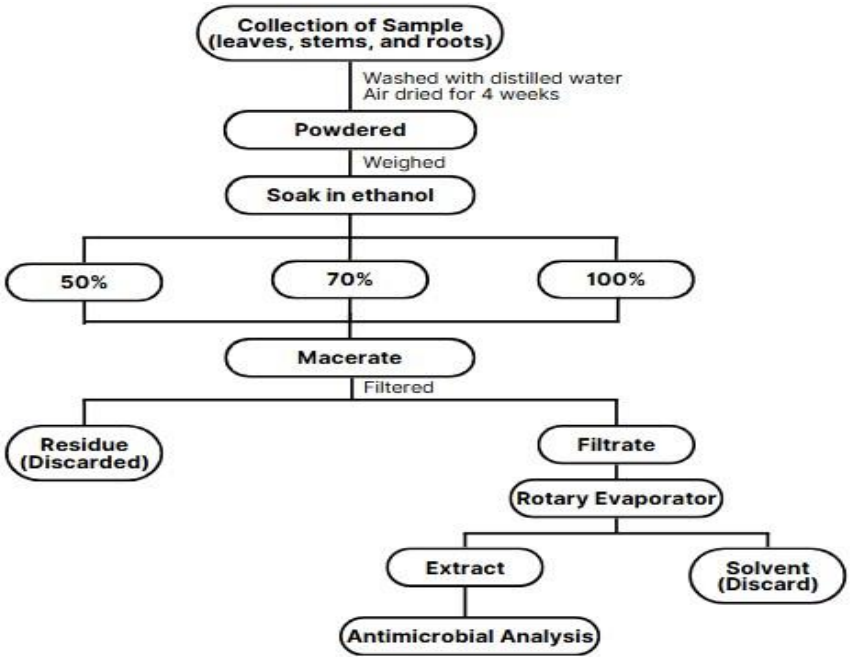

Figure B. Schematic diagram of the study

This diagram depicts the extraction and analysis of the antibacterial properties from plant sources. The procedure includes collecting, washing, drying, powdering, macerating, filtering, and concentrating the filtrate and the extract were used for determining its antibacterial properties.

Antimicrobial Activity

The increasing prevalence of antibiotic resistance underscores the importance of exploring alternative antimicrobial agents derived from natural sources. Plant-based antimicrobials, such as those from *Eleusine indica*, offer a sustainable and effective alternative to synthetic antibiotics, reducing the risk of resistance and minimizing adverse side effects. These natural compounds also hold potential for future applications in healthcare and pharmaceutical development (Borges et al., 2015).

The antimicrobial activity of *Eleusine indica* extracts was assessed using the disc diffusion method. To prepare the medium, 38 g of Mueller-Hinton Agar (Hi-Media) was dissolved in 1,000 mL of distilled water and sterilized by autoclaving at 121°C for 15 minutes under 15 pounds of pressure (pH 7.3). After cooling and mixing thoroughly, the medium was poured into sterile petri plates (25 mL/plate) and allowed to solidify (CLSI, 2023).

Pathogenic bacterial culture of *Escherichia coli* and *Staphylococcus aureus* were uniformly swabbed onto the prepared plates. Sterile filter paper discs were then loaded with 25 µL, 50 µL, and 75 µL of the plant extract and placed on the agar surface. The plates were incubated at 37°C for 24 hours to allow bacterial growth and interaction with the plant extracts.

After incubation, the inhibition zones surrounding the discs were measured in millimeters using a transparent ruler. The antimicrobial activity was then ranked according to the size of the inhibition zones. Any zone of inhibition with a size of more than 11 mm was deemed to be sensitive, whereas any zone measuring between 8 and 10 mm was regarded as moderate. Finally, a zone of inhibition of less than 7 mm was regarded as resistant.

The absence of an inhibition zone indicated no detectable antimicrobial activity (Kohner et al., 1994; Mathabe et al., 2006; Assam et al., 2010). These results provided insights into the antimicrobial potential of *Eleusine indica* and its efficacy against clinically relevant pathogens.

Biosafety, Biosecurity, and Biowaste Management

Since the research involved Biosafety Level 2 (BSL-2) organisms, standard precautions were implemented, including the use of personal protective equipment (PPE) such as lab gowns, gloves, face masks, and eyewear. All microbial handling was performed inside a biosafety cabinet, with strict hand hygiene and surface decontamination using 70% ethanol before and after procedures. To maintain biosecurity, access to the laboratory was restricted to authorized personnel, and bacterial cultures were securely stored and properly labeled. Accurate records of microbial inventories and activities were maintained. For biowaste management, infectious materials such as bacterial cultures, contaminated plant parts, and used consumables were collected in biohazard bags, disinfected, and autoclaved at 121°C for 15–20 minutes before disposal. Liquid waste was treated with 10% sodium hypochlorite for at least 30 minutes prior to disposal. Non-infectious plant waste was segregated and discarded according to local waste management protocols (World Health Organization, 2004; Centers for Disease Control and Prevention, 2020; Department of Health, 2017).

RESULTS AND DISCUSSION

Antimicrobial Effects of Goosegrass Parts Against *Escherichia coli* at Different Concentrations

Eleusine indica extracts exhibited more notable antimicrobial activity against *Escherichia coli (E. coli),* a gram-negative bacterium, particularly at higher concentrations. At the 100% concentration, the stem extract demonstrated a 11mm inhibition zone, highlighting its significant potential against *E. coli*, which is known for its resilience due to its outer membrane (Table 1). The ability of *E. indica* to inhibit *E. coli* growth is promising, especially given the structural challenges presented by the outer membrane of gram-negative bacteria. This suggests that the bioactive compounds in *E. indica*, particularly in the stem extract, may be capable of overcoming these bacterial defenses.

The root extract, like the stem, showed dose-dependent antimicrobial activity against *E. coli*. At lower concentrations (50% and 70%), the inhibition zones were small (1 mm). However, at the 100% concentration, the inhibition zone increased to 5 mm, further supporting the idea that concentration plays a critical role in the plant's antimicrobial efficacy. The leaf extract again failed to show significant antimicrobial activity against *E. coli*, reinforcing the observation made with *S. aureus* that the leaf may not be a primary source of antimicrobial compounds in *E. indica* (Figure 1).

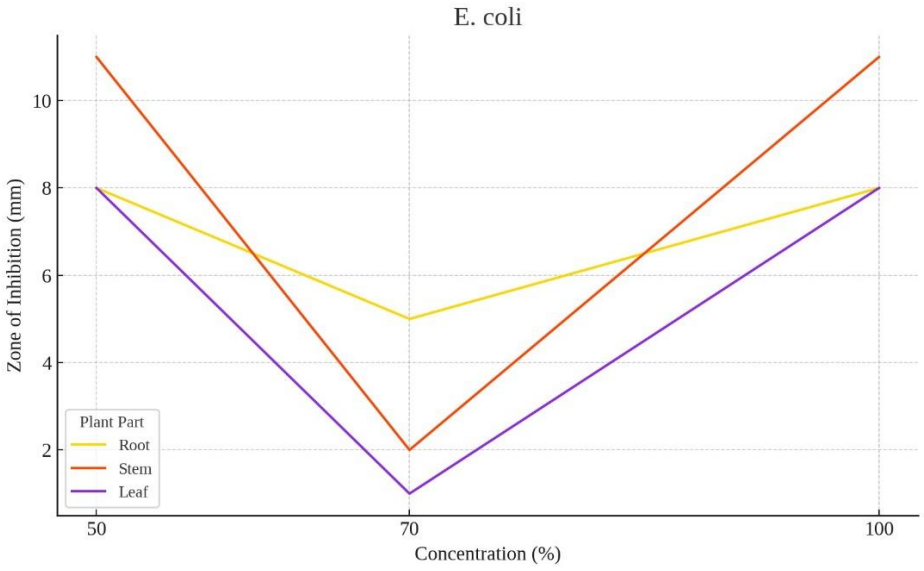

Figure 1. *E. coli* results in different concentrations

These results suggest that the stem and root extracts of *E. indica* contain bioactive compounds such as flavonoids, alkaloids, and terpenoids, which are known to have antimicrobial properties (Sukor et al., 2023).

Antimicrobial Effects of Goosegrass Parts Against *Staphylococcus aureus* at Different Concentrations

The experimental results show that *Eleusine indica* stem and root extracts exhibit moderate antimicrobial activity against *Staphylococcus aureus (S. aureus),* a gram-positive bacterium (Table 1). At the highest concentration (100%), the stem extract showed a 2 mm inhibition zone, indicating that the stem of *E. indica* may contain antimicrobial properties, albeit at a lower potency compared to conventional antibiotics such as tetracycline, which showed a considerably larger inhibition zone. This suggests that while the stem extract holds promise as an antimicrobial agent, its effectiveness may be limited when compared

to synthetic antibiotics. The root extract exhibited a more pronounced dose-dependent antimicrobial activity, with the 100% concentration showing a 5 mm inhibition zone against *S. aureus* (Figure 2). This supports the hypothesis that concentration is a significant factor influencing the antimicrobial efficacy of plant extracts, with higher concentrations containing more bioactive compounds capable of inhibiting bacterial growth.

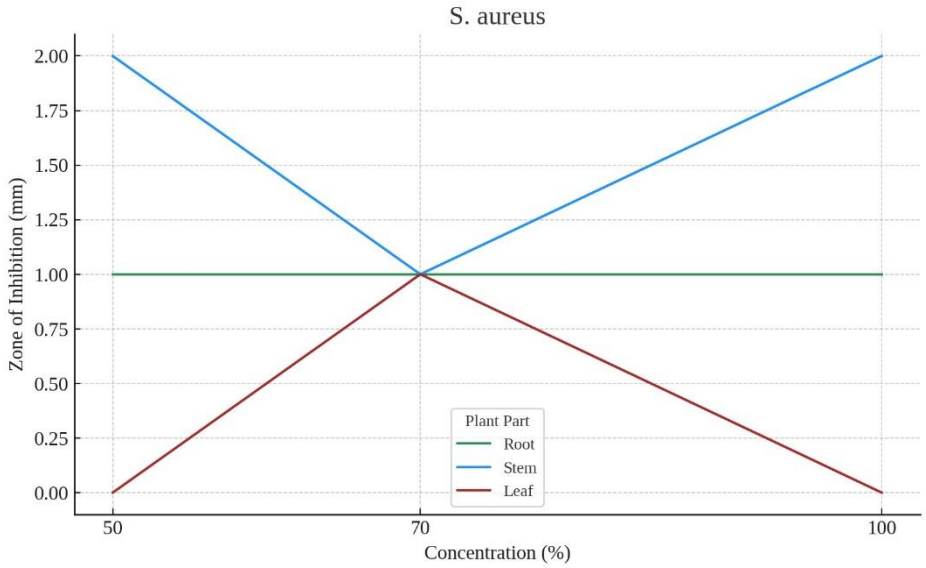

Figure 2. *S. aureus* results in different concentrations

Table 1. Inhibitory Effects on *E. coli* and *S. aureus* under different concentrations

BACTERIAL STRAIN	EXTRACT TYPE	CONCENTRATIONS	ZONE OF INHIBITION	BACTERIAL STRAIN	EXTRACT TYPE	CONCENTRATIONS	ZONE OF INHIBITION
	AK (Amikacin)	100%	7 mm		TE (Tetracycline)	100%	12 mm
	E (Erythromycin)	100%	0 mm		E (Erythromycin)	100%	4 mm
	AM (Ampicillin)	100%	10 mm		AM (Ampicillin)	100%	0 mm
	TE (Tetracycline)	100%	12 mm		RA (Rifampicin)	100%	1 mm
	P (Penicillin)	100%	0 mm		P (Penicillin)	100%	0 mm
	Root Extract	100%	8 mm		Root Extract	100%	1 mm
E. coli	Root Extract	70%	5 mm	*S. aureus*	Root Extract	70%	1 mm
	Root Extract	50%	8 mm		Root Extract	50%	1 mm
	Stem Extract	100%	11 mm		Stem Extract	100%	2 mm
	Stem Extract	70%	2 mm		Stem Extract	70%	1 mm
	Stem Extract	50%	11 mm		Stem Extract	50%	2 mm
	Leaf Extract	100%	8 mm		Leaf Extract	100%	0 mm
	Leaf Extract	70%	1 mm		Leaf Extract	70%	1 mm
	Leaf Extract	50%	8 mm		Leaf Extract	50%	0 mm

The antimicrobial activity seen in the stem and root extracts of *E. indica* can be attributed to the secondary metabolites flavonoids, alkaloids, and terpenoids. These substances have been shown in various studies to possess antibacterial, antifungal, and anti-inflammatory activities (Sukor et al., 2023; Kamu et al., 2025). The results from this study confirm these findings since the stem and root extracts were found to show high antimicrobial activity, especially when concentrated. The dose-dependent antimicrobial effects observed further suggest that higher concentrations of *E. indica* extracts release larger quantities of bioactive compounds, thereby enhancing their antimicrobial effectiveness.

The differences in antimicrobial activity observed against *S. aureus* and *E. coli* are likely due to the structural differences between gram-positive and gram-negative bacteria. Gram-negative bacteria like *E. coli* possess an outer membrane that acts as a barrier to many antimicrobial agents, which may explain their inherent resistance to many traditional antibiotics. The ability of *E. indica* extracts, particularly the stem extract, to inhibit *E. coli* growth despite this defense mechanism suggests that its bioactive compounds can penetrate this outer membrane and disrupting bacterial processes. This is particularly promising, as gram-negative bacteria are often more difficult to treat with conventional antibiotics due to their more robust resistance mechanisms (Kamu et al., 2025).

The findings from this study have significant implications for the future use of *E. indica* as a natural antimicrobial agent. The global rise of antibiotic resistance has made the search for alternative antimicrobial therapies more urgent, and plant-based antimicrobials like *E. indica* offer a promising solution. The stem and root extracts of *E. indica* show significant potential in combating both gram-positive (*S. aureus*) and gram-negative (*E. coli*) bacterial infections, particularly at higher concentrations. This suggests that *E. indica* could be developed as a viable natural alternative to synthetic antibiotics, especially in areas where antibiotics are either ineffective or inaccessible due to rising resistance (Kamu et al., 2025).

CONCLUSION AND RECOMMENDATIONS

This study has successfully demonstrated that *Eleusine indica* possessed antimicrobial activity, particularly in its stem and root extracts. Higher concentrations of the stem extract exhibited moderate antibacterial effects against both *Escherichia coli* and *Staphylococcus aureus*, with a more pronounced inhibition observed against *E. coli*. The leaf extract showed no antimicrobial activity. Additionally, the antimicrobial effect of *E. indica* was found to be concentration-dependent, with higher concentrations producing larger inhibition zones.

Future researchers are encouraged to further explore the antimicrobial potential of *E. indica*. A detailed phytochemical analysis of its stem and root extracts is recommended to identify the bioactive compounds responsible for its effects. Studies should also investigate its molecular mechanisms, potential synergy with antibiotics, and optimize extraction methods to enhance potency. In vivo studies and clinical trials are needed to confirm its safety, efficacy, and proper dosage. Lastly, future research should explore *E. indica*'s other medicinal properties, such as its anti-inflammatory, antioxidant, and cytotoxic activities, for broader therapeutic use.

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APPENDICES

APPENDIX A

Approved Letters of Consent

Misamis University
Ozamiz City
COLLEGE OF MEDICAL TECHNOLOGY

CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

PERMISSION TO CONDUCT THE STUDY

Research Title:

A COMPARATIVE ANALYSIS OF THE ANTIMICROBIAL ACTIVITY OF *Eleusine indica*'s PARTS AGAINST *Escherichia coli* AND *Staphylococcus saprophyticus*

Researchers: Balderama, Princess Hyacinth P.
Chupuico, Nona Rose G.
Molde, Divine Grace V.

Research Objectives:

This study aims to determine which part of Eleusine indica (root, stem, or leaves) exhibits the most potent antimicrobial activity against Escherichia coli and Staphylococcus saprophyticus.

Research Gap:

The current knowledge regarding the specific antimicrobial properties of the root, stem, and leaf components of Eleusine indica remains limited, particularly in relation to their effects on *Escherichia coli* and *Staphylococcus saprophyticus*. This lack of detailed understanding underscores the importance of conducting further research to explore and characterize these components and their potential applications in combating these microorganisms.

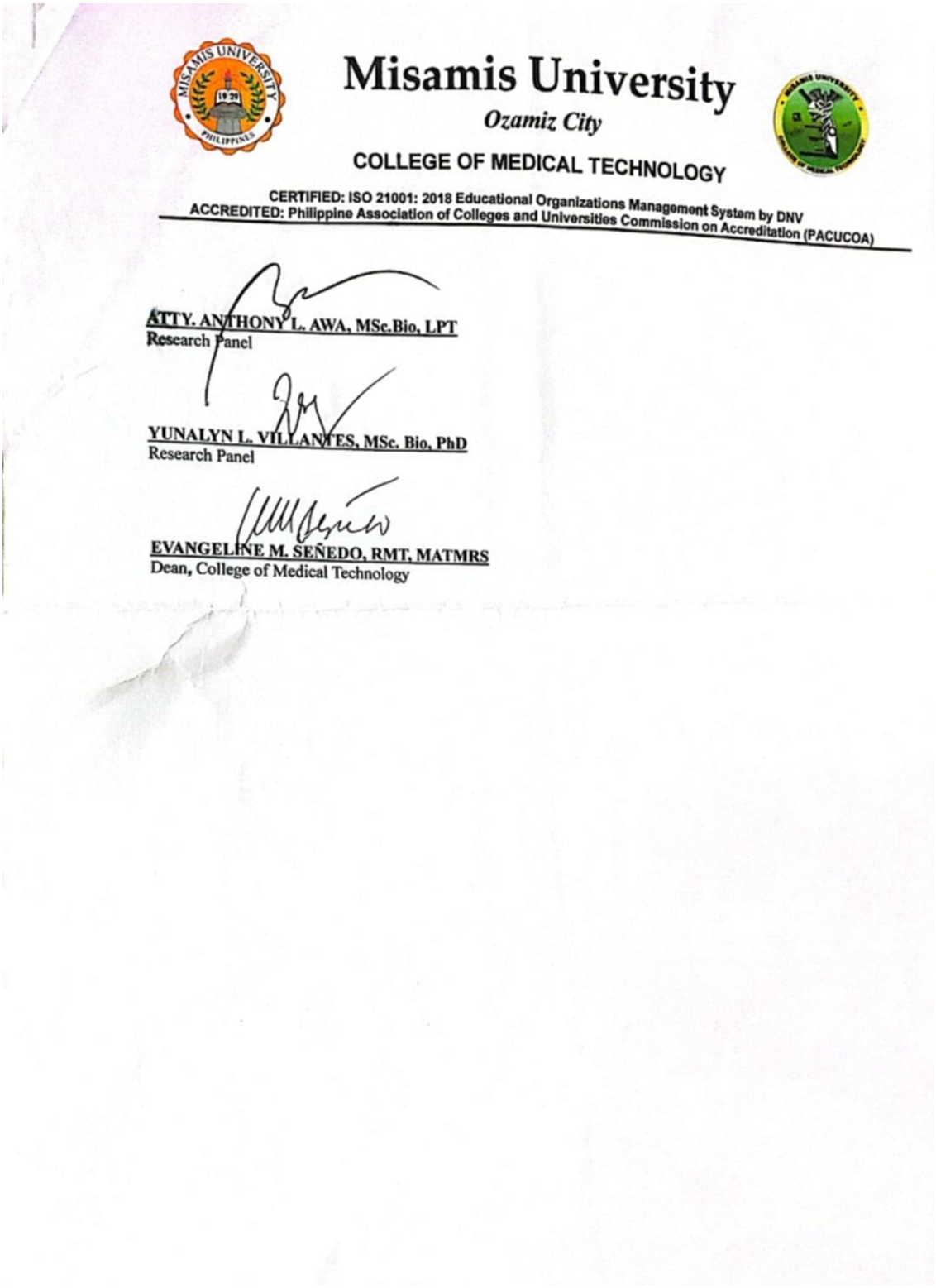
Noted by:

SHAIRA ALAINA U. GUIAMAN, MSc
Research Panel

KARL MAXEL O. LAO, RMT, MSc.MLS
Research Panel

NELFA D. CANINI, LPT, MSc.Bio, MAEd, PhD
Research Instructor

APPENDIX A Cont'd



Misamis University

Ozamiz City

COLLEGE OF MEDICAL TECHNOLOGY

CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

ATTY. ANTHONY L. AWA, MSc.Bio, LPT
Research Panel

YUNALYN L. VILLANTES, MSc. Bio, PhD
Research Panel

EVANGELINE M. SEÑEDO, RMT, MATMRS
Dean, College of Medical Technology

APPENDIX A Cont'd

Misamis University

Ozamiz City

MISAMIS UNIVERSITY RESEARCH CENTER

CERTIFIED: ISO 21001: 2018 Educational Organizations Management System by DNV
ACCREDITED: Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA)

MU-RC-042/13 November 2024

Thesis/Research Data Gathering Approval Form

Date: January 9, 2025

Name of Authors: PRINCESS HYACINTH P. BALDERAMA, NONA ROSE G. CHAPLICO, DNINE GRACE MOLDE
College/Department: MEDICAL TECHNOLOGY
Research Title: A COMPARATIVE ANALYSIS OF THE ANTIMICROBIAL PROPERTIES OF Eleusine indica's PARTS (LEAVES, ROOTS, STEM) AGAINST E. coli AND S. saprophyticus

Data Gathering Procedure:

a. Type of Research: *(Kindly check)*

- [ ] Quantitative
- [ ] Qualitative
- [x] Experimental
- [ ] Approved Research Title & Problem/Objectives
- [ ] Approved Data Gathering Procedure
- [ ] Approved Data Gathering Instrument/Data Sheets

b. Respondents/Participants/Subject/Samples to be Collected: Eleusine indica (GOOSEGRASS)

c. Procedure:

- [ ] Survey
- [ ] Interview
- [x] Experimentation
- [ ] Laboratory Testing

d. Place of Implementation/Study Area: MISAMIS UNIVERSITY

If to be conducted outside the school campus, indicate the nature of transportation to be used:

- [ ] Own private vehicle
- [ ] public utility vehicle
- [ ] rental
- [ ] Others, please indicate

e. Date/s of Implementation/Sampling:

Attachments:

- [ ] Approved Letter of Consent from the designated authority in the area/place were the study is to be conducted
- [ ] Signed Parents' Consent

The thesis proposal mentioned above is hereby recommended for the commencement of data gathering implementation.

Recommended by:

STAIRA ALAINE U. GUANZON
Thesis/Research Adviser

NELFA D. CANINI, LPT, PhD
Thesis/Research Instructor

Approved by:

College Dean

APPENDIX A Cont'd

MISAMIS UNVERSITY
Ozamiz City
Department of Student Affairs & Services

MU-DSAS-006/02June2023

PARENT'S CONSENT

RESEARCH 01/30/25
Sponsoring Group/Organization

I am allowing my son/daughter/ward, NONA ROSE G. OTHUPUICO, to join the OF A COMPARATIVE ANALYSIS OF THE ANTIMICROBIAL PROPERTIES Eleusine indica's PARTS AGAINST E. coli AND S. saprophyticus *(activity)* to be held on JANUARY - MARCH 2025 at OZAMIZ CITY under the supervision of MS. SHAIKA ALAINA U. GUIAMAN *(Adviser/Faculty)*.

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

CATHERINE G. OTHUPUICO
Signature over printed name of **Parent/Guardian**

01-30-25
Date

NONA ROSE G. OTHUPUICO
Signature over printed name of **Student**

01-30-25
Date

***Important*: This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.**

SUBSCRIBED AND SWORN to before me, this 30 JAN 2025 day of _____ at OZAMIZ CITY, Philippines, that the herein affiant personally came and appeared with his/her _____, as evidence of his/her personal identity.

Doc. No. 373
Page No. 75
Book No. XXXX
Series of 20 25

ATTY. DANIEL C. LAO
Notary Public
Appointment No. 12 (2023-2025)
For the City of Ozamiz Notary Public
Province Until Misamis Occidental
Until Dec PTR No. 2025
Gomez IBP No. Street,
Misamis TIN No. Philippines
PTR No Roll No. 33-04/07/2025-Ozamiz City
IBP No. 02373 (Lifetime)
Roll No. 29112

(For DSAS Personnel only)

Attested by:

NELPA M. CAPIO, LPT, MAEd, JD
Director, Department of Student Affairs & Services

Date: 01-30-25

APPENDIX A Cont'd

MISAMIS UNIVERSITY
Ozamiz City
Department of Student Affairs & Services

MU-DSAS-006/02June2023

PARENT'S CONSENT

RESEARCH 01/30/25
Sponsoring Group/Organization

I am allowing my son/daughter/ward, Princess Hyacinth P. Balderama, to join the A Comparative Analysis of the Antimicrobial Properties of Eleusine indica's Parts (leaves, roots, stem) against E. coli and S. saprophyticus *(activity)* to be held on January - March 2025 at Ozamiz City under the supervision of Ms. Shaira Alaina U. Guiman *(Adviser/Faculty)*.

I understand that Misamis University exercises the necessary safety precautions in this activity.

In consideration of the benefits to be derived from the above activity, I expressly waive any and all claims against the administration or any member of the faculty and staff of the Misamis University on account of any unforeseen accident or injury that my son/daughter/ward might incur in connection with the aforementioned activity.

BALDERAMA, CHERYLL PACATANG
Signature over printed name of
Parent/Guardian

01 - 30 - 2025
Date

BALDERAMA, PRINCESS HYACINTH
Signature over printed name of
Student

01 - 30 - 2025
Date

Important*: *This form shall be submitted to the DSAS Office at least two (2) days before the conduct of the activity.

SUBSCRIBED AND SWORN to before me, this 30 JAN 2025 day of at OZAMIZ CITY, Philippines, that the herein affiant personally came and appeared with his/her ________, as evidence of his/her personal identity.

Doc. No. 372
Page No. 75
Book No. LXXX
Series of 20 25

ATTY. DANIEL C. LAO
Notary Public
Appointment No. 12 (2024-2025)
For the City of Ozamiz and the Province of Misamis Occidental
Until December 31, 2025
Gomez Corner ... Street, Misamis Occidental, Philippines
PTR No. 5597265-01/07/2025-Ozamiz City
IBP No. 02873 (Lifetime)
Roll No. 29112

Notary Public
Until
PTR No.
IBP No.
TIN No.
Roll No.

(For DSAS Personnel only)

Attested by:

NELPA N. CAPIO, LPT, MAEd, JD
Director, Department of Student Affairs & Services

Date: 01-30-25

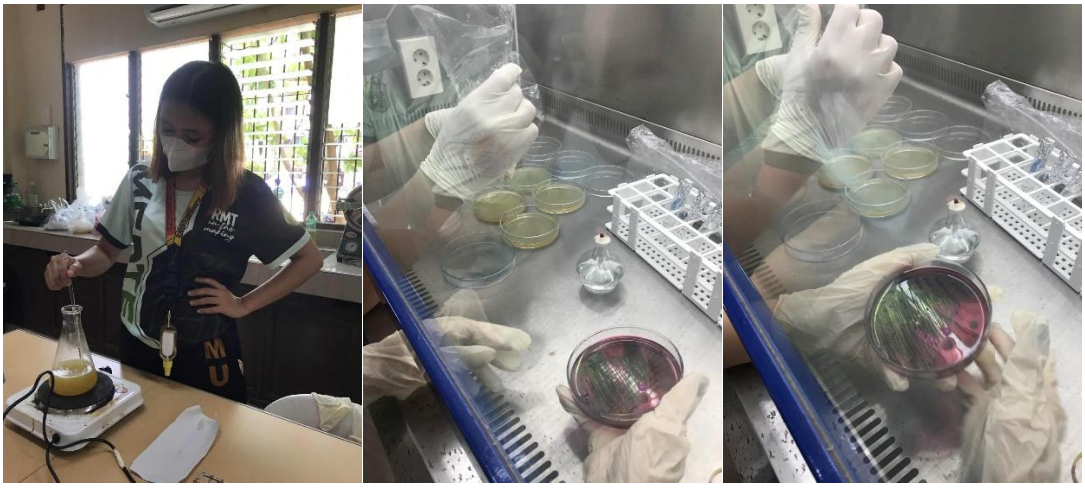
APPENDIX B

Documentation

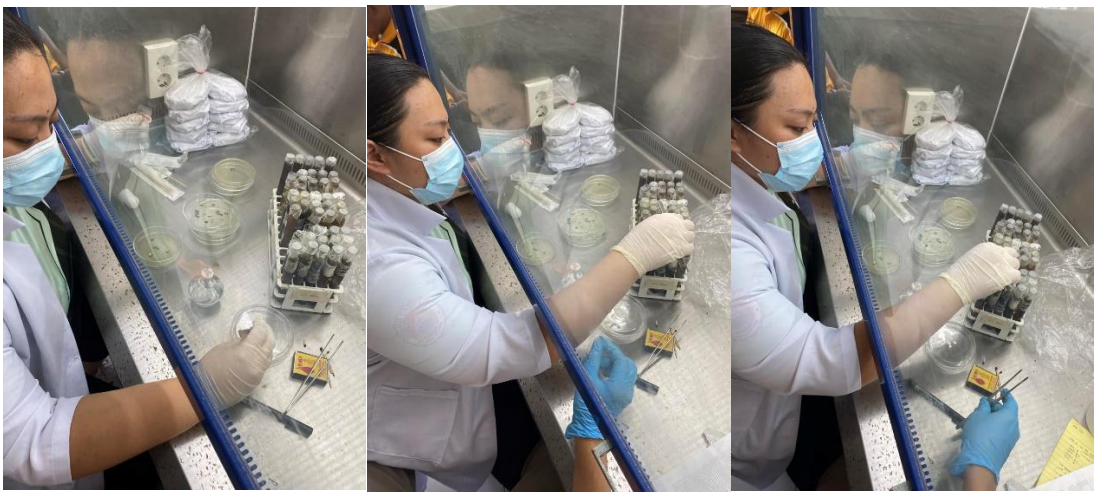
B.1. Sample collection

B.2. Sample preparation

APPENDIX B Cont'd

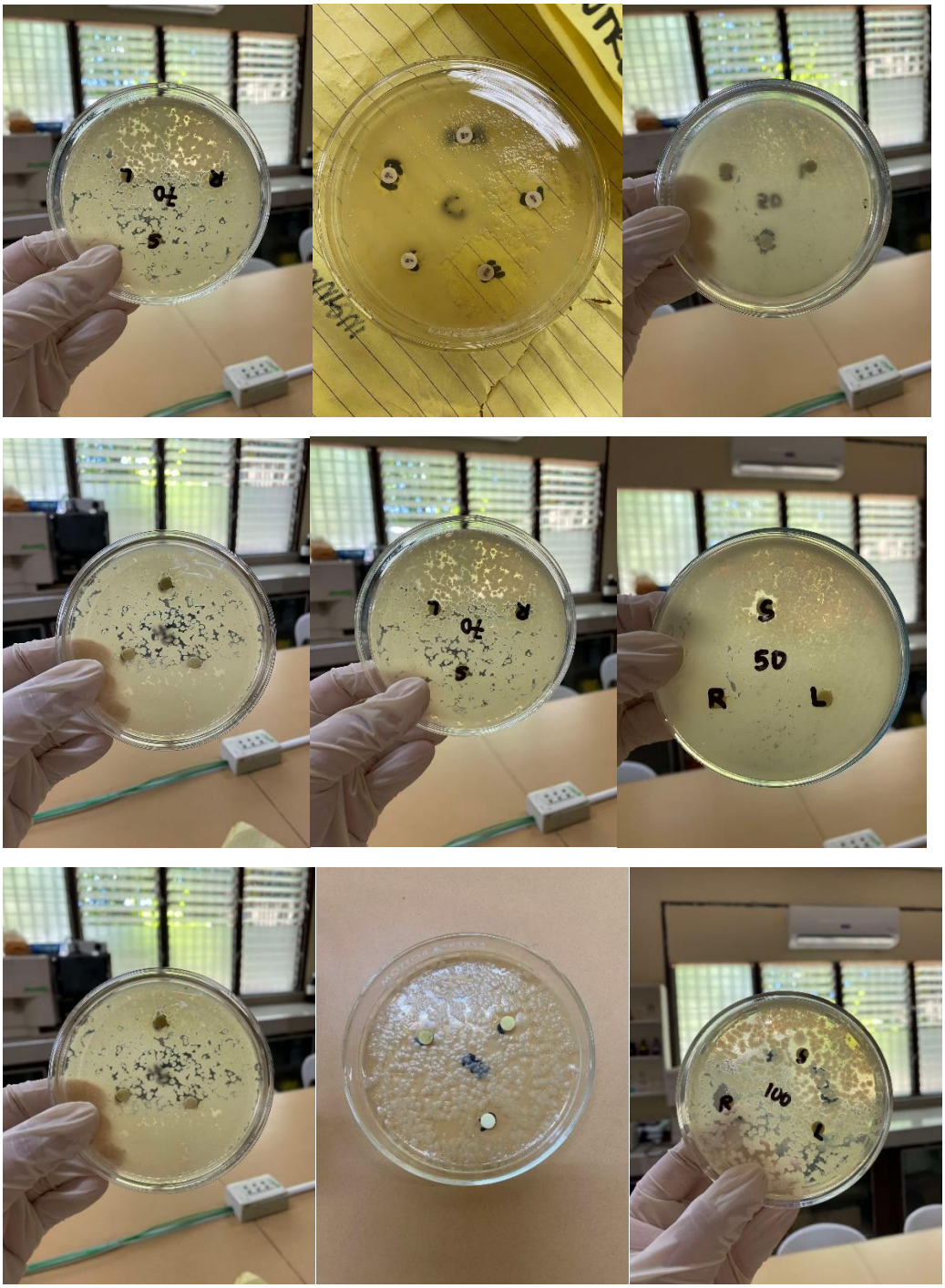


B.3. Agar and bacterial culture



B.4. Infusing plant extract with blank antibiotic discs

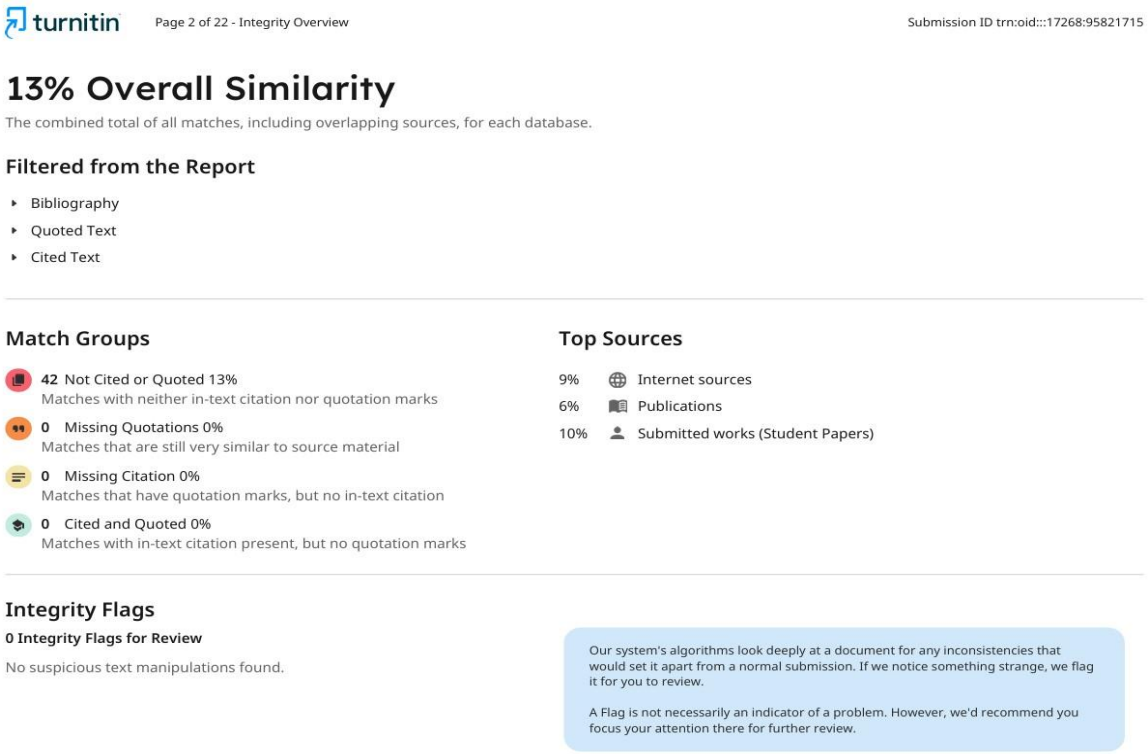
APPENDIX B Cont'd



B.5. Antimicrobial Susceptibility Testing Results at different concentrations

APPENDIX C

Turnitin Results



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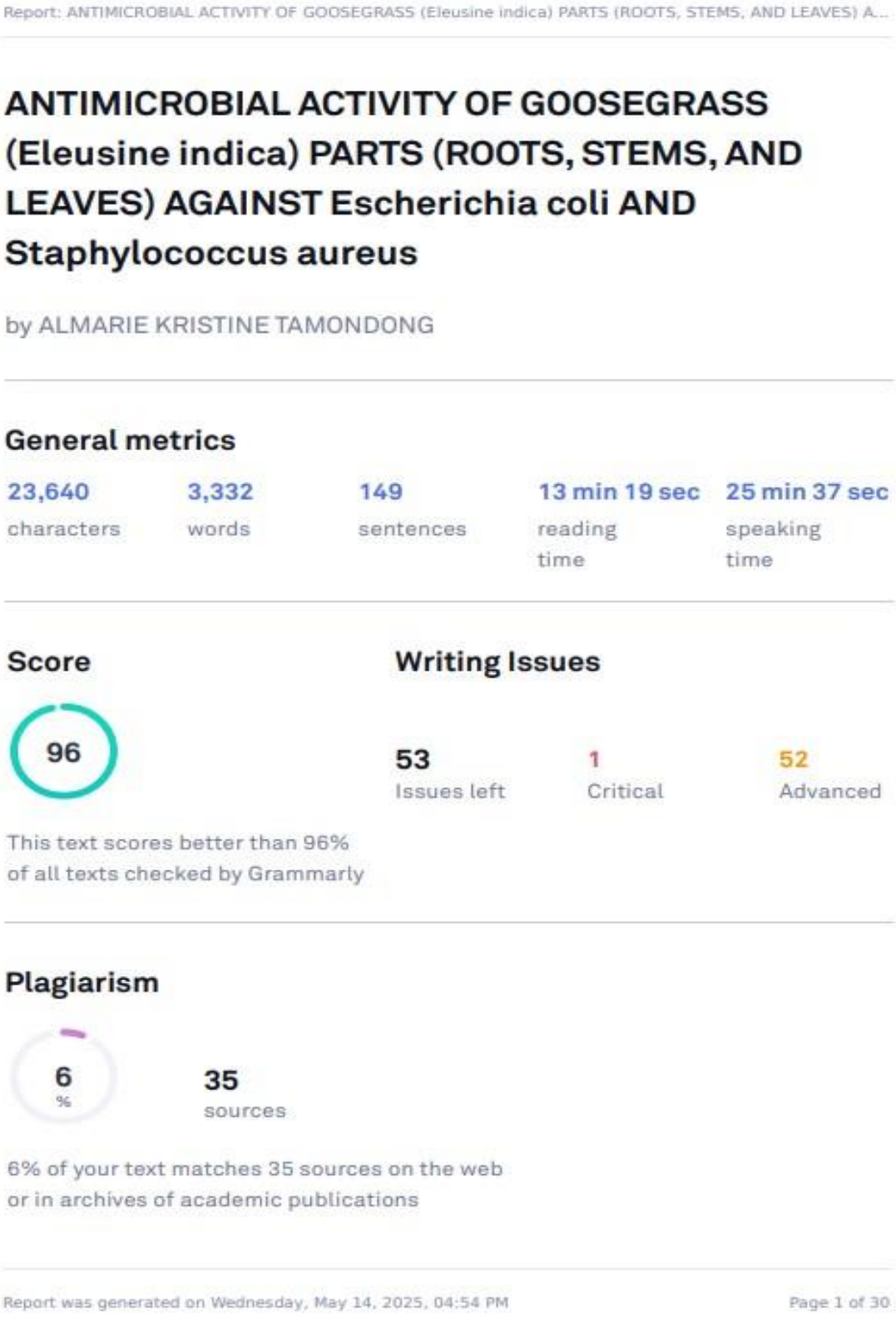
APPENDIX D

Grammarly Result



CURRICULUM VITAE

I. PERSONAL DATA

NAME **:** Princess Hyacinth P. Balderama

BIRTHDATE **:** June 29, 2004

BIRTHPLACE **:** Baroy, Lanao del Norte

ADDRESS **:** Tubod, Lanao del Norte

PARENTS **:** Roger T. Balderama

Cheryll P. Balderama

CONTACT NUMBER : 09164092170

E-MAIL ADDRESS **:** Pbalderama7@gmail.com

II. EDUCATIONAL BACKGROUND

PRIMARY EDUCATION **:** Tubod Central Elementary School

Tubod, Lanao del Norte 9209

SECONDARY EDUCATION **:** Lanao del Norte National Comprehensive Highschool

Santo Nino Village, Baroy, Lanao del Norte 9210

TERTIARY EDUCATION **:** Misamis University

H.T. Feliciano Street Aguada, Ozamiz City 7200

CURRICULUM VITAE

I. PERSONAL DATA

NAME : Nona Rose G. Chupuico

BIRTHDATE : March 30, 2000

BIRTHPLACE : General Santos City, South Cotabato

ADDRESS : Bonifacio, Misamis Occidental

PARENTS : Nowil M. Chupuico

Catherine G. Chupuico

CONTACT NUMBER : 09991657662

E-MAIL ADDRESS : nonarosechupuico@gmail.com

II. EDUCATIONAL BACKGROUND

PRIMARY EDUCATION : Dadiangas West Central Elementary School

Pres.Ramon Magsaysay Ave, General Santos City 9500

SECONDARY EDUCATION : San Pedro College

12 C. Guzman St., Davao City, 8000

TERTIARY EDUCATION : Misamis University

H.T. Feliciano Street Aguada, Ozamiz City 7200

CURRICULUM VITAE

I. PERSONAL DATA

NAME : Divine Grace V. Molde

BIRTHDATE : May 9, 2003

BIRTHPLACE : Aurora, Zamboanga del sur

ADDRESS : Aurora, Zamboanga del sur

PARENTS : Epifanio D. Molde

Emelia V. Molde

CONTACT NUMBER : 09531571228

E-MAIL ADDRESS : divinemolde8@gmail.com

II. EDUCATIONAL BACKGROUND

PRIMARY EDUCATION : Aurora Regional Pilot School - SPED

Aurora, Zamboanga del Sur 7020

SECONDARY EDUCATION : Aurora National High School

Aurora, Zamboanga del Sur 7020

TERTIARY EDUCATION : Misamis University

H.T. Feliciano Street Aguada, Ozamiz City 7200