



The **1ST** ICST 2016

Lombok - Indonesia. December, 1st - 2nd 2016

Sertificate

Awarded to

Ardiana Ekawanti

As Presenter in

The 1st International Conference on Science and Technology
“Emerging Innovation on Science and Technology”

at University of Mataram
West Nusa Tenggara, Indonesia

December, 1st - 2nd 2016

University of Mataram
Rector,



[Signature]
Prof. Ir. H. Sunarpi, Ph.D.

The 1st ICST 2016
Chairman,



[Signature]
Dr. Ir. Satrijo Saloko, M.P.

Lombok-Indonesia. December, 1th-2nd 2016

ICST 2016

The 1st International Conference on
Science and Technology

PROCEEDINGS

“ Emerging Innovation on Science and Technology for Sustainable Development ”

Supported by



ISBN : 978-602-6640-00-0

ISBN : 978-602-6640-00-0

Editor :

Nanda Diniarti, S.Pi., M.Si

Dewi Nur'aeni Setyowati, S.Pi, M.Biotech

Scientific Committe :

1. Dr. Satrijo Saloko
2. Ir. Bambang Hari Kusumo, M.Agr., Sc., Ph.D
3. Made Sriasih, Ph.D
4. Prof. Dr. Anil Kumar A
5. Prof. Ir. Sri Widyastuti, M.App.Sc.,Ph.D
6. Ir. Aluh Nikmatullah, Ph.D
7. dr. Dewi Suryani, M.Infect.Dis

Proceedings

The 1st International Conference on Science and Technology (ICST) 2016

Theme : The Emerging Innovation On Science And Technology

Published by :

Mataram University Press

Jl. Majapahit, No 62 Mataram West Nusa Tenggara, Indonesia 83125

Telp: +62-0370-633007 / Fax: +62-0370-636041

Copyright law protected

Don't to quote, reproduce and translate some or all of these books without the permission of the publisher

PREFACE

Bismillaahirrahmaanirrahiim
Assalaamu'alaikum warahmatullaahi wabarakaatuh.

Praise always we pray to God Almighty for giving us the abundance of grace, guidance and inayah, so that we all can met in the “1stInternational Conference on Science and Technology (ICST) 2016”. ICST is a conference where researchers can share and publish their scientific papers about science and technology. The theme of this conference is “Emerging Innovation on Science and Technology for Sustainable Development”.

This conference was done for two days, from 1st to 2nd December 2016, and took place in the Green Campus of the University of Mataram.

We received more than one hundred papers from various universities and research institutions in Indonesia and from overseas, but not all of the papers were published in this proceeding. The paper has been selected and grouped based on the similarity of the research field, which then are presented and discussed. Presentation of the papers will be held in eight parallel classes.

At this moment, the organizing committee would like to expressour gratitude to all of you who have participated this conference, especially to the all keynote speakers, presenters who have submitted posters or orally presented papers and also to the participants. Our special gratitude also goes to the Rector of the University of Mataram who has been highly supporting this conference. Last but not least, the organizing committee would like to thank to all of you who have supported this conference.

Wassalamu'alaikum warohmatullahi wabarakatuh.

Chairman of 1st ICST 2016

Dr. Satrijo Saloko

The 1st International Conference on Sciences and Technology
December, 1-2, 2016 Mataram, Lombok-NTB, Indonesia

OPENING SPEECH - RECTOR THE UNIVERSITY OF MATARAM The 1st International Conference on Science and Technology 2016

Respected Guests,
Keynote speakers,
Conference participants,
and all other participants.

On Behalf of all staffs of the University of Mataram, I welcome you all to Lombok, a beautiful island in West Nusa Tenggara Province, where the University of Mataram is located. Lombok is known for its natural and cultural diversity where you can enjoy traditional cuisines, beaches, waterfalls, mountain, traditional villages and handicraft of many ethnics including Sasak, Samawa, Mbojo, Balinese, Chinese, Arabic, and many others.

As the Rector of the University of Mataram, it is a great honour for me to address the opening of “The 1st International Conference on Science and Technology” here at the University of Mataram, which will be held from 1th to 2nd December 2016, with a theme “Emerging Innovation on Science and Technology for Sustainable Development”. The main aim of this seminar is to gather scientist from all over the world to share their ideas, knowledge and experiences and to build network for possible future collaboration.

As we are aware that sharing knowledge and experiences from speakers are extremely valuable in a conference, therefore I would like to express my high appreciation, first, to the keynote speakers from overseas and from Indonesia for their willingness to come to Lombok to share their acknowledged works. Your effort and contribution to this conference are absolutely valuable. Second, my high appreciation also goes to the national speakers and all other participants, including the speakers from University of Mataram and local universities in West Nusa Tenggara Province, your participation in this conference not only will give incredible share of ideas, skills and knowledge that

The 1st International Conference on Sciences and Technology

December, 1-2, 2016 Mataram, Lombok-NTB, Indonesia

you have, but also will improve the academic environment that we are developing in this university. I hope this conference will be a good forum, not only for communicating and sharing ideas, knowledge and experiences, but also for building networking for future collaboration.

I would also like to take this opportunity to express my appreciation to the sponsors which have given some contribution to this conference. Last but not least, I would like to thank the organizing committee as well as all other supporters and participants, without their effort, commitment and hard work, this conference will not run well.

Finally, I wish you most successful conference, enjoy Lombok Island and hope to see you again in other forum here at the University of Mataram.

Rector of the University of Mataram

Prof. Ir. Sunarpi, Ph.D

TABLE OF CONTENTS

Title	Page
Preface	i
Opening Speech	ii
Table of Contents	iv
<i>Schemata Detection of Chemistry Teachers Prospective Students After Had Exclusive Conceptual Change Experiencing</i> Kurroti A'yun, Suyono	1-4
<i>Use of The Experimental Board on Kirchhoff's Laws to Train Students Skills in Doing Experiment</i> Hikmawati	5-8
<i>Potential of Abalone (Haliotis sp.) as Control Agent of Biofouling (seaweed) in Mariculture with Cage Nets</i> Dewi Nur'aeni Setyowati, Nanda Diniarti	9-12
<i>Growth Performance Of Kappaphycus alvarezii with Addition of Sargassum sp. Extract Using Spraying Technique</i> Tino Feri Ananta, Nunik Cokrowati, Mursal Ghazali	13-20
<i>Development of e-SCM Open Source as Integration of Data Managemen for Fish Farmers SMEs in Pasar Ulekan Bandung</i> Yudi Priyadi, Jurry Hatammimi	21-27
<i>Seasonal Comparison of Aquatic Macroinvertebrate Benthic were Collected in Powerplant Segment Sidutan Stream, North Lombok</i> Nanda Diniarti	28-30
<i>Economic Analysis of Direct Loan Cattle Dispersal System in Sumbawa District</i> Anggi Fitriza and Hermansyah	31-34
<i>Green Synthesis of Bio-degradable Superabsorbent Polymers from Carboxymethyl Cellulose/Humic Acid</i> Nurul Ismillayli, Siti Raudhatul Kamali, Sapri Hamdiani, Surya Hadi, Dhony Hermanto	35-38
<i>Shear Design of Reinforced Concrete Beam Using Steel Truss Encased in Flexural Plastic Hinge Zone</i> Fatmawati Amir, Iman Satyarno, Djoko Sulisty	39-43
<i>Design of Seismic Recorder with Single-Axis Geophone for Passive Seismic Monitoring</i> I Wayan Sudiarta, Raja Fathurrahman Akmaludin, Dian Wijaya Kurniawidi, Made Sutha Yadnya	44-48
<i>Study of Livestock Behavior Relationship in Cage Environmental Sanitation Management with Suspect of Scabies Disease</i> Mujahid Fitriadi, Sukardono, Made Sriasih	49-52
<i>Characteristics Of Water Inundation In The Swampland Of Pelabuhan Dalam Village (Ogan Ilir South Sumatera)</i> Puspitahati, Edward Saleh, Robiyanto H. Susanto, Ngudiantoro	53-56
<i>Elements Social Capital in The Vegetable Marketing In Tawangargo Village , Malang Regency, East Java</i> Sugeng Riyanto, Kliwon Hidayat, Keppi Sukesi	57-60
<i>Kinetics of Increasing Protein Content on The Sorghum Flour Fermentation</i> Nur Istianah	61-64
<i>Genes Action in Quantitative Traits of Rice The Result of Crosses Between Ipb 4s Varieties With Red Rice Promising Lines</i> Baiq Ernawati, I Gusti Putu Muliarta Aryana, Anak Agung Ketut Sudharmawan	65-68
<i>Behavior of Rice Market in the Lampung Province</i> Irmayani Noer, Bina Unteawati	69-72
<i>Optode Urease Biosensor and Their Application for The Determination of Hg (II) in Aqueous Solution</i>	73-76

Dhony Hermanto, Mudasir, Dwi Siswanta, Bambang Kuswandi	
<i>Inhibitive Determination of Hg (II) in Aqueous Solution Using a Urease Amperometric Biosensor</i> Dhony Hermanto, Mudasir, Dwi Siswanta, Bambang Kuswandi	77-80
<i>Activated Carbon Composites from Rice Husk as an Adsorbent Textile Waste</i> Dian W. Kurniawidi, Cici Andayani, Siti Alaa', Susi Rahayu	81-84
<i>Early Detection of Newborn Hearing Impairment: The Useful of Mobile Application</i> Hamsu Kadriyan, Sapto Sutardi	85-89
<i>Incorporate Computational Chemistry as an Alternative for Chemistry Laboratory Work at High School Level</i> Saprizal Hadisaputra, Lalu Rudyat Telly Savalas, Sapri Hamdiani	90-93
<i>The Application of Giving Various Dose of NPK Manure Toward Tobacco Crop (Nicotiana Tabaccum L.) in Lombok Island West Nusa Tenggara Island</i> Titin Sugianti, Fitria Zulhaedar, Sudjudi	94-101
<i>The Optical Properties of SnO₂ Thin Layer With Dopan Zinc Using Solgel Technique</i> Aris Doyan, Susilawati, Yolanita Septiana	102-105
<i>The Electrical Properties of Barium Hexaferrite Nanopowders Using Co-Precipitation Method</i> Susilawati, Aris Doyan	106-110
<i>Detection of Lombok Faults using Gravity Methods</i> Suhayat Minardi, Teguh Ardianto, Alfina Taurida Alaydrus	111-115
<i>Description of Cognitive Conflict Levels in Chemistry College Students in Conceptual Change Strategy</i> Rosalina Eka Permatasari, Suyono	116-125
<i>Preliminary Study And Synthesis Thin Film of Crystalline Al, Zn Co-Doped SnO₂ (Stannic Oxide) With Sol-Gel Dip Coating Technique</i> Aris Doyan, Norma Ikraman, Susilawati, Syifa Azzahra, Zahid Ramdhan	126-128
<i>Statistical Downscaling Model Using Nonparametric Regression to Predict Temperature in Selaparang Lombok</i> Mustika Hadijati, Desy Komalasari, Nurul Fitriyani	129-132
<i>Preliminary Study and Synthesis Thin Film of Antimony Tin Oxide (ATO) with Sol-Gel Spin Coating Technique</i> Syifa Azzahra, Aris Doyan, Susilawati, Ahmad Harjono, Norma Ikraman, Zahid Ramdhan	133-136
<i>The Identification on Iron Compound of Nature Sand in Ampenan Beach Mataram</i> Annisa Fithriyani, Husniatul Khair, Susilawati, Aris Doyan	137-140
<i>Preliminary Study of Electrical and Magnetic Properties of Barium MHexaferrites from Nature Sand With Co-Ni Substituted by Co-Precipitation</i> Husniatul Khair, Annisa Fithriyani, Susilawati, Kosim, Aris Doyan	141-144
<i>Agro-tourism in North Lombok Stimulates New Crops and Technology Adaptation, and Farming Becomes Profitable</i> Taslim Sjah, Zainuri, Ahmad Sauqi, Jayaputra	145-149
<i>Simulation of the Bubble Gas Detection inside the Fluids based on Transmission and Reflection of Ultrasonic Waves</i> Firyal Dhiyaul Haqqi, Bakti Abdillah, Rahadi Wirawan, Laili Mardiana	150-156
<i>Development of Data Acquisition System of Moving Object for Landslide Monitoring System</i> Rahadi Wirawan, Bakti Abdillah, Wayan Sudiarta, Dian Wijaya Kurniawidi	157-160
<i>Preliminary Study and Synthesis Thin Film Of Fluorine Tin Oxide (Fto) With Sol-Gel Spin Coating Tecnique</i> Zahid Ramdhan, Aris Doyan, Kosim, Susilawati, Syifa Azzahra, Norma Ikraman	161-164
<i>The Livelihood Strategy of Dry Land Farmers in Karang Bayan Village, West Lombok, Indonesia</i> I Ketut Budastra, Taslim Syah, IGL. Parta Tanaya, Suparmin, Halil	165-168

<i>Nonparametric Regression Spline in The Estimation of The Average Number of Children Born Alive Per Woman</i> Nurul Fitriyani, I Nyoman Budiantara, Ismaini Zain, Vita Ratnasari	169-172
<i>Development Elements of Industrial Production Increase in Productivity Of Micro / Small (Export Oriented Product) for Enhancing Competitiveness of Industry [Case Study: In Lombok-NTB]</i> I G.A.K Chatur Adhi Wiryra Aryadi, I Made Wijana, I Wayan Joniarta	173-176
<i>Study of Maize-Pulses Intercropping on a Dryland</i> I K. D. Jaya, Sudirman, H. Suheri	177-180
<i>The Performance of Production and Price of Rice In South Sumatra</i> Desi Aryani	181-184
<i>Growth Performance of Broiler Chickens Fed Diets Containing Putak and Rice Bran Supplemented With Cellulase, Xylanase, B-Glucanase, Pectinase, Phytase, Protease and Amylase</i> Nalle Catootjie Lusje, Netty Ermawatty, Marlin R. K. Yowi, Defrys R. Tulle	185-190
<i>Growth Performance of Red Rice as Affected by Insertion of Peanut Row between Double and Triple-Rows of Rice in Aerobic System on Raised-Beds</i> Nihla Farida, Hanafi Abdurrachman, V.F. Aris Budianto, Wayan Wangiyana	191-196
<i>Improving Growth and Bulb Production of Several Varieties of Shallot through Mycorrhiza Inoculation and Growing Peanut Plants Inserted between Double-Rows of Shallot (Allium ascalonicum L.)</i> Wayan Wangiyana, I Komang Damar Jaya, I Gde Ekaputra Gunartha, Sunarpi	197-201
<i>Skill of Warige as A Seasonal Climate Forecast in Lombok, Indonesia</i> Ismail Yasin, Mahrup, Mansur Ma'shum, Sukartono, Husni Idris	202-206
<i>Simple Solar Desalination for Seawater at Kec. Bayan Kab. Lombok Utara</i> Dhony Hermanto, Nurul Ismillayli, Siti Raudhatul Kamali, Fahrurazi	207-210
<i>Production of Lentinula edodes (Shiitake mushrooms) on inoculated logs of a range of tree species</i> Irwan Mahakam Lesmono Aji	210-215
<i>Shear Analysis And Design of Reinforced Concrete Interior Beam Column Joint Using King Cross Steel Profile</i> Rahmani Kadarningsih, Iman Satyarno, Muslikh, Andreas Triwiyonono	216-219
<i>Polytomous Logistic Regression in Analyzing the Presence of National Pilot Mosque in Karang Baru Mataram, 2016</i> Nurul Fitriyani, Lailia Awalushaumi, Agus Kurnia	220-223
<i>Shear Capacity Of Hybrid Coupling Beam</i> Nursiah Chairunnisa, Iman Satyarno, Muslikh, Akhmad Aminullah	223-227
<i>The Modification and Analyzing of heat Loss of The Heater System in The Knockdown Fumigator Type</i> M. Munandar Prayuda, Sukmawaty, Guyup Mahardhian D.P.	228-233
<i>Design of Seismic Recorder with Single-Axis Geophone for Passive Seismic Monitoring</i> I Wayan Sudiarta, Raja Fathurrahman Akmaludin, Dian Wijaya Kurniawidi, Made Sutha Yadnya	234-238
<i>Zinc Supply and Root Pruning on Growth and Relative Zinc Absorption Rate by Transplanted Rice (Oryza sativa L.)</i> Mulyati	239-246
<i>Making Learning Media of Statistical Physics Course Using The Internet Offline Browser for Physics Students in PMIPA FKIP of Mataram University</i> Muhammad Taufik, Aris Doyan, Susilawati, Gunawan	247-250
<i>Potential for Mass Rearing of the Egg Parasitoids, Ooencyrtus malayensis and Hadronotus leptocorisae (Hymenoptera: Scelionidae) on Nezara viridula Eggs</i> Aisah Jamili, Yen Kusnita	251-254
<i>Factors Related to Stunting in Children Aged 24-59 Months in Narmada Public Health Care</i>	255-259

Lina Nurbaiti, IDGN Agung, Umara Lani Anika, Arina Windri Rivarti, Dimas Pambudi Prakoso, Nabila Fawzia Putri, Nanda Retno Wardhani, Agus Gowinda Amijaya, Andri Irfan	
<i>The Effect Of Shape And Number Of The Tube Of A Flat Plate Solar With A Gravel Absorber On Heat Transfer Rate And Collector Efficiency</i> Made Wirawan, Mirmanto	260-263
<i>Waters Carrying Capacity for Developing Spiny Lobster Farming using Phosphorous Budget Approach in Ekas Bay, West Nusa Tenggara</i> Muhammad Junaidi	264-267
<i>Immobilization of TiO₂ on Coal Bottom Ash and Its Activity Test as A Photocatalyst in Degradation of Methylene Blue Dye</i> Tuty Alawiyah, Nurul Hidayat, Endang Tri Wahyuni	268-272
<i>Design of Low Frequency Vibration Generator As Seismic Sensor Calibrator with Optocoupler Counter</i> Yulkifli, Rahadi Wirawan, Yoggy Refiyon	273-278
<i>Measuring and Mapping Carbon and Nitrogen in Indonesian Tropical Soil using Rapid Technique of Near Infrared Technology</i> B.H. Kusumo, Sukartono, Bustan, C.W.H. Anderson, C.B. Hedley, M.J. Hedley, M. Camps Arbertain	279-287
<i>Correlation Between Waist/Hip Ratio And Lipid Profile Of Lactovegetarian Community In West Lombok</i> Ardiana Ekawanti, Agnes Ragil Rosano	288-291
<i>Isolation of Andrographolide from Andrographis paniculata</i> Aliefman Hakim, Dwi Laksmiwati, I Nyoman Loka, Sarifa Wahida Al Idrus, Try Setyaningsih, Supriadi	292-295
<i>The Use of 1-Mcp: Overview Several Studies on The Postharvest Quality of Selected Fruits</i> Liana Suryaningsih B, John K. Fellman, James P. Mattheis, Xisheng Sun	296-299
<i>Design Of The Measuring Instrument Of Turbidity Level Using Turbidity Sensor Based on SMS Gateway</i> Lily Maysari Angraini, Laili Mardiana, Kasnawi Al Hadi, Eka Ahmawati	300-307
<i>The Identification of Agroforestry System Plants as Raw Ingredients/Materials for Herbal Soap in Sesaot Forest</i> Indriyatno, Wiharyani Werdiningsih, I Gde Mertha	308-310
<i>Growth an Yield of Onion (Allium Cepa Var. Ascalonicum) as CA Result of Addition of Biocompost and Boactivity Fermented with Trichoderma spp.</i> I Made Sudantha, Suwardji	311-316

Correlation Between Waist/Hip Ratio And Lipid Profile Of Lactovegetarian Community In West Lombok

Ardiana Ekawanti^{1,*}, Agnes Ragil Rosano¹

¹ Medical Faculty Mataram University, Jl. Pendidikan No. 37 Mataram, West Nusa Tenggara

* Email: ekawantimuhaimin@gmail.com

Abstract

Central obesity and dyslipidemia are the risks of metabolic syndrome. Waist and Hip (W/H) ratio is early screening to diagnose of central obesity. Vegetarian diet decreased the risks of metabolic syndrome. Aim of this study was to find out the correlation of waist and hip ratio and lipid profile of lactovegetarian community in west Lombok. This research design was cross sectional study involving all community of lactovegetarian in west Lombok. There were 29 member of lactovegetarian community involved in this study. Anthropometric assessment conducted to find out W/H ratio and blood sample taken to assess lipid profile. Correlation of W/H ratio and lipid profile analysed by using Pearson correlation. The result for correlation of W/H ratio and lipid profile W/H ratio and cholesterol did not correlated (p 0.887) W/H ratio and triglyceride (p 0.632) W/H ratio and HDL (p 0.978) and W/H and LDL (p 0.862). That result can be concluded that W/H ratio did not correlated with lipid profile of lactovegetarian community.

Keywords: *vegetarian, anthropometric, waist/hip ratio, lipid profile*

1. Introduction

Vegetarian diet tends to be more popular all over the world, including Indonesia. In 1997, 1 % of American population were vegetarians, and in 2006 they were increased to 23 % of all population ^[1]. In India, more than 50% of population were vegetarian in 2003 ^[2]. Indonesia Vegetarian Society (IVS) documented that there are 5000 vegetarian in 1998 and these number were raised in 2007 to be 70.000 of vegetarian participants. In West Nusa Tenggara (WNT) vegetarians did not well-documented, IVS noted that most of vegetarian in WNT were lacto-vegetarian and lacto-ovo vegetarian ^[3].

Vegetarian diet has decreased the risk of some diseases such as hypertension, type 2-diabetes mellitus, cancer and metabolic syndrome ^{[4] [5] [6]}. Metabolic syndrome was syndrome which was including obesity, dyslipidemia, hyperglycemia and hypertension. This syndrome increased the risk of type 2- diabetes mellitus and cardiovascular disease ^[7]. Prevalent rate of metabolic syndrome was 15-30 % all over the world and the highest was in developing country ^[8].

Diet is one factor that affected the risk of metabolic syndrome ^{[9] [10]}. Study conducted by Adventist Health Study in America and Canada showed that vegetarian diet decreased risk of metabolic syndrome ^[5]. Study conducted by Diah ^[11] on vegetarian in Yogyakarta, Semarang and Surabaya indicated that the risk of metabolic syndrome of vegetarian vegan was not different significantly to difference vegetarian non vegan.

Some studies showed that metabolic syndrome increased by central obesity, while metabolic syndrome consist of dyslipidemia. Since the lactovegetarian has restricted in animal product diet, so that they consumed low containing fat. This condition would affected lipid profile of this community. The aimed of this study was to find out the correlation between WHR and lipid profile in lactovegetarian community.

2. Material and Method

2.1. Study Design

This research was an observational research using cross sectional study design. All parameters namely interview, anthropometric measurement (waist circumference and hip circumference) and lipid profile assessment conducted in one period of time. Dependent variable of this study was lipid profile, while independent variable was waist/hip ratio. This study was taken place in lacto vegetarian community in Gerung district in July and August 2015.

2.2. Research Participants

Participants in this study were the member of lacto vegetarian community which fulfill inclusion and exclusion criteria. Inclusion criteria were: member of lacto vegetarian community, agree to participate by signing informed consent, aged 18-64 year old. Exclusion criteria were: active smoker, alcohol consumption, pregnant, refuse to participate. Minimal sample size calculation by using proportion formulation found that number of minimal sample was 30. From 45 member of lactovegetarian community 30 member were enrolled and one person was excluded because of the age was under 18 year old.

2.3. Research procedure

Following the signing of informed consent, participants underwent research procedure. Waist circumference was measured by using WHO anthropometric guideline, that was in the middle of the line between arcus costae and crista iliaca and hip circumference was on m. gluteus maximus. Ratio of waist circumference and hip circumference then categorized into central obesity or not. Afterwards, 5 ml of blood sample were taken from v. mediana cubiti then spilled out from disposable sputum into plain sample tube (non-EDTA tube) to get blood serum. Serum then assessed for lipid profile by using automatic hemoanalyzer and the value was stated in mg/dL.

3. Result and Discussion

The result of this study was as follows:

Table 1. Participants characteristic of W/H ratio and lipid profile

Characteristic of participants	Value (mean±SD)
Waist to hip ratio	0.84±0.05
- Male	0.85±0.06
- Female	0.83±0.05
Lipid profile	
Triglyceride	176±128 mg/dL
- Male	201±157 mg/dL
- Female	156±100 mg/dL
Cholesterol	165±38 mg/dL
- Male	164±39 mg/dL
- Female	167±39 mg/dL
HDL	41±12 mg/dL
- Male	39±12 mg/dL
- Female	42±14 mg/dL
LDL	
- Male	92±35 mg/dL
- Female	84±46 mg/dL

The participants features from table showed that mean of W/H ratio was in normal limit, either male or female were not suffered from central obesity (male <90 cm and female <85 cm). Triglyceride value for male was higher than normal value. HDL value either male dan female were lower than normal value, while LDL and cholesterol within normal limit.

Since data were normal distribution statistically, so that appropriate statistical analysis for correlation testing was Pearson's correlation test. The Pearson's test result as below:

Table 2. Correlation between W/H ratio and lipid profile

	Pearson's Correlation (p,)			
	Triglyceride	Cholesterol	HDL	LDL
WHR	0.289;0.204	0.352; 0.179	0.583;0.106	0.999;0.000

Table 2 demonstrated that W/H ratio was not correlated significantly to triglyceride, cholesterol, HDL and LDL in lactovegetarian community. Waist/Hip ratio is one parameter which is useful to describe central or abdominal obesity in the population. Compare to all anthropometric measurement, W/H ratio was a sensitive parameter to assess the risk of cardiovascular diseases ^[12]. Based on the result of W/H ratio (WHR)of lactovegetarian population in West Lombok, founded that the risk of cardiovascular disease was lower than normal population since WHR value was lower than normal population, male <90 and female <85 (WHO, 2011). Regarding to this reference value 92 % of the lactovegetarian population had normal WHR, that meant this population has mild cardiovascular risk ^[12] (WHO, 2008). Study by Czernichow, et al (2011) ^[13] demonstrated that WHR was the best predictor of cardiovascular risk compared to other antropometric parameter in diabetes mellitus population and it could describe value of VLDL and LDL, the larger of WHR and the larger of VLDL and LDL value. The result of this research was different from Czernichow. Life style and underlying disease of the population affected lipid profile of the population.

Lipid profile which consist of triglyceride, total cholesterol, LDL and HDL in this study were not correlated to waist and hip ratio in lactovegetarian population. This result was the same as found by Gandhi, et al, 2014^[4]; Chaudri et, al. 2013 ^[15]; Jian et al, 2014 ^[16]; Verma, et at. 2015 ^[17]; Huang, 2014 ^[18].

4. Conclusion

Conclusion of this study was WHR in lactovegetarian community in West Lombok was normal and also most of lipid profile within normal limit, except HDL value was lower than reference value. WHR did not correlated to lipid profile in lactovegetarian community in West Lombok.

References

- [1] Key TJ, et.al. Health Effect of Vegetarian and Vegan Diets. *Proceedings of Nutrition Society*. 2006. Available from: www.ncbi.nlm.nih.gov/pubmed/16441942 . [Accessed 28th February 2015].
- [2] Kusharisupeni, A. Vegetarian Gaya Hidup Sehat Masa Kini. Andi Offset. Yogyakarta.
- [3] Rahayu PERS. Profil lemak pada vegetarian jenis Lacto-ovo di Mataram. Universitas Mataram. [Skripsi]. 2008.
- [4] Tonstad S, Nathan E, Oda K, et al. Vegan Diets and Hypothyroidism. *Am Nutrients Journal*.2013 Available from:<http://www.ncbi.nlm.nih.gov/pubmed/24264226> . [Accessed 20th February 2015].
- [5] Rizzo NS, Sabaté J, Jaceldo SK, et al. Vegetarian Dietary Patterns Are Associated With a Lower Risk of Metabolik Syndrome: The Adventist Health Study 2. *Diabetes Care Journal*, vol. 34 pp. 1225-1227. 2011. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3114510/>. [Accessed 20th

- February 2015].
- [6] Pettersen BJ, Anousheh R, Fan J, et al. Vegetarian Diets And Blood Pressure Among White Subjects: Results From The Adventist Health Study-2 (AHS2). *National Institutes of Health*. 2012. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22230619>. [Accessed 7th March 2015].
- [7] Soegondo S, Purnamasari D. Sindroma metabolik. Dalam : Sudoyo AW, Setiyohadi B, Alwi I, Simadibrata M, Setiati S, editors. Buku Ajar Ilmu Penyakit Dalam Ed.5. Interna Publishing: Jakarta. 2009
- [8] Cameron AJ, Zimmet PZ, Alberti KG, et al. The metabolik syndrome as a predictor of incident diabetes mellitus in Mauritius. *Diabet Med J, No. 24 (12)*. 2007 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/17976203>. [Accessed 15th March 2015]
- [9] Amanda JB, Terry C, Christine M. Dietary patterns and metabolik syndrome - a review of epidemiologic evidence. *Asia Pacific Journal Of Clinical Nutrition, Vol. 15(2), pp. 134-142*. 2006. Available at: <http://espace.library.uq.edu.au/view/UQ:79858> [Accessed 15th March 2015].
- [10] Pamela LL, Lyn MS, June S. Dietary Intake and the Development of the Metabolik Syndrome. *Circulation Journal, vol. 117 pp. 754-761*. 2008. Available from: <http://circ.ahajournals.org/content/117/6/754.full> [Accessed 15th March 2015].
- [11] Diah Ari Setyorini. Perbedaan Sindroma Metabolik Pada Wanita Vegetarian Tipe Vegan dan Non Vegan. Semarang University. 2012
- [12] WHO. 2008. Waist Circumference and Waist-Hip Ratio: Report of WHO Expert Consultation. Geneva, WHO
- [13] Czernichow, et al. Comparison of WHR and other Obesity Indices as Predictor of CVS risk in people with type 2 diabetes. *Eur J Cardiovasc Prev Rehabil*. 2011 Apr 18(2): 312-319
- [14] Gandhi P, Agrawal N, Sharma S. 2014. A Study of Vegetarian Diet and Cholesterol and Triglycerides Levels. *Indian Journal of Applied Science* vol.4 .
- [15] Chauduri A, Borade NG, Bandopadhyayi, Hazra SK, Saba S. 2013. A Comparative Study of Lipid Profile and Autonomic Function in Vegetarian and non-vegetarian postmenopausal women. *Medical Journal of Dr. D.Y.Patil University*.
- [16] Jian ZH, Chiang CY, Lung CC, Ho CC, Ko PC, Nfor ON, Chang HC, Liaw YC, Liang YC, Liau YP. 2014. Vegetarian Diet and Cholesterol and TAG levels by Gender. *Public Health Nutrition*: 18(4), 721-726
- [17] Verma M, Verma P. 2015. Comparative Study of Lipid Profile Levels in Vegetarian and Non-Vegetarian Person. *IJLSSR* vol.3
- [18] Huang YW, Jian ZH, Chiang CY, Lung CC, Ho CC, Ko PC, Nfor ON. 2014. Vegan Diet and blood lipid profiles: a cross sectional study of pre and postmenopausal women

Isolation of Andrographolide from *Andrographis paniculata*

Aliefman Hakim^{*}, Dwi Laksmiwati, I Nyoman Loka, Sarifa Wahida Al Idrus,
Try Setyaningsih, Supriadi

Study Program of Chemistry Education, University of Mataram
Majapahit street 62, Mataram-Lombok 83125, Indonesia
Email: Aliefmanhakim27@gmail.com

Abstract

Andrographolide has been isolated from the methanol extract of *Andrographis paniculata*. Isolation is done by maceration and recrystallization. Isolated andrographolide used this method that has high amount (> 5% of the total extract). Andrographolide are identified using spectrum data of NMR, IR, and UV. Andrographolide can be further utilized for natural product material for synthesis, bioactivity studies, or chemotaxonomic studies. Andrographolide has been produced in large quantities and commercialized through the Calon Perusahaan Pemula Senyawa standar Indonesia (CPPBT-SSI) cooperation of Ristekdikti with Mataram University.

Keywords: Isolation, andrographolide, *Andrographis paniculata*

1. Introduction

Secondary metabolites are organic compounds derived from plants that produced not through the main metabolic pathways (Hakim, 2016). In general secondary metabolites have bioactive activity. Secondary metabolites are tasked to protect plants from pests and diseases, both from the plant itself or the surrounding environment. Secondary metabolites is only produced in small amounts. Some examples of classes of compounds that are included in the category of secondary metabolites namely terpenoids, steroids, polyketides, phenyl propanoid, flavonoids, and alkaloids (Hakim, *et al.*, 2016a). The main characteristics of secondary metabolites found in plants namely (1) have ecological functions like towing insects, protective, tools to compete, hormones, (2) unevenly distributed in every organism, (3) physiology activity related to chemical structure and relationships between structure.

Isolation of secondary metabolites from medicinal plants examined in natural product laboratory (Hakim, *et al.*, 2016b). Generally isolation of secondary metabolites consists of extraction, fractionation, purification, and elucidation structure of secondary metabolites. The same secondary metabolites from a plant species can be isolated in a various ways, so there is no standard procedure to isolate the secondary metabolites of a plant species. These isolation activities provide opportunities for students to design their own experiment (Hakim, *et al.*, 2016a). The discovery of secondary metabolites isolation procedures are simple and inexpensive will provide opportunities availability of secondary metabolites in significant amounts. In this article will describe the isolation procedure andrographolide from *Andrographis paniculata*.

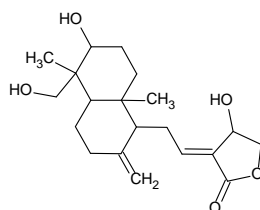


Figure 1. Structure of andrographolide

1.1. *Andrographis paniculata*

Andrographis paniculata Nees. (Bitter) is the annual plant that belongs to the family Acanthaceae (Sulistijo and Pujiasmanto, 2007). *A. paniculata* are upright, grows naturally in lowland areas to a height of ± 1600 m above sea level. *A. paniculata* are grown in a variety of habitats, such as the suburbs of fields, gardens, or forests. The main components of *A. paniculata* is andrographolide useful as medicine. In addition leaf of *A. paniculata* contains saponins, tannins, flavonoids (Taiz and Zeiger, 1991). Other chemical constituents present in the leaves and stems of *A. paniculata* are lactone, paniculin, and calmegin. Traditionally *A. paniculata* has been used for the treatment of snake or insect bites, fever, dysentery, rheumatism, tuberculosis, gastrointestinal infections, and others. *A. paniculata* is also used for antimicrobial/antibacterial (Yusron *et al.*, 2005).

Currently *A. paniculata* widely studied to be developed as a raw material of modern medicine, including the use of bitter as infection medicine. *A. paniculata* widely used topically as skin infections, rashes, sores, mange, open wounds and minor burns light. In addition *A. paniculata* is also widely used to treat of diabetes. All parts of *A. paniculata* such as leaves, stems, flowers and roots was eaten or boiled to drink (Pujiasmanto, *et al.*, 2007). The bitter taste is caused by the presence of andrographolide compounds that are numerous in the bitter plant especially in the leaves and stems. Andrographolide content in the leaves of 2.5 to 4.8% of the dry weight *A. paniculata*. Andrographolide is a diterpene lactone compound and soluble in organic solvents (Srijanto *et al.*, 2012).

Andrographolide has many benefits in health. Andrographolide has a variety of pharmacological activities such as lowering blood sugar levels, triglycerides, and LDL, anti-inflammatory, antioxidant, and analgesic. In addition Andrographolide also used as an antibacterial (Wardiatini *et al.*, 2014). This article will discuss the method of isolation andrographolide effectively and inexpensively.

2. Result and Discussion

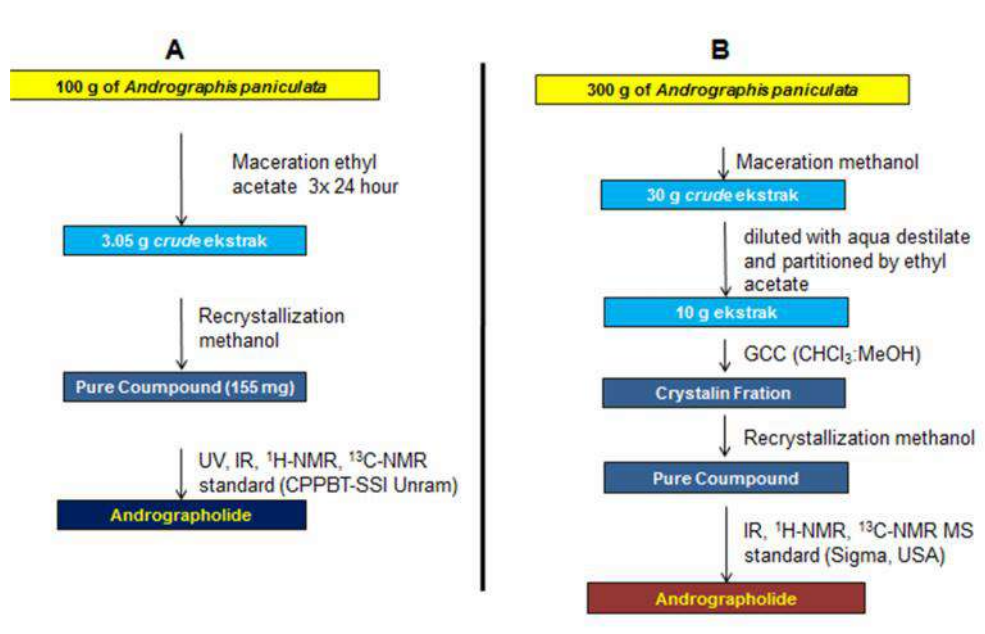


Figure 2. Comparison of isolation procedure of andrographolide

A = This reseach, B = Sukardiman *et al.*, (2007)

The used materials in this study consist of the andrographolide standard (CPPBT-SSI Mataram University), leaf of *A. paniculata*, ethanol, n-hexane, ethyl acetate, distilled water, methanol and TLC plate. The used tools in this study consist of a set of tools of maceration, filter paper, rod, plate, and a rotary evaporator.

A total of 100 gr of powder *Andrographis paniculata* was macerated with ethyl acetate 3x24 hours. Obtained extract were collected and evaporated with a rotary evaporator until it is condensed extract (3.05 g). Viscous extract were then recrystallized using hot methanol several times to obtain a yellowish white crystal (155 mg). These crystals were tested for purity using three systems eluent namely ethyl acetate: acetone (8: 2) ($R_f = 0.7$); chloroform 100% (0.6); ethyl acetate 100% (0.5). The structure of pure isolated coumpound were determined based on the spectroscopy data like NMR, UV, IR and confirmed using andrographolide standard (CPPBT-SSI Mataram University) by TLC standards and isolates on the same TLC plate and taking the value of the standard and isolates R_f spot. The results of spectroscopic data and R_f standard compound showed that isolated coumpound was andrographolide.

Isolation procedures of andrographolide from *A. paniculata* previously been published by Sukardiman *et al.* (2007). Comparison of andrographolide isolation procedures performed in this study and reference (Sukardiman *et al.*, 2007) is shown in Figure 2. It is seen that Sukardiman *et al.* (2007) procedures of isolation of andrographolide from *A. paniculata* in six steps, whereas isolation procedures performed in this study through four steps. Sukardiman *et al.* (2007) conducted a total extract fractionation using Gravity Coloum Chromatography (GCC) using CHCl_3 :MeOH as eluent. Results of fractionation was purified using recrystallization with methanol to produce andrographolide. On the other hand this study directly was recrystallization of total extract of *Andrographis paniculata* using hot methanol to produce andrographolide. Based on the above explanation andrographolide isolation procedures performed in this study is simpler than the andrographolide isolation procedure been published previously (Sukardiman *et al.*, 2007). Isolated andrographolide used procedures performed in this study that has high amount (> 5% of the total extract). Andrographolide can be further utilized for natural product material for synthesis, bioactivity studies, or chemotaxonomic studies. Andrografolida has been produced in large quantities and commercialized through the Calon Perusahaan Pemula Senyawa standar Indonesia (CPPBT-SSI) cooperation of Ristekdikti with Mataram University.

Acknowledgements

We wish to thank Direktorat PPBT, Kementerian Riset, Teknologi, dan Pendidikan Tinggi for financial support of this research in CPPBT programe No 32/PPK/F4/PKS.CPPBT/IX/2016 and No: 316.A/SPP-CPPBT/UN18.12/PL/2016.

References

- [1]. Hakim, A. (2016). Meningkatkan kualitas pembelajaran kimia bahan alam melalui praktikum. Arga Puji Press. Mataram
- [2]. Hakim, A., Liliyasi, Kadarohman, A., Syah, Y.M. 2016a. Making a Natural Product Chemistry Course Meaningful with a Mini Project Laboratory. *J. Chem. Educ.*, 93 (1), 193–196.
- [3]. Hakim, A., Liliyasi, Kadarohman, A., Syah, Y.M. 2016b. Effects of the Natural Product Mini Project Laboratory on the Students Conceptual Understanding. *Journal of Turkish Science Education*. 13 (2), 27-36.
- [4]. Pujiasmanto, B., J. Moenandir, S. Bahri, and Kuswanto. 2007. Kajian Agroekologi dan Morfologi Sambiloto (*Andrographis paniculata* Ness) pada Berbagai Habitat. *Biodiversitas* 8 (4):326-329
- [5]. Srijanto, B., Olivia, B.P., Lely, K., Eriawan, R. & Sriningsih. 2012. Pemurnian Ekstrak Etanol Sambiloto (*Andrographis paniculata* Ness) dengan Teknik Ekstraksi Cair-cair. *Prosiding InSin*as 0096.
- [6]. Sulistijo, T. D., dan B. Pujiasmanto. 2007. Identifikasi Sambiloto (*Andrographis paniculata* Ness) sebagai

- Dasar Pemanfaatan dan Pelestarian Plasma Nutfah. Biodiversitas 8 (3): 218 – 222
- [7]. Taiz, L. and E. Zeiger. 1991. Plant physiology. The Benjamin/Cummings Publ. Com., Redwood City. 565-568
- [8]. Wardiatini, N.K., Widjaja, I.N.K. & Noviyanti, N.W.R. (2014). Isolasi Andrografolid dari *Andrographis paniculata* (Burm. f.) Ness menggunakan Metode Purifikasi dan Kristalisasi. Jurnal Farmasi Udayana, Vol.III (1): 31-34.
- [9]. Yusron M, M. Januwati M, E. R. Pribadi. 2005. Budidaya tanaman sambiloto. Balai Penelitian Tanaman Obat dan Aromatika. Badan Penelitian dan Pengembangan Pertanian . Bogor.

The Use of 1-Mcp: Overview Several Studies on The Postharvest Quality of Selected Fruits

Liana Suryaningsih B.¹, John K. Fellman², James P. Mattheis³, Xisheng Sun⁴

^{*1}*Faculty of Agriculture, University of Mataram, 83125. Nusa Tenggara Barat Province, Indonesia*

²*Department of Horticulture and Landscape Architecture, Washington State University, Pullman, WA 99164-1030, USA*

³*USDA, ARS Tree Fruit Research Laboratory, Wenatchee, Washington, USA*

⁴*AgroFresh Inc. China. R&D Manager for Asia*

**Email: liana_suryanings@wsu.edu (Mobile: +6282146193080)*

Abstract

Several studies in using 1-methylcyclopropene (1MCP) to the postharvest quality of some selected fruits have been done within 2010-2015 period at some different places. 1-MCP has effectively inhibited the production of ethylene and maintained the firmness on 'Royal Gala' apples stored at controlled atmosphere for 4 months; suppressed the carbondioxide on 'Cavendish' bananas for 8 days under controlled atmosphere storage; and maintained the firmness on 'Kayu' and 'Raja' bananas at ambient temperature.

Keywords: *1-methylcyclopropene, carbondioxide, ethylene, firmness*

1. Introduction

1-methylcyclopropene (1-MCP), an inhibitor of ethylene perception, is increasingly used to improve storage potential and to maintain quality of vegetables and fruits (Curry, 2008; Watkins, 2008). 1_MCP shows promise as commercial control of ripening and senescence of harvested fruits and vegetables (Boonyarithongchai et al., 2010; Watkins, 2008). Overview several studies using 1-MCP on the postharvest quality of selected fruits is the objective of this research.

2. Materials and Method

2.1 Apple

'Royal Gala' apples harvested at three different maturities were treated with 1 ppm of 1-MCP for 15 hours and were stored for 4 months under CA storage. Quality assessment was done at day 1 and day 7 after storage.

2.2. Banana

'Cavendish' bananas were treated with 350 ppb of 1-MCP for 18 hours and were stored for 11 days under CA storage. The CO₂ production were assessed everyday during storage.

'Raja' and 'Kayu' bananas harvested at three different maturities were treated with 0.1114 gram of 1-MCP for 20 hours and stored for 7 days at ambient temperature. Quality assessment was done at day 1, 5 and 7.

3. Results and Discussion

3.1 'Royal Gala' Apples

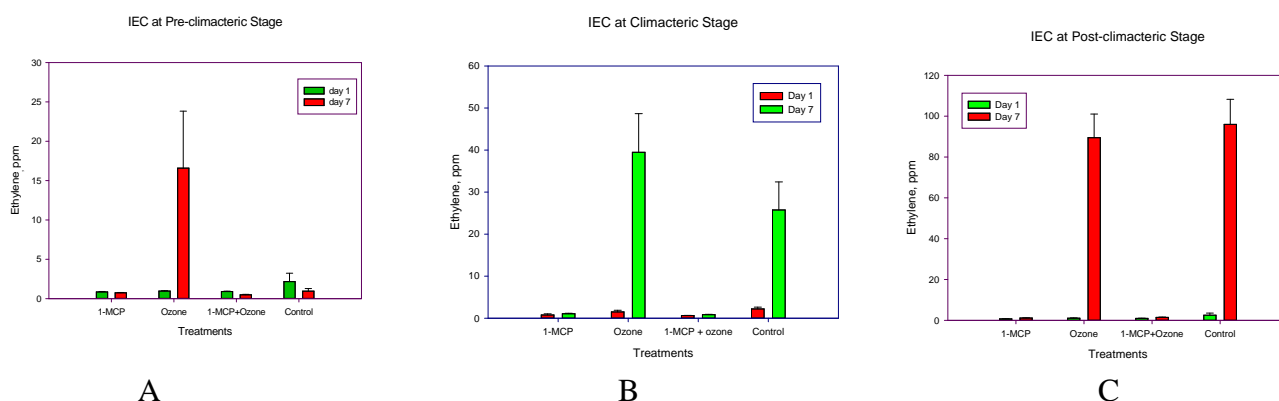


Figure 1. A: The internal ethylene concentration (IEC) for day 1 and day 7 after storage at pre-climacteric stage; B: The internal ethylene concentration (IEC) for day 1 and day 7 after storage at climacteric stage; C: The internal ethylene concentration (IEC) for day 1 and day 7 after storage at post-climacteric stage.

Results showed that 1-MCP effectively hampered the internal ethylene production (IEC) during storage at all maturity stages at day 1 after storage and continued to day 7 after storage.

3.2. 'Cavendish' Bananas

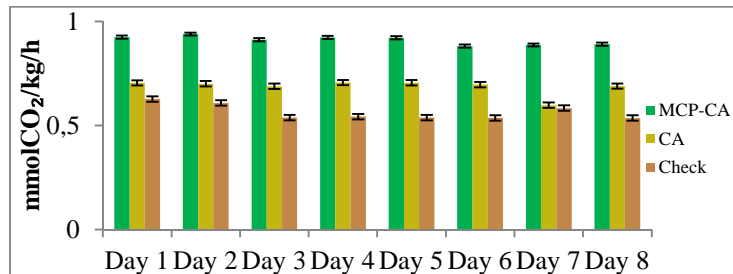


Figure 2. The CO₂ production for all treatments during storage.

As shown on figure 2, treatment with 1-MCP effectively increased the production of CO₂ which lead to the ability of 1-MCP to delay ripening on bananas.

3.3. 'Kayu' Bananas

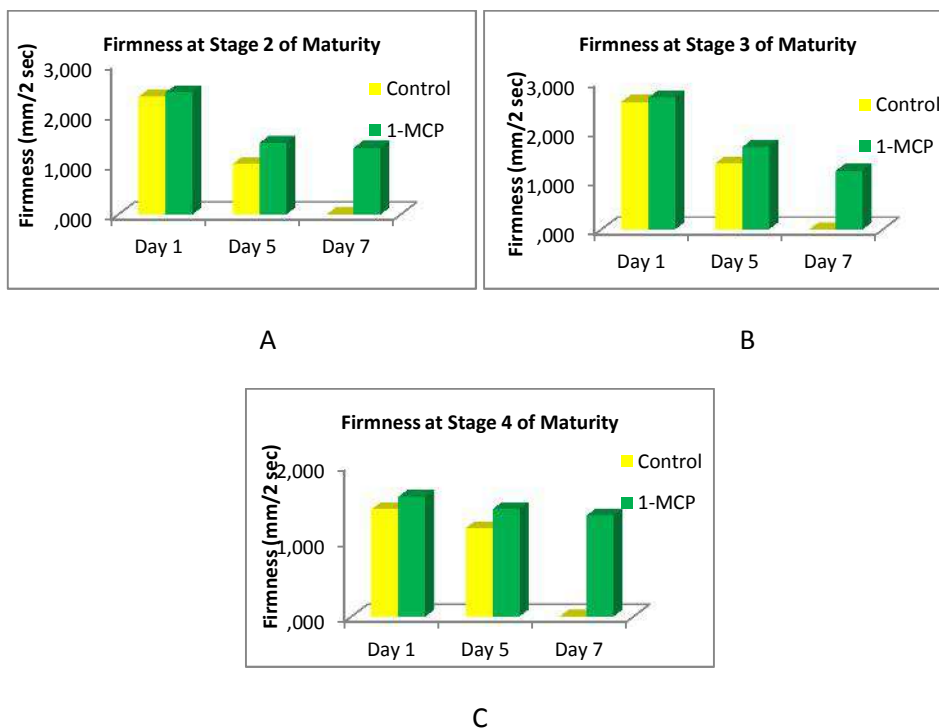
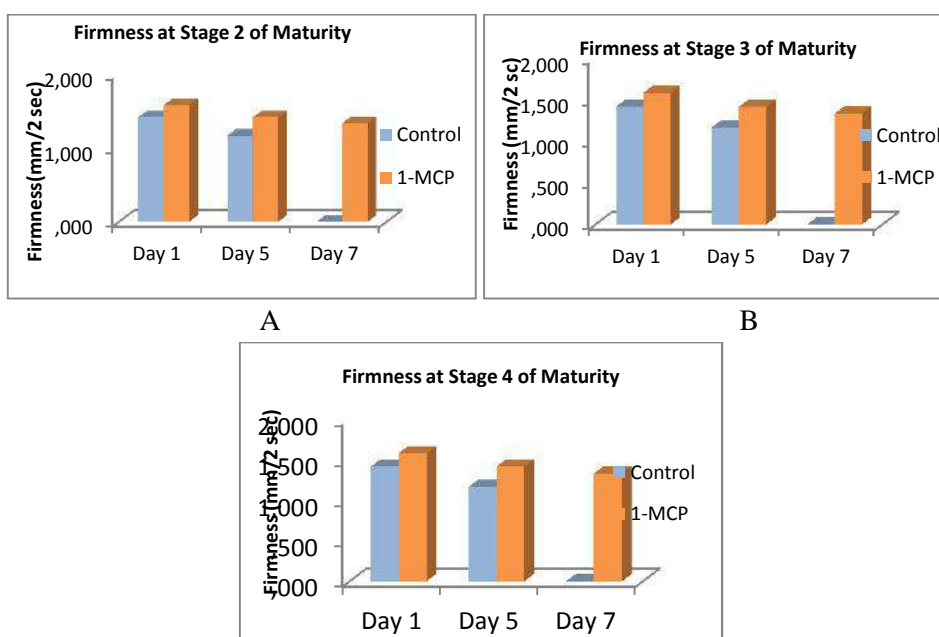


Figure 3. A: Firmness at day 1, 5, and 7 at stage 2 of maturity; B: Firmness at day 1, 5, and 7 at stage 3 of maturity; C: Firmness at day 1, 5, and 7 at stage 4 of maturity.

The use of 1-MCP on 'Kayu' bananas maintained the firmness better than untreated fruits at all stages of ripening.

3.4. 'Raja' Bananas



C

Figure 4. A: Firmness at day 1, 5, and 7 at stage 2 of maturity; B: Firmness at day 1, 5, and 7 at stage 3 of maturity; C: Firmness at day 1, 5, and 7 at stage 4 of maturity.

Figure 4 also showed the similar results that the use of 1-MCP on 'Raja' bananas maintained the firmness better than untreated fruits at all stages of ripening.

4. Conclusion

1-MCP not only inhibited the ethylene and CO₂ production, yet also maintained better firmness during and after storage on several selected fruits

References

- [1] C. B. Watkins, *Overview of 1-Methylcyclopropene Trials and Uses for Edible Horticultural Crops*, HortScience
- [2] E. Curry, *Effects of 1-MCP Applied Postharvest on Epicuticular Wax of Apples (*Malus domestica* Borkh) During Storage*, Journal of the Science of Food and Agriculture, 88:996-1006, 2008.
- [3]. P. Boonyaritthongchai and S. Kanlayanarat, *Effect of 1-MCP Treatment on the Postharvest Quality of Banana Fruit 'Kluai Kai'*, Acta Hort, 877, ISHS 2010.

Design Of The Measuring Instrument Of Turbidity Level Using Turbidity Sensor Based on SMS Gateway

Lily Maysari Angraini¹, Laili Mardiana^{1,*}, Kasnawi Al Hadi¹, Eka Ahmawati¹

¹*Physics Departement, Mathematics and Science Faculty, Universitas of Mataram, Jalan Majapahit 62 Mataram 83125*

**E-mail : lailimardiana@unram.ac.id*

Abstract

Ideal clean water must meet the water quality requirements which have been given by government. The presence of contaminants / impurities can cause turbidity and disturb water quality. Measurement of turbidity levels are generally still conventional in certain period. Therefore, the device which capable to measure turbidity level in real time and continuously are needed. This study aimed to design a turbidity level device based SMS gateway and find out the testing result of the device. The method used is hardware design using ATmega328 microcontroller on the Arduino Uno module. The components used are GSM Shield module to send SMS information, data logger system which is equipped with a RTC (Real Time Clock) for data storage along with time data information, and Turbidity Sensor TSD-10 as a detector. Whereas the design of software used Arduino IDE software as editor. The calibration process is done by comparing the value of the standard measuring instrument with value of sensor readings. It aimed to get linearity equation which will be used in the unit conversion process.

Keywords : *turbidity, SMS gateway, turbid meter, turbidity sensor*

I. Introduction

Water is one of the very important natural resource in the world. Water is a major component in the process of living creatures. Water is needed by living things not just to meet daily needs, but also as a means of transport, for industrial use, as a source of energy, agriculture and other purposes. Based on the role that is vital for life, then the required availability of water in good condition, both quality and quantity. The water is of poor quality will have an impact on the environment and the health of humans and other living things. The decline in water quality will degrade efficiency, productivity and the carrying capacity of water resources. Water pollution is generally derived from domestic sources and non-domestic sources. These pollutants affect water quality and cause turbidity in water.

Turbidity (turbidity) is a state where a liquid is reduced transparency due to the insoluble substances (ISO 1999). There are three aspects that affect turbidity, including aspects of physical, chemical and biological aspects. Water turbidity level will generally be determined by the amount of NTU (nephelometric turbidity units). Magnitude turbidity of drinking water that meets the health requirements applicable by reference is not more than 5 NTU and not perceivable turbidity of the water will not be seen.

One standard test equipment to determine the level of turbidity is Turbidimeter. This tool is already common and easily searchable. But the price is relatively expensive, so only certain parties who have it. The design of the measuring instrument turbidity levels have also been carried out by some previous researchers. However, only limited research conducted to determine the level of turbidity and not many are using communications-based information systems.

This is why the authors to design a tool instrumentation capable of measuring the

level of water turbidity effectively and accurately using the Turbidity Sensor-based SMS Gateway and to know the test results of these sensors. In this study, the testing process is done with a case study on the Ancar river, in Mataram .

2. Theory

2.1. Turbidity sensor type TSD-10.

This sensor measures the amount of light coming from a light source (diode) to the light receiver (phototransistor) in order to calculate the water turbidity level.

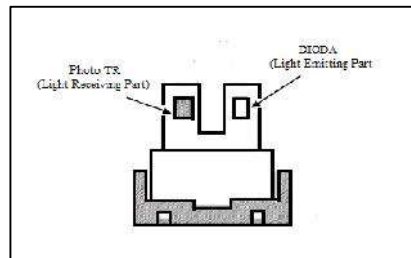


Figure 1.1 Parts of turbidity sensor (Source: www.ge-mcs.com)

There are two main components of the sensor circuit that changes the light intensity of the phototransistor and a light emitting diode (LED). Phototransistor generates a current in the base area. Countercurrent to the phototransistor is controlled by the amount of light or infrared received. While the LED is a semiconductor PN junction that emits light when fed forward Retainer . N-type semiconductor has a number of free electrons. While the P-type semiconductor has a number of free holes. If the N and P type semiconductors will be connected to form an energy barrier (junction) (Wahyudi, 2012).

2.2. Mikrokontroler Atmega 328

Arduino Uno is a microcontroller-based ATmega328 is a platform that is open source. Arduino has managed to write a program, compile it into binary code and upload it to the microcontroller memory.

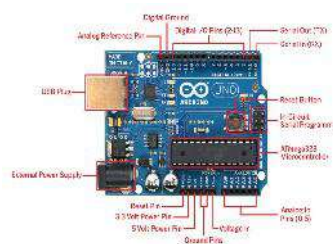


Figure 1.3 Arduino uno (Source: www.arduino.cc)

2.3. Icomsat GSM/GPRS Shield

Icomsat is a GSM / GPRS shield arduino whose main components are SIM900 Quad-band GSM / GPRS module. The use of this Icomsat done via AT commands (AT commands), and can be integrate with Arduino / Itarduino and Mega. Arduino to communicate and send commands to the GSM shield through serial communication.

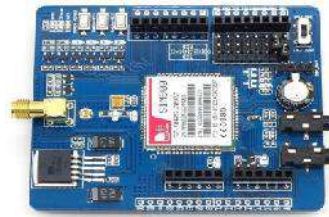


Figure 1.4 Icomsat GSM / GPRS Shield (Source: www.arduino.cc)

To be able to connect to the Internet network, Icomsat require the current GSM cards. APN settings, username and password entered on the card arduino sketch. Arduino and GSM shield can perform two-way communication, providing data on GSM arduino shield to be sent and GSM shield provide response data to arduino.

2.4. RTC (*Real Time Clock*)

Real Time Clock (RTC) serves as an information provider time (date and time) for the microcontroller. Time data is transferred from the RTC to the microcontroller via I2C interface. RTC can count the seconds, minutes, hours, day, date, month and year are valid until 2100.



Figure 1.5 RTC module (Source: www.sfe-electronics.com)

3. Methods

System design in this study consists of two parts, namely the design of the system hardware and software system design.

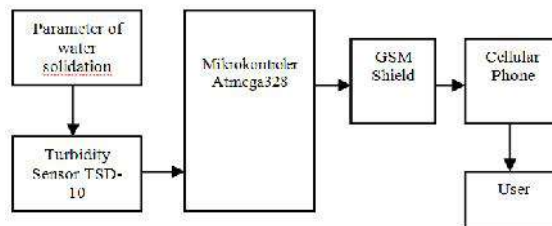


Figure 2.1 The flow of the whole system work process

3.1. Hardware Design Techniques

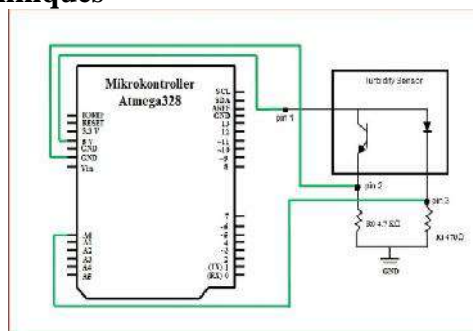


Figure 2.3 Hardware design tools

3.2. Mechanical Design Software

Software design is done by making use software Sketch arduino Arduino IDE shown in Figure 2.4.

3.3. Mechanical Testing Equipment

The samples are orange solution made with different concentrations, namely 7.5%; 10%; 12.5%; 15%; 17.5%; 20%; 22.5%; 25%; and 27.5%. In this process, the sensor displays the results in the form of voltage values with the unit mV. The results obtained will be compared with the results of measurements using standard tools Turbidimeter in units of NTU. From the comparison results will be obtained graph the linearity between the value of the voltage (mV) and turbidity (NTU), and the regression equation

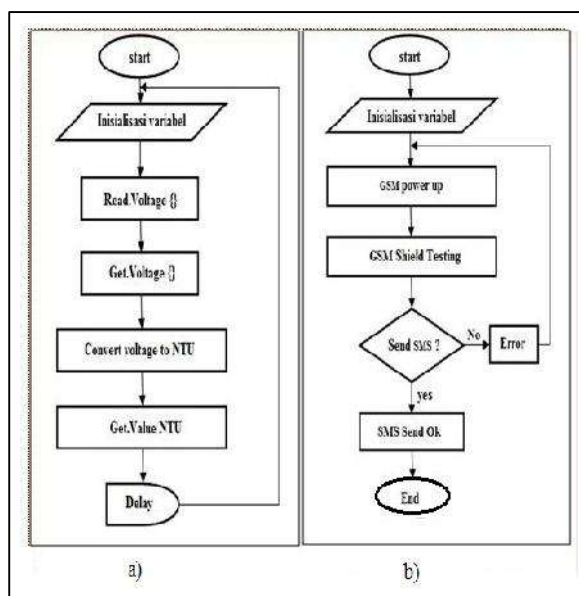


Figure 2.4 Flow Chart of the system, a) flow chart data system, b) flow charts GSM Shield

3.4. Mechanical Calibration

The calibration process is done by comparing the measurement results with the level of turbidity Turbidimeter standard tools and tools in the wake. The results obtained are the sensitivity values. Because the second unit of measurement tools are different, the data processing is done to determine the regression equation which could then be used as a reference for conversion into an NTU. Following the transfer function is generate

$$y = a + bx \tag{2.1}$$

3.5. Data Retrieval Techniques

The data retrieval process starts by uploading a program using the Arduino software. The program gives a chance to send information via SMS (Short Message Service). Data taken at 5 points Ancar Mataram river region.

4. Results and Discussion

A. Results of System Design

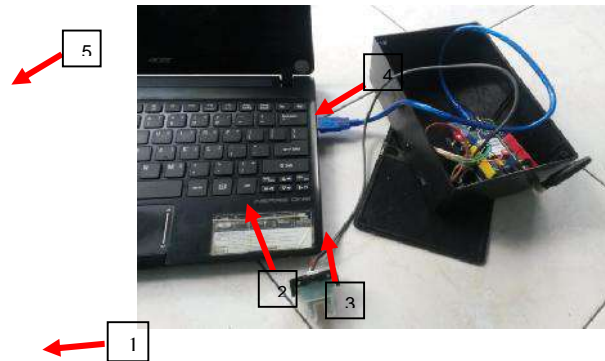


Figure 3.1 overall tool set consisting of 1) Turbiditi Sensor, 2) GSM Shield and Arduino, 3) Antenna, 4) cable downloader, 5) PC .

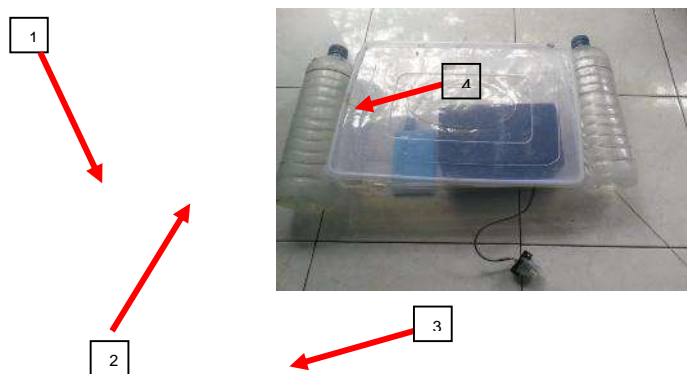


Figure 3.2 System measuring tool is ready tested, 1) power bank, 2) system tools, 3) Turbidity Sensor, 4) buoys

4.2. System Testing Results

The testing phase system is divided into two, namely Turbidity sensor testing and system testing SMS Gateway

1) Testing Results Turbidity Sensor TSD-10

a. Calibration Unit Con

Table 3.1 Results of measurement using a turbidimeter and turbidity sensors

concentration solution (%)	Turbidimeter (NTU)	Sensor (mV)
7,5	169	3440,86
10	221	3391,98
12,5	293	3225,81
15	359	3103,62
17,5	447	2971,65
20	517	2903,23
22,5	605	2771,26
25	668	2595,31
27,5	711	2580,65

From the data in Table 3.1 regression equation which could then be used as a reference

for conversion into an NTU.

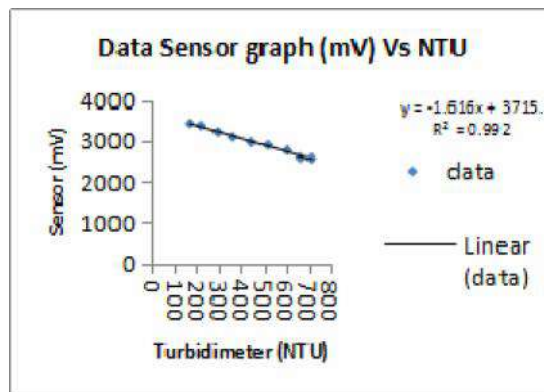


Figure 3.3 Graph linearity of the relationship between the results Turbidimeter (NTU) with the results of sensor readings (mV)

4.3. Measurement Result

After Satun converted into NTU, remeasurement do untu determine the level of accuracy of the sensor determines the values of the relative error of the measurement results. In terms of percent errors, accuracy defined by equation (4.2). The results obtained after the conversion are as follows:

Table 3.2 Data after conversion unit into NTU

Concentration solution (%)	Turbidimeter (NTU)	Sensor (NTU)	% Error
7.5	169	210.86	24.77
10	221	259.81	17.56
12.5	293	333.24	13.73
15	359	409.73	14.13
17.5	447	483.16	8.09
20	517	550.48	6.48
22.5	605	608.61	0.60
25	668	669.8	0.27
27.5	711	718.75	1.09
Average			9.35

From these data it can be seen that the tool design has an average relative error of 9:35%

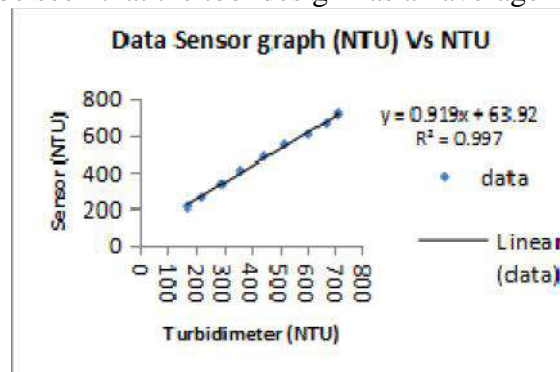


Figure 3.4 Graph linearity of the relationship between the results Turbidimeter (NTU) with the results of sensor readings (NTU)

4.4. SMS System Testing Results

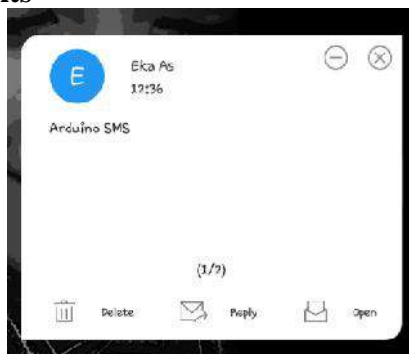


Figure 3.5 The test result GSM Shield

From the testing that has been done can be seen that the tool's ability to send SMS is the same as the range of GSM cards are used. SMS communication can reach a larger area because the GSM network has been spread in Indonesia, even in remote areas

Overall System Testing Results



Figure 3.6 The form of SMS received by the user

The process of data collection is done at five points in the watershed Ancar, Mataram. Data collection was performed for 20 minutes at each point with 1 minute delay. Here is the average value of the measurement results of the turbidity level at each point.

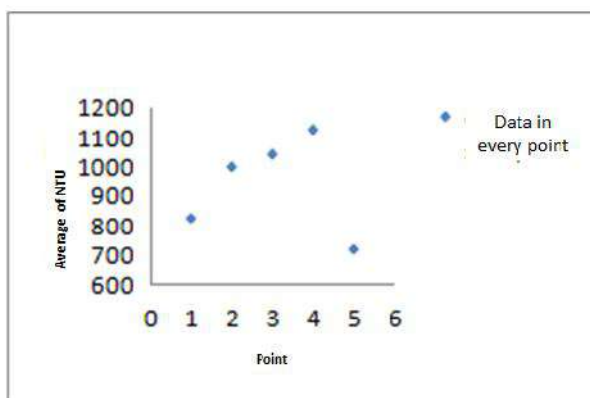


Figure 3.7 Graph of the average measurement results in every point

In theory, if there are no external factors, a river flows downstream or estuary would be more turbid than the upstream area and the center. From the data obtained in this study,

data from point one to point four are in accordance with the theory. However, the data point to a five decreased. This is because the turbidity sensor is very sensitive to light it receives. The intensity of light in the estuary downstream or greater than the upper and middle areas. As a result, the intensity of light received by the sensor is larger than the barrier material or dissolved materials, so that the sensor assumes that the water is clear.

5. Conclusion

The system uses turbidity level measuring instruments Turbidity Sensor-based SMS gateway has been successfully created and is composed of hardware and software devices. The hardware device consists of arduino uno, GSM shield, RTC, GSM card and Turbidity Sensor. Device Software consists of software arduino IDE. The system uses turbidity level measuring instruments Turbidity Sensor-based SMS gateway has been able megukur turbidity levels with an average relative error of 9.35% and is capable of sending SMS as informassi system to the user. Results obtained at each point (1-5) is 822.9; 998.2; 1040.3; 1123.5; and 718.4 in units of NTU

References

- [1] Arduino Inc. 2009. *Arduino Mega 2560* (<http://www.arduino.cc/en/Main/ArduinoBoardMega2560>) diakses pada 2 April 2016.
- [2] Bariguna, Dipo. 2008. *Studi Tingkat Kekeuhan Air Menggunakan Citra Radar Airsar*. Bogor : ITB.
- [3] Constanzo, A. (2013, Oktober). An Arduino Based System Provided with GPS/GPRSShield for Real Time Monitoring of Traffic Flows. In *Application of Information and Communication*. (AICT), 2013 7th International Conference on (pp. 1-5). IEE.
- [4] Hendrizon, Yefri Dan Wildan. 2012. *Rancang Bangunalat Ukur Tingkat Kekeuhan Zat Cair Berbasis Mikrokontroler AT89S51 Menggunakan Sensor Fototransistor Dan Penampil LCD*. Padang : Universitas Andalas.
- [5] <http://ge-mcs.com>. 2013. TSD-10 Turbidity Sensor. Diakses pada 3 maret 2016
- [6] <http://indo-ware.com/produk-3080-sensor-kekeuhan-air.html>. Diakses Pada 03 Maret 2016.
- [7] https://arduino-info.wikispaces.com/DS1307_RealTime_Clock_Brick. Di akses pada tanggal 11 Maret 2016.
- [8] International Standards Organization. 1999. *Water Quality – Determination Of Turbidity*. ISO 7027. Geneva : Switzerland.
- [9] Itead Studio .2014. *IComSat v1.1 - SIM900 GSM/GPRS shield Overview*.
- [10] Nuzula, Nike ika, dan Endarko. 2013. *Perancangan Dan Pembuatan Alat Ukur Kekeuhan Air Berbasis Mikrokontroler ATmega8535*. Surabaya: ITS.
- [11] Peraturan Menteri Kesehatan RI NO.416/MENKES/PER/IX/1990 tanggal 3 september 1990.
- [12] Pitojo dan Eling. 2003. *Deteksi Pencemar Air Minum*. Semarang : CV Aneka Ilmu.
- [13] Sutrisno. 1987. *Elektronika, Teori dan Penerapannya*. Bandung:ITB.
- [14] Thangarajah, A., Wongkaew, B., & Ekpanyapong, M. (2014). *Implementation of Auto Monitoring and Short-Message-Service System via GSM Modem*. IJCER, 3(2), 63-68.
- [15] Uldin, Riza dan Masroah. 2006. *Pemanfaatan Rangkaian Pengukur Intensitas Cahaya Untuk Rancang Bangun Alat Pengukur Tingkat Kekeuhan Air*. Semarang : Universitas Negri Semarang.
- [16] Wahyudi. 2012. *Elektronika Dasar 1*. Mataram : FKIP Press.

The Identification of Agroforestry System Plants As Raw Ingredients/Materials for Herbal Soap in Sesaot Forest

Indriyatno^{1,*}, Wiharyani Werdiningsih², I Gde Mertha³

¹Department of Forestry, Mataram University

²Department of Food Science and Technology, Mataram University

³Department of Education of Biology, Mataram University

*indrilamuk@yahoo.com

Abstract

“Back to nature” lifestyle is start to develop in the middle to high class society. The awareness of the use of herbal ingredients is increasing, considering the many risks of the use of chemical ingredients. Sesaot forest area is grown and planted by agroforestry people. The methods that have been used are exploration and description. The research of the plant's identification as raw materials for herbal soap in Sesaot Forest Area, West Lombok, has been done in June-July 2016. The objective of this research is to determine the species of plants as herbal soap's material that grow in the Sesaot Forest Area. The dominant vegetations that can be used as raw material for herbal soap are coconut (*Cocos nucifera* L.), candlenut (*Aleurites mulocana* (L.) Willd.), avocado (*Persea americana* Mill.), coffee (*Coffea canephora* Pierre ex A. Froehner), cacao (*Theobroma cacao* L.), piper (*Piper betle* L.), saffron (*Curcuma longa* L.) and yellow campaka (*Magnolia champaca* (L.) Baill. ex Pierre).

Keywords: *identification, herbal soap's raw ingredients, Sesaot Forest Area*

1. Introduction

Indonesia has a high biodiversity plants, many of them are used for cosmetics, medicines and soap materials. People prefer the herbal soap because of the bioactive compounds contained in it are relatively suited better to the skin. The soap is mixed with active ingredients that can be directly extracted by distillation process to get the essential oil.

Nowadays, the resource of soap's raw material are from forests, either from natural forest, community forests, or state forests that managed by communities (HKm). Forest management system, both in the community forest or KPH are using agroforestry systems.

The implementation of HKm program prioritized in the less productive areas, have a high accessibility, and community dependence to the forest is relatively high. Comprehensive development in West Nusa Tenggara (NTB) province until 2000 reached 35.000 ha which spread in some regencies include Sumbawa, Dompu, Bima, East Lombok, Central Lombok and West Lombok (Masnun, 2009).

The Community forests in West Lombok Regency who had a license of Alternative Community Forest (IPHKm), covers 185 ha area which spread over three villages namely, Sesaot village, Lembah Sempage village and Sedau village located in Narmada District. Sesaot protected forest is one of the forests which managed by agroforestry system community with community-based forest management schemes, in order to increase people's income and environment preservation since 1995 (Mansy, 2009).

Community forests which located in Sesaot are located outside of the State forests area. The structure and composition are similar to HKm forest using agroforestry system with combination of agricultural crops and trees. The community forests are generally located around the yard, so there are also lot of plants bio diversity, mainly used as a house decoration, and flowers as the ingredients of essential oil.

Sesaot forest area is a forest protected area that gives the consequences to not cutting the trees in HKm areas and to minimize the over logging in community forest area, considering that the area is a conservation zone in Jangkok head watershed. To increase incomes of the people in that area is to utilize the non-timber forest product. Potential as HHBK has been done but the specific benefits not been done, that's why they identify the non-timber forest plants that have potentials as raw materials for soap. The purpose of this research is to determine the types or species of the plants that grows in HKm Sesaot area and community forest that can be used as raw materials for herbal soap also to know the dominant species that cultivated by the community.

2. Materials and Methods

This research was conducted in June-July 2016. The research located in Sesaot forest area i.e. Buwun Sejati, Sesaot, Pakuan, Lembah Sempage dan Sedau Village which is in Jangkok head watershed, district of Narmada, West Lombok Regency. The production of herbarium and specimen identification have been done in Laboratory of Silviculture and Technology of Forest Products, Department of Forestry, Mataram University.

The tools used in the research were sask herbarium, stationery, camera, books collection, pruning scissor, old newspapers, isolation, label paper, ivory paper and oven. While the materials used are spiritus (rubbing alcohol), herbarium specimen.

The type of this research is description which tend to exploration/survey. The data collection methods using survey and interview the people to get types of plants that grows in Sesaot Forest Area. From the survey result, identification has been done to know the scientific name of the plants, then from it species matched with the literature to know the plants that can be used as raw materials for the soap making. Each type of the specimens will be taken which consist of the vegetative parts (leaves and twigs) also the generative parts (flowers and fruits) if any.

3. Result And Discussion

From the result of the identification the plants that existed in Sesaot HKm are *Pterospermum javanicum*, *Theobroma cacao*, *Erythrina* sp., *Durio zibethinus*, *Coffea canephora*, *Swietenia macrophylla*, *Paraserianthes falcataria*, *Nephelium lappaceum*, *Syzygium polyanthum*, *Vanilla planifolia*, *Musa x paradisiaca*, *Persea americana*, *Ceiba pentandra*, *Aleurites moluccana* and *Piper betle*.

While there are the same plants that founded in community forest as HKm, namely coconut (*Cocos nucifera*), ylang (*Cananga odorata*), white campaka (*Magnolia alba*), yellow campaka (*Magnolia champaca*), jasmine (*Jasminum sambac*), rose (*Rosa hybrida*), pandanus (*Pandanus amaryllifolius*), clove (*Syzygium aromaticum*), tamarind (*Arenga pinnata*), agarwood (*Gyrinops verstepgii*), frangipani (*Plumiera rubra*), and white frangipani (*Plumiera alba*).

The type of plants that found in Sesaot Forest Area as soap's raw ingredients are *Theobroma cacao*, *Durio zibenthinus*, *Coffea canephora*, *Nephelium lappaceum*, *Syzygium*

polyanthum, *Vanilla planifolia*, *Musa x paradisiaca*, *Persea americana*, *Ceiba pentandra*, *Aleurites moluccana*, and *Piper betle*. While the plants that located in community forest as raw ingredients of the soap are coconut (*Cocos nucifera*), ylang (*Canaga odorata*), white campaka (*Magnolia alba*), yellow campaka (*Magnolia champaca*), jasmine (*Jasminum sambac*), rose (*Rosa hybrida*), pandanus (*Pandanus amaryllifolius*), clove (*Syzygium aromaticum*), palm sugar (*Arenga pinnata*), and agarwood (*Gyrinops verstiegii*).

The dominant species or the plants that become source of income now in agroforestry system in HKm Sesaot is durian, rambutan, avocado, coffee, cocoa, piper betel, and banana. According to the interview from the community, this species of plants is the species which have a high economic value if it sold in traditional market. From the interview to the HKm Area community, they can earn about 9.000.000 – 13.000.000 Rupiahs per ha. That product usually sold in raw form. While the dominant species in community forest except that type is coconut. while the other species is just have potential to become essential oil as ylang (*Canaga odorata*), yellow campaka (*Magnolia champaca*), white campaka (*Magnolia alba*), jasmine (*Jasminium sambac*), rose (*Rosa hybrida*), pandanus (*Pandanus amaryllifolius*) only sold in limited amount in traditional market in Keru Village, district of Narmada, West Lombok Regency. They sell it in form of flowers and leaves as aoffers to worship by the Hindus.

Unlike the piper betel, it has more economic value because of the high market demand to consume or chewing the piper betel by some of the people of Lombok. Production per hA can reach 10-50 kg with the price of 50.000 Rupiah/kg. Piper betel is very potential become raw ingredients of the soap, this is because the piper betel has a function as a natural antiseptic. So when it used as a soap ingredients, many of piper betel soap favored by the local and international tourist.

4. Conclusion

From the result of the research and discussion, it can be concluded as:

There are nine types of potential plants that can be used as raw ingredients/materials which are coconut (*Cocos nucifera*), Candlenut (*Alurites muloccana*), avocado (*Persea americana*), coffee (*Coffea canephora*), cocoa (*Theobroma cacao*), piper (*Piper betle*), curcuma (*Curcuma longa*), yellow campaka (*Magnolia champaca*), white campaka (*Magnolia alba*), frangipani (*Plumiera rubra*), and white frangipani (*Plumiera alba*).

Reference

- [1] Backer, C.A. and R.C. Bakhuizen van Den Brink Jr., 1963. *Flora of Java* Vol I. N.V.P. Noordhoff. Groningen.
- [2] Backer, C.A. and R.C. Bakhuizen van Den Brink Jr., 1965. *Flora of Java* Vol II. N.V.P. Noordhoff. Groningen.
- [3] Backer, C.A. and R.C. Bakhuizen van Den Brink Jr., 1968. *Flora of Java* Vol III. N.V.P. Noordhoff. Groningen.
- [4] Mansy, 2013. 185 Ha Hutan Sesaot NTB Untuk HkM. <http://www.antaraneews.com/berita/163736/185-hektare-hutan-sesaot-ntb-untuk-hkm>. Accessed on September 2016.
- [5] Masnun, 2009. NTB Targetkan 35.000 ha Hutan Kemasyarakatan. <http://www.antarantb.com/berita/24766/ntb-targetkan-35000-ha-hutan-kemasyarakatan>. Accessed on September 2016.

Growth and Yield of Onion (*Allium Cepa* Var. *Ascalonicum*) as CA Result of Addition of Biocompost and Bioactivity Fermented with *Trichoderma* spp.

I Made Sudantha^{1,*}, Suwardji¹

¹Faculty of Agriculture University of Mataram

E-Mail: imade_sudantha@yahoo.co.id

Abstract

The aim of this research was to look at the effect of biocompost and bioactivator fermented with trichoderma spp and their interaction on growth and yield of onion. A field experiment was conducted in Inceptisol at Seteluk Village, sub district of Batulayar and District of West Lombok. The treatments were split plot design which was consist of two main factors (1) with biocompost 20 t/ha and (2) without biocompost. The sub main plot was bioactivator consist of 5 levels mainly (a) without bioactivator, (b) 5 g/plant, (c) 10 g/plant, (d) 15 g/plant and (e) 20 g/plant. The result of this study showed that there was a significant higher on growth and yield of onion after addition of biocompost compared with without addition of biocompost. There was no interaction between biocompost and bioactivator. Furthermore, the effect of addition of biocompost at level of 10 g/plat resulted to the highest growth and yield of onion compared with other levels addition of biocompost.

Keywords: *biocompos*, *bioactivator*, *Trichoderma* spp., *onion*, *allium cepa* L.

1. Introduction

Onion(*Allium cepa* var. *ascalonicum*.) is becoming very populer horticultural crops in Indonesia due to its high economical value as well as its multi used of onion for food flavour and medical or pharmaceutical materials (Anonim, 2014). West Nusa Tenggara Province is one of the centra onion production in Indonesia after East Java, Central Java and West Java Province. However, the onion production in Indonesia is still low due to some constrains in the crop production systems.

Some factors that are responsible low production of onion in the West Nusa Tenggara Province are the use of low quality of seed and conventional farming practice by using high levels of inorganic fertilzer such as NPK Fertilizer (Sudhanta, 2015).

The use of bioactivator containing saprofit fungsi of *T. harzianumi* and isolate of SAPRO-07 and fungsi endofit of *T. koningii* isolate has been reported increased growth and yield of vanilia (Sudantha 2010a), increased growth and yield of corn (Sudantha and Suwardji,2013), increased growth and yield of soy bean (Sudantha and Suwardji, 2014), increase growth and yield of onion in the pot trial (Sudantha 2015).

In this paper we reported result of field trial the effect of biocompost and bioactivator fermented with *Trichoderma* spp on growth and yield of onion in the field trial.

2. Materials and Methods

Field trial was conducted at Seteluk Village, sub district of Batulayar and District of West Lombok from June to August 2016. Split plot experimental design was used to set up this field experiment which was consists of main treatment biocompost (1) with biocompost 20 t/ha and (2) without biocompost. Sub treatments were application of bioactivator which consist of five levels mainly (a) without bioactivator (b) 5 g/plant of bioactivator (c) 10 g/plant of bioactivator (d) 15 g/plant of bioactivator and (e) 20 g/plant of bioactivator. The treatment was repeated three times, resulted in $2 \times 5 \times 3 = 30$ experimental plots.

Biocompost of coconut shell was crushed and sieved with a 1.0 mm, then moistened with

T. koningii (Endo-04) and *T. harzianum* (isolates Sapro-07) suspense, where been grown on PDA. Solution was used water solvents which added 2.5 g granular sugar. The density of spore in suspension were 10⁷ spores/ml. This solution is commonly known as Biotricon. Biocompost compounds had been added Biotricon were at 20-24% in moisture content. Biocompost was placed in container and sealed properly in anerobic condition and incubated in the room temperature. The incunbation period was used 28 days.

Fungi *Trichoderma* spp. was used in this study and had been cultured *T. koningii* isolates Endo-04 and *T. harzianum* isolates Sapro-07, were collected by Sudantha stored in Laboratory of Plant Protection, Agriculture Faculty, Universitas Mataram. Growing up used PDA (Potato Dextrosa Agar) with incubation period were 14 days.

The Bioactivator was made of leaves coffee had been dried at 60⁰C for 14 days, after that it was crushed with a coffee mill and then sieved. The result of sieve powder was mixed with clay at 1:3 (v/v) in ratio then sterilized with *autocave*. The mixing matters were inoculated with fungi conidial biomass suspense *T. koningii* ENDO-2 and *T. harzianum* SAPRO

Plots size were 5x2 m² cropping spaces were 25 cm x 20 cm, so there were 200 plant per plot. Onion seed seeds used was cultivar of Philip. Planting hole at depth of 2.5 cm. Combination of biocompost and bioactivator were applied on treatment basis as discussed above. During the growing season, water was applied based on furrow irrigation based on its onion requirement and weeding also applied at 20, 40, and 60 days after planting. Harvesting was done after 103 days after planting.

Data were analysed using analysis of variance (2009), any significant different among means were then tested using Ducan’s Multiple Test at probability level 95%.

3. Results and Discussion

3.1. Characteristis of Biocompost and Soil’s Chemical Properties after Fermentation and Addition of Biocompost Fermented with *Trichoderma* spp.

Fermentation of biocompost using trichoderma spp affected the biocompost and soil properties. Chemical tests showed that there were decreased of biocompost pH and C/N ratio, but enhanced %-N. One of the most important of the benefit of fermentation was reducing C/N ratio. This has a significant implication on accelerating degradation of biocompost and become nutrient that may available for plant growth. Similarly fermentation biocompost also increased cation exchange capacity (CEC) (*Table 1.*).

Table 1. Chemical Change of Biocompost and Soi Properties after Fermentation and Application of Fermented Biocompost

Parameters	BC Properties			Soil Properties ^a					
	BC	FBC	Anova ^b	Basic	Soil (control)		Soil + BCT (20 tons/ha)		Anova ^b
				-1 st Day	30 th Days	60 th days	30 th Days	60 th Days	
pH (H ₂ O)	7,8	7,2	*	6,5	6,4	6,5	6,4	6,2	ns
CEC (cmol _c kg ⁻¹)	23,81	26,28	*	12,25 a	11,66 a	12,41 ab	14,53 c	14,24 bc	*
C (%)	62,00	60,00	*	2,80	2,65	3,10	3,15	3,00	ns
N (%)	0,37	0,82	**	0,18 a	0,23 ab	0,34 d	0,25 bc	0,31 cd	*
C/N Ratio	167	73	**						
Soil Respiration (μmol CO ₂ kg ⁻¹ ha ⁻¹)	-	-		9,21 a	12,42 b	11,83 b	12,05 b	13,62 b	*

^aMeans followed by the same letter at each row are not significantly different (P<0.05)

Using this fermented biocompost (FBC) were 20 tons ha⁻¹, results of statistical

analaysys on chemical tests showed that the fermentation of BC has no significance different effect on Biocompost pH and soil organic carbon (SOC), but signifcantly increased cation exchange capacity (CEC), %-N, C/N ratio and soil respiration.

Increasing CEC of soil were higher in soil applied FBC both on 30 and 60 days after application measured than without FBC application at the same period (30th and 60th days). By comparing before (1st day = 12.25 cmol_c kg⁻¹) and after fermentation and application both without FBC (30th cmol_c days = 11.66 cmol_c kg⁻¹ and 60th days = 12.61 cmol_c kg⁻¹) and with FBC application (Soil+FBC in 30th days = 14.53 cmol_c 1st kg⁻¹ and 60th days = 14.24 cmol_c kg⁻¹) also showed improvement

3.2. Effect of Biocompost and Bioactivator on The Growth of Onion

Results of analysis of variance showed that application of both fermented biocompost and level of bioactivator were both significantly increased on plant heigh at 14,21,28 and 35 days after planting (DAP). Furthermore analysis using Least Square Different (LSD) at probability 95% can be seen at Tabel 1 and 2.

Tabel 1. The influence of biocompost on the hight of plant

Treatments	Mean the heigh of Onion Plant (cm)			
	14 DAP	21 DAP	28 DAP	35 DAP
With Biocompost	23,03 a ¹⁾	27,34 a ¹⁾	30,31 a ¹⁾	32,73 a ¹⁾
Without Biocompost	21,78 b	24,66 b	26,23 b	28,81 b
LSD P< 5%	1,10	2,98	3,86	3,12

1) Means followed with the same letter in the same colum are not significantly different.

2) DAP = Day after planting

Table 1 showed that the addition of biocompost fermented with *Trichoderma* spp significantly increased plant heigh at 14 DAP, 21 DAP, 28 DAP and 35 DAP compared with the height of plant without addition of biocompost. Sudantha and Suwardji (2016) advocated that addition of fermented biocompost with *Trichoderma* spp was able to accelerate the vegetative growth of onion. Similarly Salisbury dan Ross (1995) found that some fungi that life in the soil can produce etylene that are able to stimulate the growth of plant and also able to protect the plant from root rot desease. Moreover ethelence produced by the fungi is also able to speed up the flowering time. Sudantha (2010a) also found that fungi of endofit *Trichoderma* spp. was able to colonize in the plant tissues. As a result of ethylene produced in the plant tissues, the plant was cappable of accelerating the growth of plant tissue. Moreover, Trautman dan Olinceiw (1996) reported that *Trichoderma harzianum* was able to produce cellulose enzyme that are capable of decomposing organic matter containing lignin and cellulose to the simple compounds which are dissolve in soil solution and becoming available for plant growth and development.

Table 2. Influence of Bioactivator Level on Plant Heigh of Onion

Treatment of Bioactivator	Mean of Onion Plant Heigh(cm)			
	14 DAP	21 DAP	28 DAP	35 DAP
Without bioactivator	21,30 a ¹⁾	24,10 a ¹⁾	26,08 a ¹⁾	27,10 a ¹⁾
5 g/plant	22,51 b	25,75 b	27,25 b	31,22 b
10 g/plant	22,75 bc	26,74 bc	28,43 bc	32,67 bc
15 g/plant	23,74 c	27,28 c	28,67 c	32,74 c
20 g/plant	23,71 c	27,37 c	28,70 c	32,73 c
LSD at P < 5%	1,27	1,51	1,03	1,35

1) Values followed by the same symbon in the same colum are not sigificantly different at P<5%

2) DAP= Day after planting

Table 2 showed that the level of bioactivator significantly influenced plant heigh of

onion at 14 DAP, 21 DAP, 28 DAP and 35 DAP. All treatments were significantly increased plant height. Comparing the levels of treatments, doses of 10 g/plant of bioactivator considered to be the level that is significantly increase the plant height and economically viable. This results suggested that bioactivator containing fungi of *T. koningii* isolat Endo-02 dan *T. harzianum* isolat Sapro-07 can stimulate plant height of onion.

Our data also suggested that bioactivator containing fungi of *T. koningii* isolat Endo-02 dan *T. Harzianum* isolat Sapro-07 were more prominent in increasing the height of plant of onion compared with biocompost suggesting that the use of bioactivator may economically viable and practically more easy for farmers. Similar results has been reported by Sudantha et al (2016) suggested that 10g/plant of bioactivator can significantly increased the plant height of onion and economically viable conducted in other research for other soil types. As previously reported that Sudantha (2010b) also found that fungi endofit *T. koningii* isolat ENDO-02 in the plant tissue produced etylene which able to stimulate vegetative growth of plant.

Further statistical test using LSD at P <5% for the influence of biocompost conducted independently on other plant parameters suggested that bioactivator significantly increased number of tillering, fresh weight of plant and number of plant bulb of onion (Table 3).

Table 3. Influence of biocompost on number of tillering, fresh weight of plant and fresh bulb weight of onion

Treatments	Number of tillering (bulb/rumpun)	Fresh weight of plant (g/rumpun)	Fresh bulb of onion (g/rumpun)
With biocompost	6,78 a ¹⁾	39,11 a ¹⁾	33,57 a ¹⁾
Without biocompost	5,13 b	27,38 b	22,42 b
LSD 5%	1,63	1,02	1,77

1) Values followed by the same symbol in the same column are not significantly different at P<5%

Table 3 suggested that addition of biocompost significantly increased number of tillering and fresh weight plant and fresh weight of bulb. This results similar to the results of Sudantha et al (2016) in the glass house experiment that addition of biocompost significantly increase number of tillering, plant fresh weight and fresh weight of bulb of onion. Furthermore Sudantha dan Suwardji (2013) also found application of biocompost fermented with fungi of endofit and saprofit *Trichoderma* spp increased plant height and development of onion and yield of onion.

Table 4. Influence of bioactivator on number of tillering, fresh weight of plant and fresh bulb of onion

Treatments	Number of tillering (bulb)	Fresh weight of plant (g)	Fresh weight of bulb (g)
Without bioactivator	4,91 a ¹⁾	29,42 a ¹⁾	23,71 a ¹⁾
5 g/plant	5,36 b	32,36 b	27,11 b
10 g/plant	5,62 bc	35,10 bc	28,06 bc
15 g/plant	5,87 c	35,56 c	30,86 c
20 g/plant	5,93 c	36,48 c	31,02 c
LSD P<0,5%	0,50	2,75	2,95

1) Values followed by the same symbol in the same column are not significantly different at P<5%

Table 4 showed that application of bioactivator containing fungi of *T. Koningii* isolate Endo-02 dan *T. harzianum* isolat Sapro-07 significantly increased number of tillering, fresh weight plant and fresh weight of bulb in comparison with without application of bioactivator. The data also suggested that application of bioactivator 10g/plant also significantly increased number of tillering and fresh weight plant and fresh weight of bulb.

The fact indicated that application of bioactivator capable of increasing yield of onion due to the dominant role of fungi of *T. harzianum* isolat Sapro-07. Similar reason that have been suggested in the above paragraph are apply for increasing of yield of onion as a result of application of bioactivator.

4. Conclusion

Result of this study suggested that the addition of biocompost to the soil resulted in higher growth and yield of onion compared with without addition of biocompost. In addition, the growth and yield of onion become much more higher with the additon of bioactivator at level up to 10 t/ha.

Further research should be directed to look at the method of application of biocompost and bioactivator to achieve potential yield of onion used in this study.

Acknowledgement

Financial support was provided by Ministry of Research, Technology and Higher Degree Education Republic of Indonesia for providing research funding, financial Year of 2016.

References

- [1] Anonim, 2014. Ditjen Tanaman Pangan, Hortikultura, Peternakan, Badan Pusat Statistik. <http://www.ekon.go.id/media/filemanager/2014/11/19/k/e/kementan.pdf>
- [2] Arianci, R. 2014. Pengaruh Campuran Kompos Tandan Kosong Kelapa Sawit, Abu Boiler dan Trichoderma terhadap Pertanaman Kedelai pada Sela Tegakan Kelapa Sawit yang Telah Menghasilkan di Lahan Gambut. *Jurnal Teknobiologi*, 5(1), 21-29
- [3] Cook, R. J. and K. F. Baker. 1983. *The Nature and Practice of Biological Control of Plant Pathogens. The American Phytopathol. Society*, St. Paul MN. 539 p.
- [4] Latifah, A. Kustantinah, Loekas Soesanto. 2011. Pemanfaatan Beberapa Isolat *Trichoderma harzianum* sebagai Agensia Pengendali Hayati Penyakit Layu Fusarium pada Bawang Merah. *Eugenia Vol.17 No 2*. Universitas Jenderal Soedirman.
- [5] Salisbury, F.B., and C. W. Ross, 1995. Fisiologi Tumbuhan Jilid 3. Perkembangan Tumbuhan dan Fisiologi Tumbuhan (Terjemahan D. R. Lukman dan Sumaryono). Penerbit ITB, Bandung.
- [6] Sudantha, I. M. 2009. Aplikasi Jamur *Trichoderma* spp (Isolat ENDO-02 dan 04 serta SAPRO-07 dan 09) Sebagai Biofungisida, Dekomposer, dan Bioaktivator Pertumbuhan dan Pembungaan Tanaman Vanili dan Pengembangannya pada Tanaman Hortikultura dan Pangan Lainnya di NTB. Laporan Penelitian Hibah Kompetensi DP2M DIKTI, Mataram.
- [7] Sudantha, I. M. 2010a. Buku Teknologi Tepat Guna: Penerapan Biofungisida dan Biokompos pada Pertanian Organik. Fakultas Pertanian Universitas Mataram, Mataram.
- [8] Sudantha, I. M. 2010b. Aplikasi Jamur *Trichoderma* spp (Isolat ENDO-02 dan 04 serta SAPRO-07 dan 09) Sebagai Biofungisida, Dekomposer, dan Bioaktivator Pertumbuhan dan Pembungaan Tanaman Vanili dan Pengembangannya pada Tanaman Hortikultura dan Pangan Lainnya di NTB. Laporan Penelitian Hibah Kompetensi DP2M DIKTI, Mataram.
- [9] Sudantha, I. M. dan Suwardji. 2013. Pemanfaatan Biokompos, Bioaktivator dan Biochar Untuk Meningkatkan Hasil Jagung dan Brangkas Segar pada Lahan Kering Pasiran dengan Sistem *Irigasi Sprinkler Big Gun*. Laporan Penelitian Strategis Nasional, Mataram.
- [10] Sudantha, I. M. Dan Suwardji, 2014. Pemanfaatan Bioaktivator dan Biokompos (Mengandung Jamur *Trichoderma* spp. dan Mikoriza) Untuk Meningkatkan Kesehatan, Pertumbuhan dan Hasil Tanaman Kedelai di Lahan Kering. Laporan Hibah Tim Pascasarjana DP2M Dikti, Mataram.
- [11] Sudantha, I. M. 2015. Pemanfaatan Bioaktivator dan Biokompos untuk Meningkatkan Kesehatan, Kuantitas dan Kualitas Hasil Bawang Merah. Laporan Penelitian Mandiri Program Magister Pengelolaan Sumberdaya Lahan Kering Program Pascasarjana Unram.
- [12] Sudantha, I. M., Suwardji, dan M. T. Fauzi. 2016. Pemanfaatan Bioaktivator dan Biokompos Hasil

- Fermentasi Jamur *Trichoderma* spp. serta Fungi Mikoriza Abuskular Untuk Meningkatkan Kesehatan, Pertumbuhan dan Hasil Bawang Merah. Laporan Penelitian Sumber Dana BLU PNBP Unram Tahun 2016.
- [13] Trautman, N. and E. Olynciw, 1996. Compost microorganism. Cornell Composting. Science and Engineering. Cornell University. 16 hal.
- [14] Triyatno, B. Y. 2005. Potensi beberapa Agensia Pengendali terhadap Penyakit Busuk Rimpang Jahe. Fakultas Pertanian Universitas Jenderal Soedirman, Purwokerto.
- [15] Windham, M., Y. Elad and R. Baker. 1986. A Mechanism of Increased Plant Growth Induced by *Trichoderma* spp. *Phytopathology* 76: 518 - 521.