

# PROCEEDING

## THE 5<sup>th</sup> BOGOR INTERNATIONAL CONFERENCE FOR APPLIED SCIENCE



“ Embracing  
The Global Society  
to Face New Normal Era  
through Applied Science ”

November 11<sup>th</sup>-12<sup>th</sup>, 2021  
Virtual Conference

Organized By:



Vol. 5 No. 1



**PROCEEDING**  
**5<sup>th</sup> BOGOR INTERNATIONAL CONFERENCE**  
**FOR APPLIED SCIENCE 2021 (5<sup>TH</sup> BICAS 2021)**

Theme:

“Embracing the Global Society to Face New Normal Era  
through Applied Science”

VIRTUAL CONFERENCE  
NOVEMBER 11<sup>th</sup> – 12<sup>th</sup> 2021



## **PROCEEDING**

### **5<sup>th</sup> Bogor International Conference for Applied Science 2021**

### **5<sup>th</sup> BICAS 2021**

Theme:

“Embracing the Global Society to Face New Normal Era through Applied Science”

ISBN: 978-602-6585-89-9

PUBLISH DATE: January, 26<sup>th</sup> 2022

VIRTUAL CONFERENCE

CONFERENCE DATE: NOVEMBER 11<sup>th</sup> -12<sup>th</sup> 2021

### **Committee:**

*Steering Committee:*

Board of Patron:

1. Assoc. Prof. Dr. H. Martin Roestamy, SH., MH.
2. Dr. H. Bambang Widjojanto, SH., LL.M
3. Dr. Hj. R. Siti Pupu Fauziah, M.Pd.I
4. Assoc. Prof. Dr. Ir. Dede Kardaya, M.Si
5. Assoc. Prof. Dr. Hj. Rita Rahmawati, M.Si
6. Samsuri, SE., MM

Advisor:

1. Dr. Ir. Ristika Handarini, M.P
2. Dr. Irwan. Ch, SE., MM
3. Ir. Himmatl Miftah, M.Si

*Organizing Committee:*

Conference Chair:

1. Prof. Ir. Mohamad Ali Fulazzaky, CES., DEA

Co Conference:

1. Dr (cand). Radif Khotamir Rusli, M.Ed

Secretary:

1. Mas Nur Mukmin, SE., M.Ak

Finance:

1. Warizal, SE., MH
2. Nurul Annisa Yuniarti, M.Pd

Promotion and Relation:

1. Dra. Ginung Pratidina, M.Si
2. Faisal Tri Ramdhani, S.Sos., M.AP

Paper and Publication:

1. Dr. Rasmitadila, ST., M.Pd

Secretariat:

1. Muhamad Encep, S.Kom, M.Kom
2. Muslim, SE
3. Riska Rahmawati
4. Dimas Bayu Nugroho
5. Rafael Nuansa Ramadhon

Reviewer:

1. Prof. Ir. Mohamad Ali Fulazzaky, CES., DEA (Head of Scientific Reviewer)
2. Prof. Mohammad Winugroho, Ir., M.Sc.
3. Prof. Dr. Hanafi Nur, Ir., M.Sc
4. Prof. Dr. Djaja Sibardja Sutaatmadja, Ir., M.Sc
5. Dr. Ir. Mardiah, M.Si
6. Dr. Ir Arifah Rahayu, M.Si
7. Dr. Ir. Wini Nahraeni, M.Si

Editor:

1. Radif Khotamir Rusli, M.Ed
2. Mas Nur Mukmin, SE., M.Ak
3. Muslim, SE



**Publisher:**  
Unida Press  
Universitas Djuanda Bogor  
Indonesia  
Jl. Tol Ciawi No. 1 Bogor 16720

## PREFACE

Dear ladies and gentlemen,

In this very precious moment, I would like to convey my warm regards and high appreciation for the eminent speakers, distinguished guests, respected colleagues, and all participants, from the deepest of our heart for having you joining our conference.

In 2021, we have successfully done our responsibility as scholars and researchers through The 5<sup>th</sup> Bogor International Conference for Applied Sciences (BICAS). Present our research finding virtually worldwide, proofs that knowledge have no boundaries, time, and place border. Even, the pandemic will not stop us to invent, create and publish. We should be more than proud, and this proceeding is dedicated for all participants who have share their remarkable research to the world. This current conference consist of researchers from several countries such as Indonesia, Malaysia, United Kingdom, Taiwan, Brunei Darussalam, and Pakistan.

Hereby, we would like to thank to Yayasan Pusat Studi Pengembangan Islam Amaliah Indonesia and all remarkable keynote speakers thank you for making the conference full of bright new knowledge. With the deepest of gratitude, we are more than proud to have all partners in the conference. Thank you to our loyal partner Universitas Ibn Khaldun that have been collaborating since the first BICAS and BICSS.

Through the theme “Embracing the Global Society to Face New Normal Era through Applied Science”, we have more than 40 scholars joined the conference in variety field of study such as Applied Science, Agriculture, Poultry & Husbandry, Fisheries, Bioscience, Engineering & Technology, Computer Science, Food Science, Sciences, Medicine & Applied Health, Pharmacy.

The conferences hope to serve as a forum to exchange ideas and experiences on findings and thoughts presented in empirical and theoretical assessments among Indonesian and overseas academicians and researchers. We deeply say thank a lot to all of you who make this conference happened. Thanks, are also deserved for the committee members and editorial boards for their tirelessly contributions to this conference. Finally, we hope that the pandemic is over and we could meet in person the next Bogor International Conference for Applied Science. Thank You.

Sincerely,

**Prof. Ir. Mohamad Ali Fulazzaky, CES, DEA, PhD.**

Conference Chair

**SYNOPSIS**

1. Virtual Seminar Implementation with ISBN Full Paper Proceedings and in collaboration with affiliated journals from the University of Djuanda IJAR. The 5<sup>th</sup> BICAS 2021, in collaboration with the Co-Host, Universiats Ibn Khaldun, who has always been our conference partner since 2017. Thank you for such a great collaboration. We hereby express our gratitude and appreciation to Universitas Ibn Khaldun for its willingness to become a partner of Djuanda University in the implementation of The 5<sup>th</sup> BICAS 2021. Also all remarkable keynote speakers for the willingness to share valuable thoughts though this conference.
2. Theme: **Embracing the Global Society to Face New Normal Era through Applied Science**
3. Participants: 29 People
4. Consists of several universities including:

Indonesia	Universitas Djuanda, Ibn Khaldun University, Akademi Kebidanan Al-Ikhlas, Pakuan University, Politeknik Negeri Sambas, Universitas Gunadarma, Universitas Nusa Bangsa
International	Thailand, Germany, Iran, Vietnam, Malaysia, Cambodia, France, US

## CONTENTS

<b>COVER .....</b>	<b>i</b>
<b>PREFACE .....</b>	<b>v</b>
<b>SYNOPSIS .....</b>	<b>vi</b>
<b>CONTENTS .....</b>	<b>vii</b>
<b>THE KEYNOTE SPEAKER ABSTRACTS .....</b>	<b>x</b>
<b>PROCEEDING ARTICLES .....</b>	<b>1</b>
<b>ABSTRACT.....</b>	<b>114</b>

### PROCEEDING ARTICLES

No	Article Title	Institution	Page
1	EFFECTS OF NEEM SOLUTION EXTRACT ON PESTS AND DISEASES AND DEVELOPMENT OF RED CHILI PLANTS  Author: Oktavianus Lumban Tobing, Yanyan Mulyaningsih	Universitas Djuanda Bogor	1-8
2	Phytochemical Analysis and Vitamin C Content in Biscuits With Addition of Siam Orange (Citrus Nobilis Microcarpa) Dregs Powder  Author: Kiki Kristiandi, Hidayat Asta, Rini Fertiasari	State Polytechnic of Sambas	9-13
3	INFLUENCE OF BIOFERTILIZER AND KNO <sub>3</sub> FERTILIZERS ON THE GROWTH, QUALITY AND PRODUCTION OF KAILAN PLANTS (BRASSICA OLERACEAL VAR. ALBOGLABRA)  Author: Nurochman , Panji sakti Nugraha	Universitas Djuanda Bogor	14-17
4	MITIGATION OF HORTICULTURAL PRODUCT DISTRIBUTION RISK BASED ON ENTERPRISE RISK MANAGEMENT (ERM) METHOD  Author: Arti Yoesdiarti, Himmatul Miftah, Ikhsan Qodri Pramartaa, Santia Afandi, Tiara Amanda Lestari, Vigia Marfuah Zuher	Universitas Djuanda Bogor	18-24
5	ANALYSIS OF PUBLIC PERCEPTION OF URBAN BUS OPERATION USING CLASSIC ASSUMPTION AND MULTIPLE LINEAR REGRESSION TESTS  Author: Muhamad Rinaldi, Muhammad Nanang Prayudyanto, Syaiful	University of Ibn Khaldun Bogor	25-36

6	Evaluation of Carriers for Development of Sappan (Caesalpinia sappan L.) Extract-Based Indicator Labels Author: Hikmah Nur Chosidah, Muhammad Fakhri Kurniawan, Nursyawal Nacing, Tiana Fitrilia	Djuanda University	37-41
7	A review of cascara from various types of Indonesian coffee bean origin Author: Nindya Atika Indrastuti	Djuanda University Bogor	42-44
8	Specificity of Pork Gene Primer Design (Sus scrofa) for Loop-Mediated Isothermal Amplification Analysis Method Author: Afrizal Araaf Majid, Dwi Wulandari, Isma Kusmiati, Mediasti Rahmasari, Muhamad Rizki Fauzi, Rosy Hutami	Djuanda University	45-50
9	WEANING FOOD: A FORMULATION FROM PUMPKIN PUREE AND NUTS Author: Mardiah, Retno Kartika Rosdiana <sup>2</sup> , Tiana Fitrilia	universitas djuanda	51-55
10	COLOUR AND TEXTURE PERFORMANCE OF MUNTOK WHITE PEPPER (Piper nigrum Linn) HARD CANDY Author: Distya Riski Hapsari, Fuji Lestari Nurjulianti, Rosy Hutami, Siti Nurhalimah	Djuanda University	56-61
11	Physical Quality of Noodles from Native and Modified Canistel Flours (Pouteria campechiana) Author: Aminullah, Noli Novidahlia, Sri Rejeki Retna Pertiwi	Universitas Djuanda	62-65
12	DIETARY SUPPLEMENTATION OF GARCINIA ATROVIRIDIS REDUCES MALONDIALDEHYDE LEVELS OF SPENT LAYER DUCK Author: Dede Kardaya, Dewi Wahyuni	Universitas Djuanda	66-68
13	Isolation of Triterpenoids Natural Products from Ethyl Acetate Extract of Aglaia angustifolia (Miq.) Leaf Author: Delia Ayu Karisma, Devy Susanty, Ricson Pemimpin Hutagaol, Srikandi	Universitas Nusa bangsa	69-75
14	nutrition counseling in the first thousand days of life for stunting prevention Author: Siti Rafika Putri	Akademi Kebidanan Al-Ikhlas	76-79



15	Chemical and Sensories Characteristics Hard Candy Habbatussauda (Nigella Sativa) and Honey (Apis Mellifera Linneus)  Author: Wilna Iznillillah	Universitas Djuanda	80-89
16	FUNCTIONS OF VISUAL MESSAGES AS PRESENTATION AND PROMOTION MEANS IN CHANGING THE HOKKAN INDONESIA LOGO BY SOCIAL DISTANCING  Author: Ali Alamsyah Kusumadinata, Maria Fitriah, Nia Rohmaniah	Universitas Djuanda	90-95
17	The Effect Of Repleacing Fish Meal With Maggot Flour In the Ration On The Physical Charasteristics Of KUB Chicken  Author: Dewi Wahyuni, S.Pt, M.Si, Dr.Ir Anggraeni, M.Si, Udin Bahrudin	Universitas Djuanda Bogor	96-103

## LIST ABSTRACTS

No	Abstract Title	Field Study	Institution	Page
1	RESPONSE Of RED CHILI PANTS at VARIOUS CONCENTRATIONS and TIME of ADMINISTRATION of LOCAL MICROORGANISMS of KEPOK BANANA WEEVIL  Author: Yanyan Mulyaningsih	Agriculture and Other Plantation Science	Universitas Djuanda	104
2	GROWTH AND PRODUCTION OF water spinach ( Ipomea aquatica Forsk.) IN VARIOUS TYPES OF HYDROPONIC NUTRITION SYSTEM NFT (Nutrient Film Technique)  Author: Nani Yulianti	Agriculture and Other Plantation Science	Universitas Djuanda	105
3	A framework of Social-Ecological System for Measuring the Small Island and Coastal Community Perception Index  Author: Yudi Wahyudin, Mahipal	Aquaculture and Fisheries	Universitas Djuanda	106
4	Heart Rate Detection of Stress Levels for Pregnant Women  Author: Yuli Wahyuni, Muhammad Abdulrohman Pany	Engineering & Technology	Pakuan University	107
5	POTENSI DAN STRATEGI PENGEMBANGAN PARIWISATA DITENGAH KONDISI PANDEMIK COVID 19 DI KABUPATEN SUKABUMI  Author: Dede Syahrudin, Rita Rahmawati	Engineering & Technology	Djuanda Univesity	108
6	POTENTIAL OF BANANA PEEL EXTRACT (Musa paradisiaca) AS GLUCOSIDASE INHIBITOR IN MOLECULAR DOCKING  Author: Titi Rohmayanti	Halal Science and Technology	Universitas Djuanda Bogor	109
7	The Effectiveness of Subcutaneous and Intramuscular FSH Injections on the Superovulatory Response of Limousin Cow  Author: Ganjar Eka Candra, Ristika Handarini, Weni Kurniawan	Livestock, dairy farming and small	Universitas Djuanda	110
8	The Effectiveness of Fish Meal with Maggot (Hermetia Illucens) Substitution in Ration on the Percentage of Boneless Kampung Unggul Balitnak (KUB) Chicks  Author: Rully Abdul Haq, Abdullah Baharun, Ristika Handarini	Livestock, dairy farming and small	Universitas Djuanda	111
9	Effects of Differences in Energy and Protein Levels in Rations based piper betle solution and organic chromium To The Internal Quality of Quail Eggs.  Author: Deden Sudrajat, Dewi Wahyuni, S.Pt.,M.Si	Poultry Farming	Universitas Djuanda	112
10	The Inclusion of Indigenous Vegetable-based Antioxidant in ration to improve duck egg palatability  Author: Anggraeni, Deden Sudrajat , Ristika Handarini	Poultry Farming	Universitas Djuanda	113
11	Analisis Perkembangan Cabang Kelompok Kelas Baca Anakku Sayang selama Pandemic Covid-19  Author: Agus Sri Iswiyanti, Stanty Aulia Rachmat	Others	Universitas Gunadarma	114

## THE KEYNOTE SPEAKER ABSTRACTS

# APPLICATION OF MASS TRANSFER FACTOR MODELS IN ADSORPTION, BIOSORPTION, DECOLORIZATION, DESORPTION, AND PRECIPITATION

Mohamad Ali Fulazzaky<sup>1</sup>, Ali Keyvanfar<sup>2</sup>, Etienne Paul<sup>3</sup>

<sup>1</sup>School of Postgraduate Studies, Universitas Djuanda, Jalan Tol Ciawi No. 1, Ciawi, Bogor 16720, Indonesia

<sup>2</sup>Kennesaw State University, Georgia, USA

<sup>3</sup>Chemical and Environmental Engineering, Institut National des Sciences Appliquées de Toulouse, France

Co Author: fulazzaky@unida.ac.id

---

### Abstract

**Purpose:** The investigation of the mass transfer kinetics and mechanisms of transporting a solute from liquid to solid phase needs to be verified the application of the mass transfer factor models for the various case studies of adsorption, desorption, biosorption, precipitation, and decolorization.

**Methodology:** The new approach of scientific analysis for the investigation of mass transfer affected by the external solution driving forces and internal diffusion could be useful to determine the resistance of mass transfer for different engineering practices of any pollutant removal.

**Results:** An empirical correlation between the mass transfer factor coefficient and the mass transfer performance of batch and hydrodynamic liquid-solid systems has been verified to extend the usability of the mass transfer factor models.

**Keywords:** adsorption kinetic, batch experiment, hydrodynamic column, mass transfer factor model, mass transfer resistance.

---

# THE SECONDARY METABOLITE COMPOUNDS EXTRACTED FROM CALOTROPIS GIGANTEA ROOT BARK

Kartini Hasballah<sup>1</sup>, Mohamad Ali Fulazzaky<sup>2,8</sup>, Murniana Sarong<sup>3</sup>, Herdina Fitria<sup>3</sup>, Dewi Rara Maida<sup>3</sup>, Renzavaldy Rusly<sup>4</sup>, Mohamad Fulazzaky<sup>5</sup>, Pham Anh Duc<sup>6</sup>, Amirreza Talaiekhosani<sup>7</sup>

<sup>1</sup>Department of Pharmacology, Faculty of Medicine, Universitas Syiah Kuala, Indonesia

<sup>2</sup>School of Postgraduate Studies, Universitas Djuanda, Indonesia

<sup>3</sup>Department of Chemistry, Faculty of Mathematics and Sciences, Universitas Syiah Kuala, Indonesia

<sup>4</sup>Faculty of Medicine, Universitas Padjadjaran, Indonesia

<sup>5</sup>Department of Chemical Engineering, Faculty of Industrial Technology, Institut Teknologi Bandung, Indonesia

<sup>6</sup>Environmental Engineering and Management Research Group, Ton Duc Thang University, Vietnam

<sup>7</sup>Department of Civil Engineering, Jami Institute of Technology, Iran

<sup>8</sup>Directorate General of Water Resources, Ministry of Public Works and Housing, Indonesia

<sup>2,7</sup>Corresponding Author: fulazzaky@unida.ac.id; fulazzaky@gmail.com -mail

---

## Abstract

**Purpose:** The aim of this study was to extract secondary metabolites of *C. gigantea* root bark as candidate for anticancer drug development by using the solvents of n-hexane, ethyl acetate and methanol.

**Methodology:** Antiproliferative activity of *C. gigantea* extract was assessed using the 3-(4,5-dimethylthiazol-2-yl)-2-5-diphenyl tetrazolium bromide (MTT) assay while the metabolite compounds were investigated using the fourier transform infrared spectrometry, mass spectrometry and proton nuclear magnetic resonance analysis. An extract of *C. gigantea* contains the secondary metabolites of steroid, triterpenoid, saponin, phenol and coumarin.

**Results:** Antiproliferative activity with its IC<sub>50</sub> value of 21.79 µg/mL was verified by the MTT assay. The characterization of triterpenoid shows similarity of chemical structures to taraxerol acetate and calotropone. The secondary metabolites of *C. gigantea* root bark could be considered as a potential candidate for anticancer agent to contribute to the development of new anticancer drug in the future.

**Keywords:** Antiproliferative Activity, *Calotropis gigantea* root bark extract, Calotropone, Secondary Metabolites, Taraxerol Acetate.

---

# The Impact of Urbanization on the Urban Heat Island in Phnom Penh

Bunleng Se<sup>1,\*</sup>, Daniel M. Choi<sup>1</sup>, Nyda Chhinh<sup>2</sup>, Lutz Katzschner<sup>3</sup>

<sup>1</sup>Department of Geography and Land Management, Royal University of Phnom Penh, Phnom Penh 12150, Cambodia

<sup>2</sup> Department of Economic Development, Royal University of Phnom Penh, Phnom Penh 12150, Cambodia

<sup>3</sup> Institute for Climate and Energy Concepts (INKEK) Lohfelden 34253, Germany

<sup>1</sup>[daniel.choi@rupp.edu.kh](mailto:daniel.choi@rupp.edu.kh);

<sup>2</sup>[chhinh.nyda@rupp.edu.kh](mailto:chhinh.nyda@rupp.edu.kh);

<sup>3</sup>[katzschn@uni-kassel.de](mailto:katzschn@uni-kassel.de)

\*Corresponding author: [se.bunleng@rupp.edu.kh](mailto:se.bunleng@rupp.edu.kh)

---

## Abstract

**Background:** Urban heat island (UHI) is strongly correlated with the increased urban population and urbanization that significantly exacerbate the UHI effects. Phnom Penh, as one of the most rapidly urbanizing cities in Cambodia, has been chosen as a case study for looking at UHIs and impacts of urbanization on the UHI in Phnom Penh.

**Purpose:** The contribution of the urbanization effect to the changes in the urban air temperature and wind velocity were evaluated and subsequently a potential relation between urbanization and UHI was examined.

**Methodology:** Eight-month data (January 2021 to August 2021) of air temperature and wind velocity from automated weather stations in and around Phnom Penh were analyzed for this study. UHI intensity and rate were calculated using the difference between urban and suburban air temperatures and wind velocity.

**Results:** The result indicates that the central business districts (CBDs), with high and dense buildings, may inhibit the inflow of wind leading to an increased UHI intensity in Phnom Penh. The UHI intensity in the city differs from area to area depending on the various stages of urban development for each area. We found that the difference in the increase of the UHI intensity and the increased rate of UHI between CBDs and suburban areas in Phnom Penh were 1.3°C and 0.13% on average. The difference in wind velocity between CBDs and suburban areas was 1.9 m s<sup>-1</sup> on average. This effect may be responsible for the lower UHI intensity in suburban areas compared to that in CBDs.

Keywords: Phnom Penh, temperature, urban heat island, urbanization, wind velocity

---

# A TRUST FRAMEWORK OF USER AUTHENTICATION FOR THE INTERNET OF THE FUTURE

Prof. Dr. Suhaidi Hassan

InterNetWorks Research Laboratory, Universiti  
Utara Malaysia, 06010 UUM Sintok, Kedah,  
Malaysia

Email: {suhaidi@uum.edu.my}

---

## Abstract

**Background:** Named Data Networking (NDN) has been seen as the most prominent Future Internet architecture that focusses on content-based rather than the current host-based Internet. With the new way of transmitting data, the current method of authentication which is by using digital signature and using private and public key can poses serious issues especially regarding trust. Transmission of packet within the network has become a challenge because of the anonymity of nodes. Thus, there is a need of having a new method of user authentication that promotes trust-based authentication for NDN.

**Purpose:** This keynote talk will outline a new framework of user authentication in Named Data Networking using Blockchain consensus-based mechanism of Proof-of-Authority that will promote user integrity as well as to reduce the computational overhead by giving authority to authorized user only.

**Methodology:** The proposed consensus mechanism will only allow authorized user to be the producer and indirectly mitigate cached poisoning attack. The proposed trust framework will retrieve the user's public key and checks the trust anchor which places set of public keys that have been pre-authenticated before any validation process begins. After that, the proof-of authority steps in to verify the public key by getting trust from other nodes in the network before allowing the publisher to send the content. Through this work, this framework can ensure the trustworthiness of information delivered through the future Internet environment.

**Results:** Our work contributes to the development of consensus mechanism in NDN environment. The outcome of this research not only will cultivate new findings in the future Internet, but also indirectly empowered and connected the society through ICT. Nevertheless, this research looks beyond the current environment where it gives focus on future Internet for future technology.

*Keywords: Consensus mechanism, Named Data Networking, Proof-ofAuthority, user authentication, Blockchain*

---

# PROCEEDING ARTICLES

5<sup>th</sup> Bogor International Conference  
For Applied Science 2021  
(5<sup>TH</sup> BICAS 2021)

# EFFECTS OF NEEM SOLUTION EXTRACT ON PESTS AND DISEASES AND DEVELOPMENT OF RED CHILI PLANTS

Oktavianus Lumban Tobing<sup>1</sup>, Yanyan Mulyaningsih<sup>2</sup>

<sup>1</sup>Department of Agrotechnology, Faculty of Agriculture, Universitas Djuanda, Jalan Tol Ciawi No 01 Ciawi 16720 Bogor, Indonesia

<sup>2</sup>Department of Agrotechnology, Faculty of Agriculture, Universitas Djuanda, Jalan Tol Ciawi No 01 Ciawi 16720 Bogor, Indonesia

<sup>1</sup> E-mail address [oktavianus@unida.ac.id](mailto:oktavianus@unida.ac.id) <sup>2</sup> E-mail address [yanyan.mulyaningsih@unida.ac.id](mailto:yanyan.mulyaningsih@unida.ac.id)

Corresponding Author: Email Address [oktavianus@unida.ac.id](mailto:oktavianus@unida.ac.id)

## Abstract

*The red chili plant is a seasonal plant included in fruit vegetables. Yields and growths are often disrupted by aphid pests and anthranose disease. The damage caused can be mild, moderate, and severe depending on the ferocity of pests and diseases, the supportive environment, and the susceptibility of chili plants. Extract of neem leaf solution has the potential to overcome pest disorders and diseases of chili plants therefore this study was conducted. The purpose of the study was to find out the effect of giving extracts of neem leaf solution against aphid pests and anthranose disease as well as the results and growth of chili plants. The method used is the design of a randomized trial of a factorial group with two factors and three repetitions. The first factors are the main solution I1: 300 g of neem leaf powder per liter of methanol 100%, I2: 600 g of neem leaf powder per liter of methanol 100%, and I0: not given powder. The second factor is the application stage J0: not given 0 days after planting (dap), J1:7 dap, J2: 7.14 dap, J3: 7,14,21 dap, J4: 7,14,21,28 dap, J5: 7,14,21,28,35 dap. The results of the study of extracts of neem leaf solution have a significant effect on aphid pests but not on anthranose disease. The results and growth of chili plants have a significant effect. The contribution of the research is that the administration of neem leaf extract solution can suppress the infestation of aphid pests but not in anthracnose disease. Crop yields and growth have increased.*

*Keywords: chili plant response, Neem extract; pest disorders of disease*

## I. INTRODUCTION

Extract of neem leaf solution can control the disturbance of aphid pests and anthrax disease as well as the development of red chili plants such as crop yields and growth. Extract of neem leaf solution based on the results of citations contains compounds azadirachtin, Nimbin, Nimbin, solanine, and meliantriol. Nimbin serves as fungicides, viralides, and bactericides, while others serve as insecticides with different mechanisms of action against pests. The results of laboratory tests on extracts of neem leaf solution found 11 secondary metabolite compounds, including potential vegetable / natural pesticides. This study aims to find out the effect of extracting neem solution against aphid pests and anthrax disease as well as the results and growth of red chili plants.

The study used a randomized trial design of factorial groups with 3 repetitions, namely the parent solution consisting of I0: not given powder, I1:300 g of neem leaf powder per liter of methanol 100%, and I2:600 g of neem leaf powder per liter of methanol 100% and application stage J0: not given 0 days after planting (dap), J1:7 dap, J2: 7.14 dap, J3: 7,14,21 dap, J4: 7,14,21,28 dap, J5: 7,14,21,28,35 dap. The two main solutions have a significant effect on pests but not on diseases, also have a significant effect on the yield and growth of red chili plants. The stage of application has a significant effect on pests, not on diseases, also has a significant effect on results and growth. The parent solution and application stages



affect the treatment of control or are not given the extract. This study is different from previous findings because the treatment factors are different and the observed object is also different.

## II. METHODOLOGY

The research took place from March to July 2021 at the location of Gapoktan Repeh Rapih, Sukamantri Village, Tamansari Subdistrict, Bogor Kaupaten, West Java. Research materials use a set of tools for extracting neem leaves. Ektrask obtained is applied to chili plants in the field by using a hand sprayer for each plant given 200 ml of extract solution. The research method uses a randomized trial design of factorial groups with 2 factors and 3 repetitions. The first factor is the main solution I0: not given neem leaf extract, I1:300 g neem leaf powder per 1 liter of methanol 100%, I2: 600 g neem leaf powder per 1 liter of methanol 100%, and the second factor is the resistance application of neem leaf extract i.e. J0: no application of 0 days after planting (dap), J1: application of age 7 dap, J2: age application (7.14) dap, J3: age application (7.14.21) dap, J4: age application (7.14,21.28) dap, J5: age application (7.14,21,28.35) dap. Plant variables shown in the results and discussion include the height of the plant, the number of leaves, the number of branches, the length of the fruit, the severity of pests aged 60 and 70 days after planting, and the table of the severity of the disease. The quantitative data obtained is processed using Microsoft programs and determined which variables show the contribution of real effects, selected for inclusion in this paper.

## III. RESULTS AND DISCUSSION

Figures 1, 2, 3, 4, 5, 6, 7 describe the effect of the application of the parent solution (I1, I2) and the stages of application (J1, J2, J3, J4, J5) limited to variable growth, yield, pest severity and chlorophyll content of the leaves. Table 1 shows the effect of the application of the parent solution (I1, I2) and the application stages (J1, J2, J3, J4, J5) on the variable severity of anthranose disease. The application of the parent solution I1 with I2 as well as between the stages of the application shows a fluctuating graph.

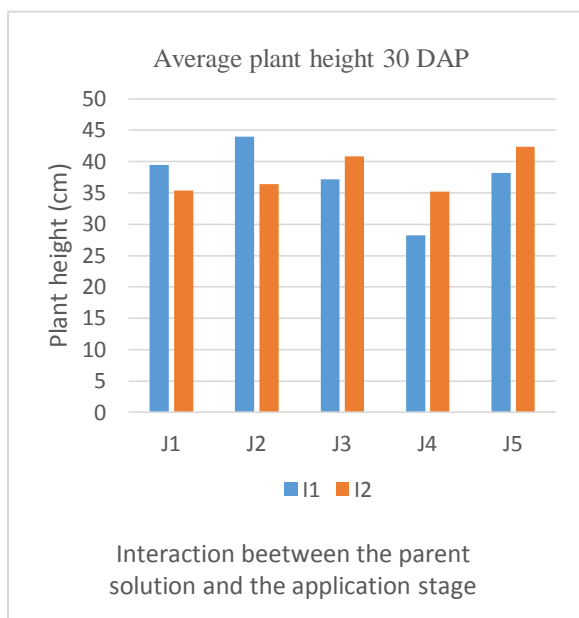


Figure 1. Parent solution, stage of application to plan height

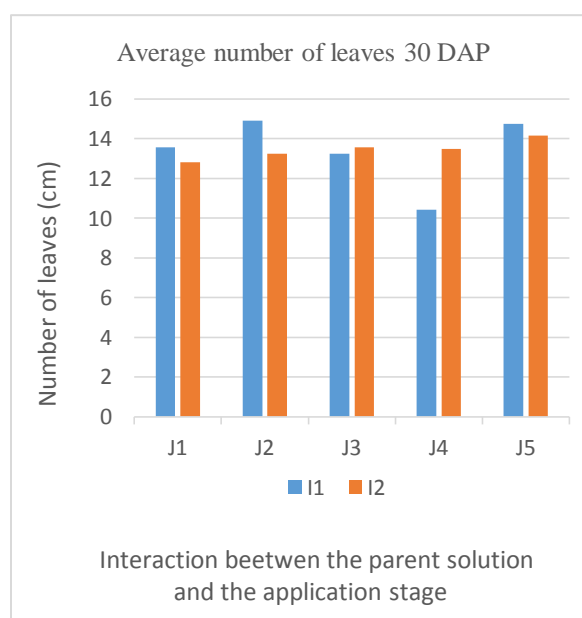


Figure 2. Parent solution, stage of application to the number of leaves

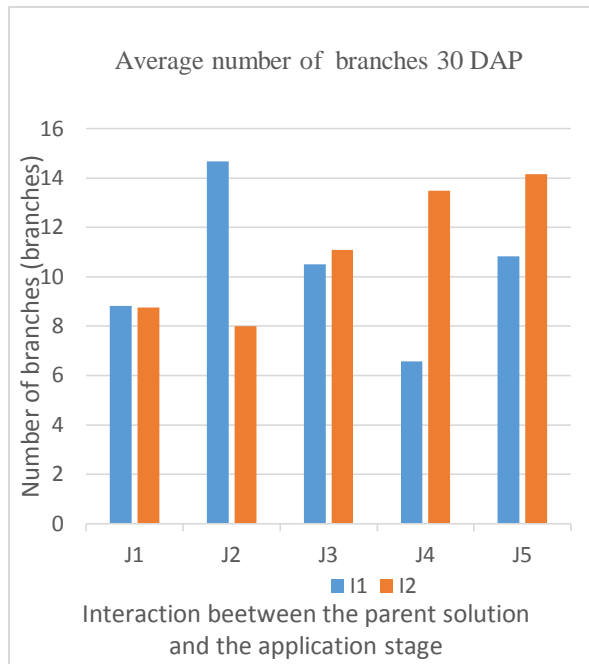


Figure 3. Parent solution, stage of application to number of branches

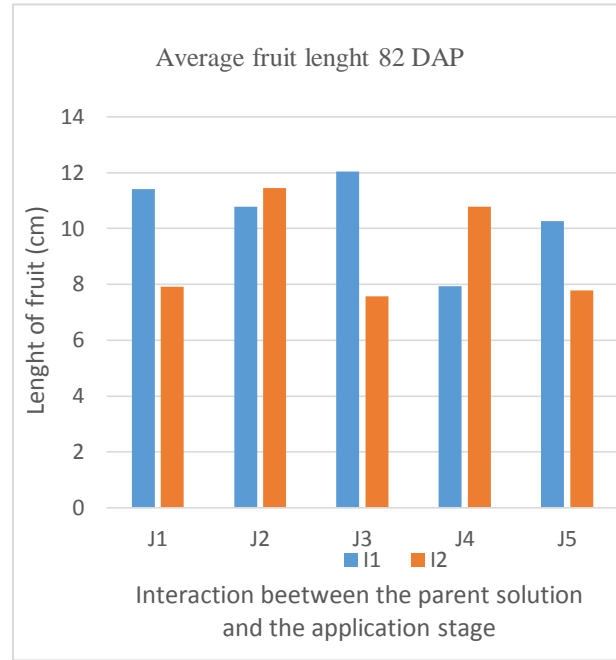


Figure 4. Plant solution, stage of application to fruit length

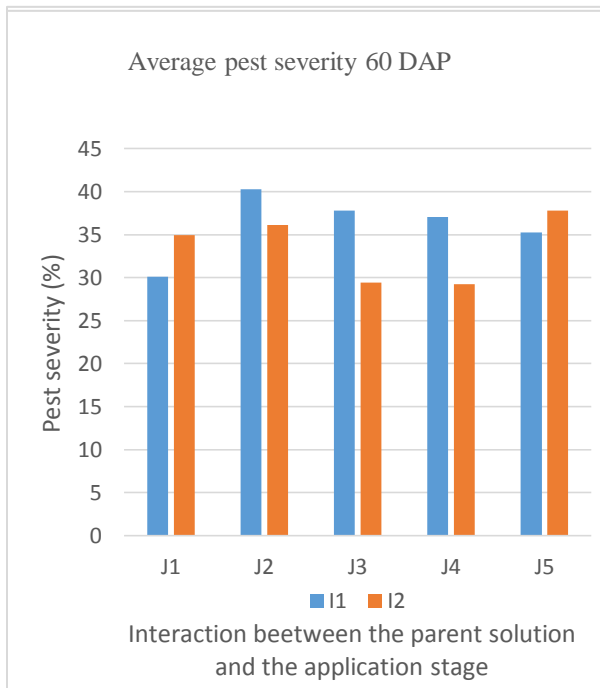


Figure 5. Parent solution, stage of application to Pest severity 60 DAP

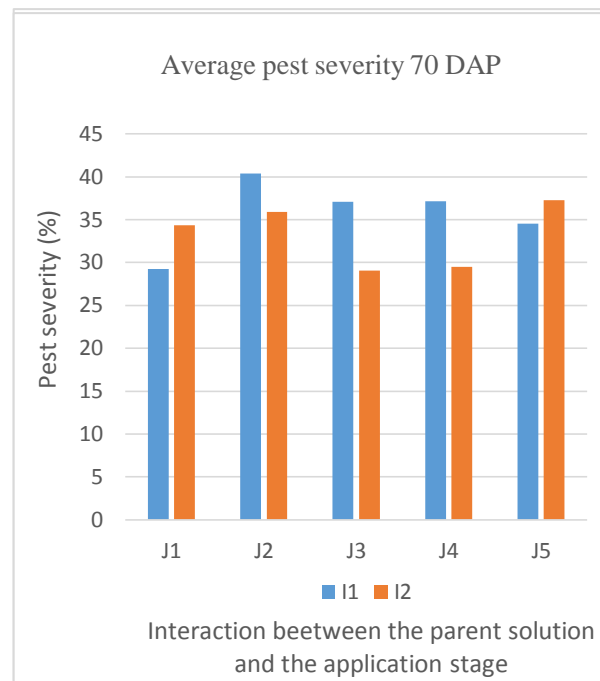


Figure 6. Parent solution, stage of application to pest severity 700 DAP

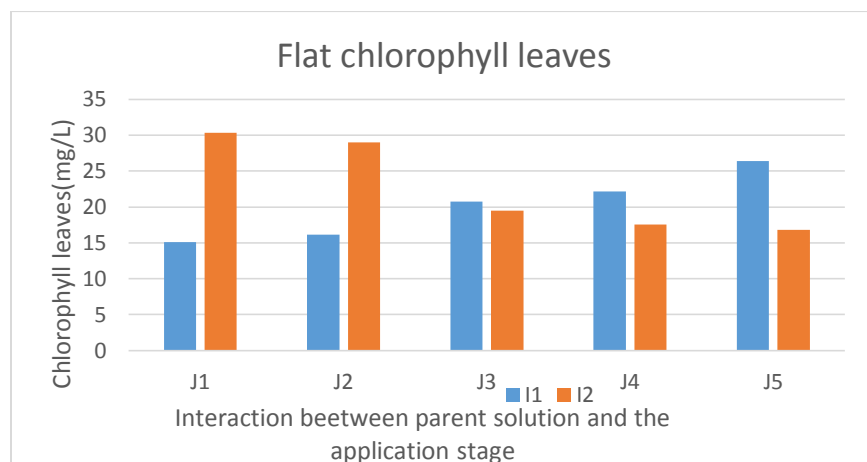


Figure 7. Parent solution, stage of application to chlorophyll leaves

Table 1 Average disease severity

Average disease severity						
Perlakuan	54 HST	59 HST	66 HST	73HST	80 HST	Rata-rata
Kontrol	1,40 a	2,23 a	5,17 a	5,93 a	7,20 a	4,387a
Parent solution						
I1	1,75 a	4,29 a	7,96 a	11,46 a	12,35 a	7,56a
I2	1,99 a	4,22 a	9,07 a	17,33 a	21,89 a	10,9a
Application stages						
J1	1,10 a	3,90 a	10,53 a	14,02 a	15,97 a	9,103a
J2	3,58 a	6,08 a	12,18 a	19,25 a	22,15 a	12,65a
J3	1,88 a	4,52 a	8,65 a	19,05 a	20,70 a	10,96a
J4	1,78 a	3,72 a	6,07 a	13,52 a	19,05 a	8,827a
J5	0,98 a	3,05 a	5,13 A	6,13 a	7,73 a	4,607a

The infestation of aphid pests or anthranose disease can disrupt the development of chili plants, especially in the components of chili yield and growth. In this study, the treatment of the parent solution I1(300 g/ l) with I2 (600 g / l) had a significant effect on pest disorders (pest severity), while the treatment of application stages J1, J2, J3, J4, J5) did not have a significant effect. The occurrence of pest attacks can cause chili results to fluctuate. Treatment of parent solutions I1 and I2 or the stages of application does not have a significant effect on anthranose disease means that anthranose disease is considered homogeneous or equally mild between treatments. This is because at the time of research from March to July 2021 there is a more dry season than the rainy season where anthrax disease develops rapidly in the humidity around high plants or  $RH \geq 80\%$ . Natural pesticides derived from neem leaf extract can be as an insecticide and non-insecticide (function, bactericidal, viricide), this is by the findings of compounds found in neem leaves such as neem, nimbidin salanin, meliantriol, azadirachtin.

Some arguments related to the results of the study will be outlined in the article below.

Secondary metabolite compounds derived from neem leaves based on laboratory tests found 11 compounds that include potential as vegetable or natural pesticides. Some of the findings of previous studies that could reinforce the results of this study are put forward in some of the arguments below.

Biopesticides derived from neem extract include azadirachtin which can control some pests. Mechanisms work by expelling, inhibiting eating, interfering with growth, and reproduction. The formulation of neem does not directly kill pests, but changes the behavior of pests insignificantly, decreasing the damage and reproductive potential of pests [1].

Research methods use online databases and papers on the prospects of neem (functions as fertilizers or pesticides against pests and diseases, pharmaceutical industries such as biological activities with metabolite production, environmental biotechnology as vegetable pesticides). Mimba has the potential as fertilizers, animal feed supplements, plant defenses against insects (bioinsecticides), and pathogenic microorganisms (antimicrobial activity) in the agricultural or pharmaceutical industries such as metabolite compounds that are antitumor, antioxidants, and anti-bactericidal activity, also according to reports used for combination with nanoparticles (Green nanoparticles)[2].

The research aims to find out the losses due to aphid pests, the benefits of plants as plant insecticides, how to plant insecticides work, plant-based insecticide research on red chili aphids, obstacles, and strategies for the development of vegetable pesticides. In the dry season, the loss due to aphids ranges from 40%, outside the dry season 10-30%, and 90% as a vector. Vegetable pesticides are grouped into three types based on the mechanism of action are natural ingredients with antifitopatogenic compounds (agricultural antibiotics), phytoxyction, regulate plant growth (phytotoxins, plant hormones, and the like) and compounds are active against insects (insect hormones, pheromones, antifidan, repellents, attractants, and insecticides). Aphids on red peppers can be controlled using plants including garlic, tobacco, turmeric, neem, papaya, distance, brotowali, soursop, and red pepper [3].

The effect of dosing neem seeds against *A. gossypii* and the growth character of the red chili plant. The dose used (0, 25, 50, 75, 100, 125) grams, and carbofuran pesticide comparison. The best result is that a dose of 50 grams of neem seeds per polybag can suppress the population of *A. gossypii* and show the best influence on the growth character of plants, namely the chlorophyll content of leaves, plant height, the hardness of the leaves of chili plants and the level of element N absorbed [4].

Mimba has the active ingredients azadirachtin, salanin, meliantriol, nimbin, and nimbidin as a result of secondary metabolites that control plant pests and diseases by affecting growth, feeding power, reproduction, and oviposition [5].

The results of laboratory analysis of neem leaf extract contain 11 compounds, some of which are fungicides (anti-fungi) and insecticides (anti-insect pests). It is on this basis that this study was conducted to find out how many roles natural pesticide formulations of leaf origin neem against the suppression of pest disorders and the main diseases of chili plants. With the known emphasis on the disorder, it has to do with the results and growth of chili plants.

The treatment of the combination of neem leaves with cayenne pepper by testing the concentration of a solution consisting of 5 levels is 0%, 5%, 10%, 15%, and 20% against the mortality of green aphids in vitro results obtained a combination of neem leaves and cayenne pepper fruit waste between treatments significantly different. The best result of 15% concentration for the handling of green aphid pests of chili plants [6].

The effect of giving neem leaf extract is P0: 0 ml extract, P1: 50 ml extract, P2: 75 ml extract, P3: 100 ml extract which is each dissolved with 1 liter of water. The results showed a significant influence on the suppression of mortality of whitefly (*Bemisia tabaci*). Doses of 50 ml and 75 ml are the best effects on whitefly [7].

Effectiveness of vegetable pesticides against pest control of chili plants using treatment A: control, B: 100 ml/plant garlic extract, C: 100 ml/plant neem extract, D: 100 ml/soursop extract plant. It found two pests are aphids and whitefly that attack plants. The results obtained application of 100 ml/plant neem leaf extract is the most effective treatment to suppress pest populations in chili plants [8].

Know the effect of some botanical insecticide preparations (neem and other plants) on insect reproduction. The research uses methods of literature studies. The result obtained from mapping is that insect reproduction is influenced by the viscosity of the concentration of botanical insecticide preparations. The reproduction rate of insects is lower when the concentration of lethal is higher [9].

Testing 6 concentrations of neem leaf extract, consisting of M0:0%, M1:1%, M2:5%, M3:10%, M4:15%, and 5M:20% against the control of anthrax disease caused by *Colletotrichum capsisi* fungus in post-harvest red chili fruit showed a significant effect. The best concentrations of 15% and 20% for the control of anthrax disease are seen to be smaller colony diameter sizes and lower disease incubation periods [10].

Treatment consists of 3 factors are first mushroom *Colletotrichum acutatum* and *Colletotrichum gloeosporioides*, both vegetable pesticides with active ingredients neem (Agr I and Agr II), third 6 standards of pesticide concentration treatment (0%, 0.5%, 1%, 2%, 3%, 4%, and 5%). Based on the results of testing it is known that vegetable pesticides Agr I and Agr II can inhibit the growth of mushrooms in vitro and Agr I is more potential to control *Colletotrichum* spp. However, the vegetable pesticide Agr I is unable to control pathogens that have been present in plant tissues [11].

The purpose of the study was to find out the effectiveness of the extract fraction of neem leaves and castor leaves as bio fungicides against the growth of *C. capsici* in vitro causing anthrax disease in chili peppers. The results obtained extract of neem leaf alcohol fraction 90%, leaf extract distance alcohol fraction 10%, alcohol fraction 90%, ethyl acetate fraction 10%, and n-hexane fraction 90% potential as a vegetable fungicide that can inhibit colony growth and formation of Spores *C. capsici* [12].

Testing two treatment factors, banana weevil extract consists of (0, 15, 30, and 45) % and neem leaves from (0, 15, 30, 45) % to the reconditioning of chili growth and production. The administration of neem leaf extract has a significant effect on the width of the title of age 44 and 54 days after planting, the area of the leaves interacting at the age of 44 and 64 days after planting, the number of branches interacting age 54 days after planting, and the incidence of disease interacting age 44 days after planting. Findings from the study of neem leaf extract had a significant effect on growth, but banana weevil extract had no significant effect on production because during the 5 months of research there was a long dry season [13].

Test the exposure of some plant extracts against the growth of *Colletotrichum gloeosporioides* that cause anthrax in chili (*Capsicum annum* L.). Plant extract consists of control, neem leaf extract, betel leaf extract, distance leaf extract, saliar leaf extract, extract saliar+betel leaves, saliar leaf extract+j.tintir, saliar leaf extract+neem, betel leaf extract+j.tintir, betel leaf extract+neem, j.tintir+neem leaf extract, saliar+betel leaf extract+betel+j.tintir+neem, saliar leaf extract+betel+j.tintir, saliar leaf extract+betel+neem and betel leaf extract+j.tintir+neem. The results showed the treatment of tintir distance plant leaf extract, betel+mimba plant leaf extract, and saliar+betel+mimba plant leaf extract significantly inhibited the growth of *C. gloeosporioides* but did not significantly inhibit the growth of *C. gloeosporioides* spores. [14].

The effect of the administration of a solution of neem leaves and banana weevil moles on anthrax disease and the growth of red chili plants. The treatment consists of two factors: the concentration of neem leaf solution (0%, 15%, 30%, 45%) and the concentration of mol banana weevil (0%, 15%, 30%, 45%). As a result, the concentration of neem leaf solution did not have a significant effect on all observed worshippers. The concentration of 45% banana weevil MOL solution had a significant effect in increasing plant height, leaf count, number of productive branches, and fruit weight per plant compared to the control treatment, but was no less noticeable compared to the concentration of 30%. Anthranose attacks do not occur against all plants observed in all treatments, meaning the percentage of disease incidence and the severity of the disease is 0%. This is due to environmental factors that are not supportive of the development of *Colletotrichum* sp fungus. [15].

#### IV. CONCLUSION AND NEWNESS

Application of mimba stock solution and application stages proven to suppress aphid pest attacks and potentially also suppress the attack of anthracnose disease as long as there is a conformity between environmental factors and pathogens that cause anthracnose disease. Secondary metabolite compounds from neem leaf extract contribute to the suppression of aphid pests, increased yield, and growth of red chili plants. The implications of this study can be used to control pests and diseases of chili plants, as well as potentially control pests and diseases of horticultural plants found in Indonesia.

#### ACKNOWLEDGEMENT

The authors wish to thank the ministry of research and technology of higher education, which has funded the research. Thanks also go to the Directorate of Research and Community Service of Djuanda University, which supported the research.

#### V. REFERENCES

- [1] Adhikari Kripa., Sudip Bhandari., Dikshya Niraula & Jiban Shrestha. 2020. Use of neem (*Azadirachta indica* A. Juss) as a biopesticide in agriculture: A review. *Journal of Agriculture and Applied Biology*. 1(2): 100-117.
- [2] Ana Paula Ferreira., Débora Elisa Antunes de Mendonça., João Arthur dos Santos Oliveira, & Helio Conte. 2019. Neem (*Azadirachta indica* A. Juss) as a Biotechnological tool: a short review. *Journal of Luminária, União da Vitória*. 21(02): 28-35.
- [3] Purnamasari Ika & Sri Endah Nurzannah. 2021. Tumbuhan Indonesia potensian sebagai insektisida nabati untuk mengendalaikan hama kutu daun (*Aphis gossypii*) dan *Myzus persicae* pada tanaman cabai merah. In: Website: <http://jurnal.fp.uns.ac.id/index.php/semnas>. Prosiding Seminar Nasional Fakultas Pertanian UNS.
- [4] Muchlis Ardi Zulfikar. 2021. The effects of various doses of *Azadirachta indica* A. Juss. Seed cake against *Aphis gossypii* (Glover) and growth characters of red chili plants (*Capsicum annum* L.). *Journal of Plant Protection Cropsaver* 4(1): 15-26.
- [5] Hasibuan Muainah., Erpina Delina Manurung., dan Lely Zulhaida Nasution. 2021. Pemanfaatan dan mimba (*Azadirachta indica*) sebagai pestisida nabati. *Jurnal. FP. UNS.*, 5(1): 1153-1158. Prosiding seminar nasional <http://jurnal.fp.uns.ac.id/index.php/semnas>
- [6] Rajab Ahmad Mijwad., Ari Hayati., dan Hasan Zayadi. 2018. Pengaruh larutan kombinasi daun mimba (*Azadirachta indica*) dengan buah cabai rawit (*Capsicum frutescens*) terhadap mortalitas kutu daun hijau (*Aphis gossypii*) secara in vitro. *Jurnal sains alami* 1(1): 1-6. <http://riset.unisma.ac.id/index.php/mipa/article/view/1390>
- [7] Maharani, Sri., Yusmaidar Sepriani, dan Hilwa Walida. 2020. Pengaruh ekstrak daun mimba (*Azadirachta indica* Juss) terhadap mortalitas hama kutu kebul (*Bemisia tabaci*). *Jurnal mahasiswa agroteknologi* 1(2): 55-60
- [8] Haerul., Muhammad Izzdin Idrus, dan Risnawati. 2016. Efektifitas pestisida nabati dalam mengendalikan hama pada tanaman cabai. *Jurnal Agrominansia* 1(2): 129-136
- [9] Risnawati. 2021. Meta analisis: perkembangan sediaan insektisida botani berdasarkan pengaruhnya terhadap reproduksi serangga. *UG Jurnal* 15(5): 24-31.
- [10] Ali Muhammad., Yunel Venita., dan Benny Rahman. 2013. Uji beberapa konsentrasi ekstrak daun mimba (*Azadirachta indica* A. Juss.) untuk pengendalian penyakit antraknosa yang disebabkan jamur *Colletotrichum capsici* pada buah cabai merah pasca-panen. *Jurnal unri* :1-14. [https://sagu.ejournal.unri.ac.id/index.php/JSG/...](https://sagu.ejournal.unri.ac.id/index.php/JSG/) · PDF file
- [11] Paradisa Yashanti Berlinda., Wahyuni, Enung Sri Mulyaningsih., Ambar Yuswi Perdani., dan Arief Heru Prianto. 2020. Evaluasi pestisida nabati dengan ekstrak mimba (*Azadirachta* sp.) untuk

- pengendalian pertumbuhan Antraknosa pada buah cabai *Jurnal Fitopatologi Indonesia* 16(3): 112-122. DOI: 10.14692/jfi.16.3.112–122
- [12] Ningsih Yanti., Efri., dan Titik Nur Aeny. 2013. Pengaruh fraksi ekstrak daun mimba (*Azadirachta indica* A.) dan daun jarak (*Jatropha curcas* L.) terhadap diameter koloni dan jumlah spora jamur *Colletotrichum capsici* penyebab penyakit antraknosa pada cabai (*Capsicum annum* L.). *Jurnal Agrotek Tropika* 1(3): 325-330. [jurnal.fp.unila.ac.id/index.php/JA/article/download/2059/1815](https://jurnal.fp.unila.ac.id/index.php/JA/article/download/2059/1815) · PDF file
- [13] Lumban Tobing Oktavianus dan Yanyan Mulyaningsih. 2020. The reconditioning growth of production of chili through the banana hump and neem leaf extract. *Indonesian Journal of Applied Research* 1(3): 136-148. <http://Scholar.google.co.id/Scholar?hl=id&as-dt=0%2C5&q=jurnal+mimba+kutu+daun+dan+antraknosa&btnG=>
- [14] Pranyata Agus., Efri Suskandini Ratih Dirmawati., Muhammad Nurdin. 2021. Efektivitas komposisi beberapa ekstrak tumbuhan terhadap pertumbuhan jamur *Colletotrichum gloeosporioides* penyebab antraknosa pada cabai (*Capsicum annum* L.). *Jurnal Agrotek Tropika*, 9(1): 52-59. <https://jurnal.fp.unila.ac.id/index.php/JA/article/download/4778/3389> · PDF file
- [15] Aziziy Muhammad Hifniy., Oktavianus Lumban Tobing., dan Yanyan Mulyaningsih. 2020. Studi serangan antraknosa pada pertumbuhan cabai merah (*Capsicum annum* L.) setelah aplikasi larutan daun mimba dan mol bonggol pisang. *Jurnal Agronida*, 6(1): 22-32. <https://ojs.unida.ac.id/JAG/article/download/2668/pdf> · PDF file

## **Phytochemical Analysis and Vitamin C Content in Biscuits With Addition of Siam Orange (*Citrus Nobilis Microcarpa*) Dregs Powder**

Kiki Kristiandi<sup>#1</sup>, Rini Fertiasari<sup>2</sup>, Hidayat Asta<sup>3</sup>

<sup>1,2,3</sup>*Department of Agribusiness, Food Agroindustry Study Program, State Polytechnic of Sambas Kalimantan Barat dan Sambas*

<sup>1</sup>email: kikikristiandi2020@gmail.com

---

### **Abstract**

Biscuits are one of the food groups favored by all people. Biscuits are food products obtained by baking dough made from flour, butter and sugar and other additives. The purpose of this study was to analyze the phytochemical content and vitamin C content of siam orange dregs biscuits. The sample used in this study was Siamese orange dregs. for the tests carried out on the Siamese orange biscuits were water content and ash content using the SNI 01-2891-1992 test method, fat content using the Shoxlet test method, Protein SNI 01-2354.4-2006, carbohydrates by difference, crude fiber using the test method gravimetry and vitamin C content. The making of Siamese orange biscuits was given three treatments. The first treatment was using 30 grams of refined sugar (F1), 30 grams of Siamese orange pulp powder (F2), 15 grams of refined sugar and 15 grams of Siamese orange pulp powder (F3). Based on the results of the analysis that has been carried out that the water content, ash content and crude fiber with three treatments have met the standard, fat is only in F2 (27.217) and F3 (27.416) and for carbohydrates the highest test results are in F2 ( 56. 7912) as well as for the content of vitamin C F2 (0.055). Tests using these seven parameters can be said to meet market measurements for biscuit products, even though the vitamin C content does not meet daily needs.

**Keywords: Phytochemicals, Vitamin C, Biscuits, Siamese Oranges**

---



## I. INTRODUCTION

Biscuits are food products with various shapes and textures as well as a sweet taste (1). Biscuits usually use wheat flour as the raw material. Biscuits are one of the food groups favored by all people (2,3). The development of biscuits has been carried out a lot, starting from biscuits as complementary food for breast milk, special biscuits for teenagers, special biscuits for the elderly and others. Biscuit development is a good opportunity to do, considering that the processing in making biscuits is quite easy and the ingredients for making it do not require special ingredients (4).

Biscuits are often used as a booster or hunger pang and also biscuits have a longer shelf life than other products (5). Along with the times, it has resulted in changes in lifestyle of people's consumption patterns. Some people even use biscuits as the main dish in breakfast (6). This is because biscuits are one of the food products that are easy to serve and stay in one gourd (7).

Biscuits are food products obtained by baking dough made from flour, butter and sugar as well as permitted additives. Based on the classification, biscuits are divided into four, namely hard biscuits, crackers, cookies and wafers (8). Hard biscuits are usually due to the condition of the flour that is widely used and provide a very crunchy texture and tend to have no more moisture content than the other three types of biscuit groups. While crackers are not too different from hard biscuits, the type of dish is usually sprinkled with sugar (9). Cookies usually have a texture that is not too crunchy and tend to be moist and tough and for wafers they are long and layered with additional food sprinkled like chocolate and other types of flavor additions (4,10).

The raw materials in the manufacture of biscuits often provide different organoleptic properties. Biscuits can be one of the products that are given the intervention of adding other nutrients and the tendency of these preparations to make senses (2). Processes that can be used as additional ingredients in making biscuits are raw materials that have been used first. One of the additions used as raw material is Siamese orange pulp flour. Siamese orange is a variety that is widely known and almost all regions of Indonesia develop this type of plant. The highest growth rate of Siamese orange in Indonesia is in East Java and West Kalimantan is one of the provinces with 7th rank with the largest production (BPS, 2020). The orange market opportunity owned by Siamese oranges is quite high, but it is not aligned with the control of organic waste itself. Almost Siamese oranges are organic waste. Types of waste that are not utilized in processed organic oranges include skin, pulp and seeds (11). This part is almost a waste. Meanwhile, the waste can be processed into food that has good nutritional value

## II. METHODOLOGY

The making of Siamese orange biscuits was carried out at the Sambas State Polytechnic Agribusiness Laboratory. The flouring material is done by taking the dregs of the squeezed Siamese orange juice. Furthermore, stirring is done using a blender machine and after the results are quite soft, then put into a frying pan that is given a mixture of sugar. The sampling technique was purposive with an experimental study design approach. The selection of Siamese oranges is based on the number of agricultural products produced in the City of Sambas. Siamese oranges are obtained directly from the local market located in Sambas Regency. In this study, three treatments were given

The materials used in this research include: Siamese orange dregs, flour, vitamin FE, sugar, biscuit molds, salt, oven, blender, sieve, stirrer. And for the tests carried out on the Siamese orange biscuits were water content and ash content using the SNI 01-2891-1992 test method, fat content using the Soxhlet test method, Protein SNI 01-2354.4-2006, carbohydrates by difference, crude fiber using the gravimetric test and vitamin C content. The making of Siamese orange biscuits was given three treatments. The first treatment was using 30 grams of refined sugar (F1), 30 grams of Siamese orange pulp powder (F2), 15 grams of refined sugar and 15 grams of Siamese orange pulp powder (F3).

## III. RESULTS AND DISCUSSION

The test in this study was carried out with 7 measurement parameters using three formulas and each dose presented in each formula was F1 30 grams of refined sugar, F2 30 grams of Siamese orange pulp powder and F3 15 grams of refined sugar and 15 grams of Siamese orange pulp powder. The process carried out in the manufacture of Siamese orange pulp powder is stirred using a blender and then heated in a frying pan at a temperature of  $\pm 60$  OC. The purpose of the heating is to form a powder and from the powder it is added to the processed biscuits. The heating process takes  $\pm 2$  hours.

Based on Table 1. The highest and best water content in this study was obtained by F1 (4.5116). The moisture content of the biscuits. Moisture content is part of the level of long storage strength and resistance to the condition of the product. This is in line with (12), which explains that water activity in a product is an important factor and affects the stability of dry food in the storage process.

Table 1. The results of the analysis of phytochemicals and vitamin C in Siamese Orange Biscuits

Parameter	Result (%)		
	F1	F2	F3
Water content	4.5116	5.7869	6.0368
Ash Content	2.2728	2.0760	2.1542
Fat Content	31.329	27.217	27.416
Protein Level	7.789	8.129	7.659
Carbohydrate	54.1001	56.7912	56.7345
Fiber Content	0.857	0.845	0.816
Vitamin C	0.047	0.055	0.052

Source: Primary data, 2021

The water content in this study is related to the research conducted by (13). Where the results show that the water content in the research conducted is within the maximum limit specified in the quality requirements of SNI 01-2973-2011. As for F2 (5,7869) it is close to the quality standard of SNI 01-2973-2011, which is 5%.

The results of Table 1 for the ash content in the three treatments showed conformity with the standards circulating in the market, namely 0.54% - 2.23%. However, based on SNI 01-2973-1992 the conditions required for the ash content are at 1.5%. Testing the ash content in biscuits aims to determine the purity and cleanliness of the biscuits (3,14). In addition, the ash content to indicate the organic matter from the rest of the combustion of an organic material. If the ash content in a biscuit product is high, then the process is thought to be less than hygienic (15,16). Because the condition of cleanliness in a product provides an overview of the previous processing.

Table 1 shows that the fat content in biscuits that are close to SNI is F2 (27.217%) and F3 (27.416%), while for F1 it exceeds the specified SNI. The fat content in biscuits has an important influence because the fat content in biscuits can change the nature of the food (4). Another thing that can happen if the fat content is too high is the aroma it creates and can cause rancidity. However, based on market parameters, the average fat content is in the range of 8.6% - 27.4%. When viewed from the value of the most related market parameters are F1 and F2. Fat is one of the raw materials that is given at the time of making biscuits, but the composition of the ingredients given is not too excessive because if fat is added to the manufacture of biscuits, the resulting biscuits will be brittle (17,18).

The results of testing the protein content in the manufacture of biscuits using the test method of SNI 01-2354.4-2006. Table 1 shows that the highest protein content is F2 of 8.129% while based on the standard in SNI 01-2973-1992 the protein content requirement in biscuits is around 6%. So that this research meets the quality requirements and is in line with biscuit standards in general. Proteins or amino acids with chemical elements C, H, O and N (18–20). Protein is one of the macronutrients that can be obtained from plant and animal foods. In terms of quantity and quality, protein content has different variations, this can be influenced by various conditions including during processing, product distribution and others (21). The safe temperature in the processing of protein nutrients is 60-80 0C. Protein levels in foodstuffs determine the quality of foodstuffs and protein can also assist in the preparation of enzymes and antibodies as well as body fluids including blood, milk and egg whites (12).

Carbohydrates are macronutrients that are abundant in nature. Types of carbohydrates are divided into monosaccharides, disaccharides, oligosaccharides and polysaccharides (17). Table 1 shows that the highest carbohydrate test values are F2 (56.7912%) and F3 (56.7345%) while the smallest carbohydrate value based on the test results is F1 (54.1001%), this can be caused because F1 was not carried out. substitution of Siamese orange dregs powder. Carbohydrates are the main source of calories that have a role in determining the sensory characteristics of food (8). Carbohydrates showed that the three treatments were included in the carbohydrate standard (22).

Fiber is one type of carbohydrate found in Siamese biscuits and is often associated with health. The crude fiber in this test is the part that cannot be hydrolyzed by chemicals. Crude fiber is the residue

from foodstuffs that have undergone a heating process under strong acid and alkaline conditions for 30 minutes (23). The crude fiber content contained in the test results is F1 (0.857%) F2 (0.845%) F3 (0.816%). The amount of crude fiber in Siamese orange biscuits tends not to be too large, this happens because during the processing, stirring and heating. To get the powder from the orange dregs, three times the manufacturing process is needed. The dregs that are made into powder are also damaged due to the heating process using fire with the aim of drying quickly.

Fiber in food is part of food that has a level of difficulty for absorption by the body (21). As with other nutritional components, fiber also has an important function in the body's metabolism. One of the functions of fiber in metabolism is that it is able to excrete waste deposits in the body in the form of feces (24).

The vitamin C contained in this Siamese orange biscuit comes from the dregs that have been made into powder. The content of vitamin C in the three biscuit treatments was relatively low, namely for F1 (0.047%) F2 (0.055%) F3 (0.052%). Vitamins in a product can provide general characteristics. Vitamin C has a function as an antioxidant. This is in line with Yulistina's research (2016) which explains that the benefits of vitamin C are to improve the immune system and can ward off free radicals that can affect health, besides that the mechanism of antioxidants can act as free radical scavenging and donate electrons to free radical molecules so that they become free radicals. balanced (19,25). Vitamin C is part of the same micronutrients as other nutrients that play an important role in cells and plasma in counteracting free radicals, but the weakness of vitamin C content is that it can be damaged due to oxidation, especially due to heat (26,27).

#### IV. CONCLUSIONS AND NEWNESS

The results of phytochemical and vitamin c tests on siam orange biscuits with three treatments found that the water content, ash content and crude fiber had met the standards of SNI 01-2973-1992 and SNI 01-2973-2011, fat was only at F2 (27.217) and F3 (27,416) and for carbohydrates the highest yield was found in F2 (56,7912) as well as for vitamin C content of F2 (0.055). Based on these results, Siamese orange biscuits can be categorized as snacks that are in accordance with market parameters in general, but the vitamin C content in orange biscuits still does not meet the daily nutritional adequacy.

#### V. REFERENCES

1. Jagat A. Pengkayaan Serat Pada Pembuatan Biskuit Dengan Substitusi Tepung Ubi Jalar Kuning (*Ipomea Batatas L.*). *J Apl Teknol Pangan.* 2017;6(2):4–7.
2. Irmayanti wa ode, Hermanto, Asyik N. Analisis organoleptik dan proksimat biskuit berbahan dasar ubi jalar (*Ipomea batatas L*) dan kacang hijau (*Phaseolus radiatus L*). *J Sains Dan Teknol Pangan.* 2017;2(2):413–24.
3. Wulandari F. Analisis Kandungan Gizi, Nilai Energi, Dan Uji Organoleptik Cookies Tepung Beras Dengan Substitusi Tepung Sukun. *J Apl Teknol Pangan.* 2016;5(3).
4. Wodi SIM, Rieuwpassa FJ. Biskuit Tinggi Protein Berbasis Daging Ikan dan Tepung Sagu (*High Protein Biscuit Meat and Sago Flour-Based*). *J Ilm Tindalung.* 2017;3(2):73–7.
5. Wulandari, Herpandi, Lestari SD, Putri R. Karakteristik Fisiko-Kimia Biskuit Dengan Fortifikasi Tepung Belit. *Jphpi.* 2019;22:246–54.
6. Sibarani S. Analisis kandungan gizi dan uji daya terima biskuit tepung bekatul (*rice polish*) sebagai alternatif makanan fungsional skripsi. 2021;
7. Nurdjanah S, Musita N, Indriani D. Karakteristik Biskuit Coklat Dari Campuran Tepung Pisang Batu (*Musa balbisiana colla*) Dan Tepung Terigu Pada Berbagai Tingkat Subtitusi. *J Teknol Dan Ind Has Pertan.* 2011;16(1):51–62.
8. Ansar A, Setiawati DA, Murad M, Muliani BS. Karakteristik Fisik Briket Tempurung Kelapa Menggunakan Perikat Tepung Tapioka. *J Agritechno.* 2020;13(1):1–7.
9. Teri I, Stolephorus N, Sinar UD, Panjaitan TFC, Fadhlullah M, Nurmala R, et al. Analisis Kandungan Nutrisi Biskuit Cracker dengan Penambahan Tepung Ikan Teri Nasi (*Stolephorus sp.*) di UD. *Sinar Bahari Tina Fransiskha C. Panjaitan 1* □, Muhammad Fadhlullah 1, Riska Nurmala 1 & Yuliati H. *Sipahutar 2.* 2021;195–202.

10. Setyowati WT, Nisa FC. Formulasi Biskuit Tinggi Serat (Kajian Proporsi Bekatul Jagung : Tepung Terigu dan Penambahan Baking Powder). *J Pangan dan Agroindustri*. 2014;2(3):224–31.
11. Kristiandi K, Sambas PN. Pemanfaatan kulit jeruk siam sebagai pestisida alami utilization of siam orange skin as a natural pesticide. 2020;6(2):46–52.
12. Dwi Gita RS, Danuji S. Studi Pembuatan Biskuit Fungsional dengan Substitusi Tepung Ikan Gabus dan Tepung Daun Kelor. *BIOEDUSAINS J Pendidik Biol dan Sains*. 2018;1(2):155–62.
13. Normilawati, Fadlilaturrahmah, Hadi S, Normaidah. Penetapan Kadar Air dan Kadar Abu pada Biskuit Yang Beredar Di Pasar Banjarbaru. *J Ilmu Farm*. 2019;10(2):51–5.
14. Haryani, A.T. SA dan SH. Kadar Gizi, Pati Resisten, dan Indeks Glikemik Biskuit Gandum Utuh (*Triticum aestivum* L) Varietas DWR-162. *J Teknol Pangan dan Has Pertan [Internet]*. 2017;12(1):1–12. Available from: <http://journals.usm.ac.id/index.php/jtphp/article/view/470/279>
15. Widodo S, Sirajuddin S. Biscuit Formulation With Substitution of Brown Rice Flour. *J Bus Hosp Tour*. 2019;5(2):159.
16. Ivanišová E, Drevková B, Tokár M, Terentjeva M, Krajčovič T, Kačániová M. Physicochemical and sensory evaluation of biscuits enriched with chicory fiber. *Food Sci Technol Int*. 2020;26(1):38–43.
17. Utami CP, Simanjuntak BY, Krisnasary A, Gizi J, Bengkulu PK. Analisis zat gizi makro ( karbohidrat , protein , lemak ), serat , kadar air , dan daya terima organoleptik formulasi biskuit tepung beras analog. 2021;05(01):37–46.
18. Saputro SB, Karyantina M, Suhartatik N. Karakteristik Biskuit dengan Variasi Substitusi Tepung Sorgum ( *Sorghum bicolor* L . ) dan Ekstrak Jahe ( *Zingiber officinale* Rosch ). *J JITIPARI*. 2017;4(2):89–95.
19. Irferamuna A, Yulastri A, . Y. Formulasi Biskuit Berbasis Tepung Jagung Sebagai Alternatif Camilan Bergizi. *J Ilmu Sos dan Hum*. 2019;8(2):221.
20. Latifah E, Rahmawaty S, Rauf R. Biskuit Garut-Tempe Tinggi Energi Protein sebagai Alternatif Snack untuk Anak Usia Sekolah; Analisis Kandungan Energi Protein dan Daya Terima. *Darussalam Nutr J*. 2019;3(1):19.
21. Musita N. Kajian sifat organoleptik biskuit berbahan baku tepung jagung TERNIKSTAMALISASI DAN TERIGU. *J Din Penelit Ind*. 2016;27(2):110–8.
22. dos Passos MEA, Moreira CFF, Pacheco MTB, Takase I, Lopes MLM, Valente-Mesquita VL. Proximate and mineral composition of industrialized biscuits. *Food Sci Technol*. 2013;33(2):323–31.
23. Primilestari S, Purnama H. Teknologi budidaya jeruk di lahan gambut untuk meningkatkan produktivitas dan pendapatan petani di Kabupaten Tanjung Jabung Barat. *Pros Semin Nas Lahan Suboptimal*. 2019;(September):978–9.
24. Hardiyanti, Nisah K. Analisis Kadar Serat Pada Bakso Bekatul Dengan Metode Gravimetri. *Amina*. 2021;1(3):103–7.
25. Aluhariandu VE, Tariningsih D, Lestari PFK. Analisis usahatani jeruk siam dan faktor – faktor yang memengaruhi penerimaan petani (studi kasus di desa bayung gede kecamatan kintamani kabupaten bangli). *Agrimeta*. 2016;6(12):77–86.
26. Triyonate EM, Kartini A. Nutrition College , Volume Halaman. *J Nutr Coll*. 2015;4(2):259–63.
27. Yulistiana F, Kedokteran F, Sebelas U, Rsud M. Pengaruh Vitamin C Terhadap Kadar Interleukin-6 Plasma , MDA Plasma dan Lama Rawat Inap Penderita PPOK Eksaserbasi Akut Effect of Vitamin C to The Plasma Level of Interleukin-6 , Plasma MDA and Length of Hospitalization of COPD Exacerbation Patient. 2018;38(1):24–32.

**INFLUENCE OF BIOFERTILIZER AND  $KNO_3$  FERTILIZERS ON THE  
GROWTH, QUALITY AND PRODUCTION OF KAILAN PLANTS  
(*BRASSICA OLERACEAL VAR. ALBOGLABRA*)**

**PANJI SAKTI NUGRAHA, NUROCHMAN<sup>2</sup> YANYAN MULYANINGSIH<sup>2</sup>**

<sup>1</sup> Student Agrotechnology Study Program, Faculty of Agriculture, Djuanda University

<sup>2</sup> Staff Lecturer in Agrotechnology Study Program, Faculty of Agriculture, Djuanda University

**Co Author: Rochmannur1960@gmail.com**

---

**Abstrak**

Potassium is the second macro nutrient after N which is most absorbed by plants. One source of potassium elements that are often used is  $KNO_3$  which has potassium and nitrogen content in balanced conditions. Potassium in nitrate compounds ( $KNO_3$ ) is needed more than other nutrients. But the use of chemical fertilizers with improper doses can cause negative impacts on crops, the environment, and human health, so it takes an effort to cultivate agriculture that can have a good impact on nature, namely by using biofertilizer biological fertilizers. The purpose of this study was to determine the influence of biofertilizers and  $KNO_3$  on the growth, quality and production of kailan plants (*Brassica Oleracea* var. *Alboglabra*). This study used a complete randomized design (RAL) consisting of two factors, namely the composition of biofertilizer (0 ml/liter, 10 ml/liter, 20 ml/liter, 40 ml/liter, 60 ml/liter) and the composition of  $KNO_3$  (0 ml/liter, 10 ml/liter, 20 ml/liter, 40 ml/liter, 60 ml / liter). The results showed that the treatment of biofertilizer and  $KNO_3$  concentrations had a noticeable effect on plant height, header width, and leaf count from 14 to 35 HSPT. Treatment of biofertilizers and  $KNO_3$  at the age of 35 HSPT affects the change of stem diameter, fresh weight, dry heavy sweetness level, and leaf area.

**Keywords:** *Alboglabra*, *Biofertilizer*, *Brassica Oleracea* var, *kailan*,  $KNO_3$ .

---



## I INTRODUCTION

Kailan plant (*Brassica oleracea*) is one of the plants belonging to the cabbage family that can be used stems and leaves. This type of vegetable plant has vitamins and minerals that are useful for maintaining body health, including vitamin A, vitamin C, thiamin and lime (Zuhry 2010). Kailan is much loved and consumed daily by the wider community. Indonesia has not been developed on a wide scale, but has high economic value. (Novrian *et al.* 2012).

One of the agricultural cultivation efforts that can have a good impact on nature is to use biofertilizer biological fertilizers so that it is expected that leaf growth increases and saves the use of chemical fertilizers. Biofertilizers are fertilizers that contain living microorganisms that are added to the soil in the form of inoculan or in other forms to provide certain nutrients for plants (Hasibuan 2010). Biofertilizer is a fertilizer that has the main content of microorganisms that benefit both soil and plants. Microorganisms in biofertilizers function as nutrient transformers in soil, producers of growing regulatory substances (ZPT) and disease controllers (Andhika 2017).

Macro nutrients N, P, and K are needed by kailan plants. Hanafiah (2007) states that element K is the second macro nutrient after N that is most absorbed by plants. Element K in plants in the form of K<sup>+</sup> cations. K loss is very high due to leaching from the ground surface (Utomo *et al.* 2016). Potassium serves for plants to be more resistant to destruction, resistant to pests and diseases and improve the quality of fruit during the generative period of the plant. Potassium is a nutrient that plays a role in plant metabolic processes such as photosynthesis and nutrient transport to plant containers (Marschner 2012). KNO<sub>3</sub> has potassium and nitrogen content in balanced conditions. K<sub>2</sub>O content in KNO<sub>3</sub> is quite large between 45 - 46% and N content of 13%. (Widiastoety 2007).

## II METHODOLOGY

This research was conducted in April to June 2021 which took place in The Mother Garden of Kp. Cijeruk RT 03 RW 07 Sukamanah Village, Ciawi Subdistrict, Bogor Regency, West Java. Tools used in this study include soil processing tools, planting tools, sprinklers and pesticide sprayers, digital scales, scissors, ruler. The material used fresh cow's milk 3 liters, granulated sugar 2 kg, fine bran 2 kg, coconut water 3 liters, honey 100 Grams, aqua water 10 L and 160 ml microbes agrobost fertilizer and seedtan. Polybags needed are size 25x30 cm, planting media (soil and manure), synthetic fertilizers namely biofertilizer and KNO<sub>3</sub> biological fertilizers.

The study used a complete randomized design (RAL) factorial. The first factor is the composition of the biofertilizer and the second factor is KNO<sub>3</sub>. Plants consist of 5 levels of treatment, plants consist of 5 levels of treatment, namely: B0 (Biofertilizer 0 ml/liter), B1 (Biofertilizer 10 ml/liter), B2 (Biofertilizer 20 ml/liter), B3 (Biofertilizer 40 ml/liter), B4 (Biofertilizer 60ml/liter) and K0 (KNO<sub>3</sub> 0 ml/liter), K1 (KNO<sub>3</sub>10 ml/liter), K2 (KNO<sub>3</sub> 20ml/liter), K3 (KNO<sub>3</sub> 40ml/liter), K4 (KNO<sub>3</sub> 60ml/liter). Each level of treatment will consist of 3 repeats and each repeat consists of 3 plants, so there are 225 samples of experimental units..

## III RESULTS AND DISCUSSIONS

Data from plant height observations and diversity analysis showed that there was no interaction between biofertilizer concentrations and KNO<sub>3</sub> against plant height. A single factor of biofertilizers is seen that there is a very noticeable influence on the observation of plant height having a real effect on plant height, while a single factor of KNO<sub>3</sub> dose is seen that there is a very noticeable influence on plant height observations. The average height of the plant can be seen in Table 1.

Data from observation of the number of leaves from variety analysis showed that there was no interaction between biofertilizer concentration and KNO<sub>3</sub> dose of the number of aged leaves. A single factor in biofertilizer concentration is seen that there is a very noticeable influence on the number, can be seen in Table 1.

Data from observations of header width and the results of variety analysis showed that there was no interaction between the concentration of biofertilizer and KNO<sub>3</sub> against the width of the header. A single factor of biofertilizer concentration is seen that there is a very noticeable influence on the observation of the width of the header and a noticeable effect on plant height, while the single factor of KNO<sub>3</sub> dose is seen that there is a very noticeable influence on the wide observation of the kailan plant header can be seen in Table 1.

Data from observations of stem diameter, leaf area, fresh weight and dry weight of plants during harvest and the results of variety analysis. The results of the variety analysis showed that there was no interaction between the concentration of biofertilizer and the dose of KNO<sub>3</sub> to the observation of stem diameter, leaf area, fresh weight and dry weight of the plant during harvest. A single factor in biofertilizer concentration is seen that there is a very noticeable influence on the observation of leaf area, fresh weight and dry weight of plants at harvest, and a





noticeable effect on stem diameter, whereas a single factor of  $\text{KNO}_3$  dosage is seen that there is a very noticeable influence on leaf area observation, fresh weight and dry weight of plants during harvest, and a noticeable effect on stem diameter. The average diameter of the stems, leaf area, fresh weight and dry weight of the plant at harvest can be seen in Table 2.

Data from observations of the level of sweetness and the results of variety analysis. The results of the variety analysis showed that there was a noticeable interaction between the concentration of the biofertilizer and the dose of  $\text{KNO}_3$  to the observation of the level of sweetness. Similarly, in each single factor both biofertilizer concentration and  $\text{KNO}_3$  dose it was seen that there was a very noticeable influence on the sweetness level of the kailan plant. The average level of sweetness of the kailan plant can be seen in Table 3.

#### IV CONCLUSION AND NEWNESS

The results showed that the treatment of biofertilizer and  $\text{KNO}_3$  concentrations showed results that had an effect on plant height, header width and number of leaves from 14-35 HSPT. Biofertilizer and  $\text{KNO}_3$  treatment at the age of 35 HSPT affects the change in stem diameter, fresh weight, dry bobobot, sweetness level and leaf area.

#### REFERENCES

- Andhika Putri dan Rudiana. 2017. Pengaruh Penambahan Yeast Hydrolysate Enzymatic (YHE) pada Formulasi Pupuk Hayati terhadap Pertumbuhan Tanaman. *Unesa Journal Of Chemistry*. Vol. 6. No. 3.
- Hanafiah KA. 2007. *Dasar-Dasar Ilmu Tanah*. Ed. 2. Erlangga. Jakarta. 358 hlm.
- Marschner P. 2012. *Mineral Nutrition of Higher Plants*. Academic Press. London.
- Utomo MB, Rusman, Sudarsono T, Sabrina J, Lumbanraja dan Wawan. 2016. *Dasar-Dasar Ilmu Tanah dan Pengelolaan*. Pranadamedia Group. Jakarta
- Widiastoety D. 2007. Pengaruh  $\text{KNO}_3$  dan  $(\text{NH}_4)_2\text{SO}_4$  terhadap Pertumbuhan Bibit Anggrek Vanda. *Jurnal Hortikultura* 18 (3) : 307-311.
- Zuhry, Elza. 2010. Aplikasi  $\text{KNO}_3$  terhadap pertumbuhan dan hasil tanaman kailan (*Brassica alboglabra* L.) *J.SAGU* 9 (2): 7 - 11.

TABLE

Table 1. Average height of plant, number of leaves, width of title 35 MST

Rata-rata tinggi Tanaman, jumlah daun, lebar						
tajuk	Treatment					
	Concentration					
	B0	B1	B2	B3	B4	
Plant height	Biofertilizer	17.65 a	19.04 bc	29.71ab	19.70 c	
	$\text{KNO}_3$	K0	K1	K2	K3	K4
		18.34 a	18.43 ab	18.98 bc	19.23 cd	19.69 d
Number of leaves	Biofertilizer	B0	B1	B2	B3	B4
		8.83 a	9.52 bc	9.41 b	9.85 c	9.73 c
	$\text{KNO}_3$	K0	K1	K2	K3	K4
		9.17 a	9.22 a	9.49 ab	9.61 bc	9.85 c
Width of header	Biofertilizer	B0	B1	B2	B3	B4
		5.88 a	6.3 bc	6.27 <sup>b</sup>	6.57 <sup>c</sup>	6.47 <sup>bc</sup>
	$\text{KNO}_3$	K0	K1	K2	K3	K4
		5.88 a	6.35 <sup>bc</sup>	6.27 <sup>b</sup>	6.57 <sup>c</sup>	6.47 <sup>c</sup>

Description: The average value in the same column/row followed by the same letter does not differ markedly according to the DMRT test at the level of 5%

**Table 2. average stem diameter, leaf area, fresh weight, dry weight**

Average stem diameter, leaf area, fresh weight, dry weight				
Hanged	stem diameter	leaf area	fresh weight	dry weight
<b>Biofertilizer</b>				
B0	0.88 <sup>a</sup>	12.62 <sup>a</sup>	33.63 <sup>a</sup>	22.53 <sup>a</sup>
B1	1.30 <sup>abc</sup>	13.39 <sup>a</sup>	40.60 <sup>b</sup>	27.20 <sup>b</sup>
B2	0.96 <sup>ab</sup>	13.56 <sup>a</sup>	40.52 <sup>b</sup>	27.15 <sup>b</sup>
B3	1.59 <sup>c</sup>	17.39 <sup>c</sup>	45.59 <sup>b</sup>	33.56 <sup>c</sup>
B4	1.48 <sup>bc</sup>	15.56 <sup>b</sup>	42.53 <sup>b</sup>	29.97 <sup>bc</sup>
<b>KNO<sub>3</sub></b>				
K0	0.85 <sup>a</sup>	12.22 <sup>a</sup>	31.42 <sup>a</sup>	21.05 <sup>a</sup>
K1	1.04 <sup>a</sup>	12.44 <sup>ab</sup>	32.12 <sup>a</sup>	21.52 <sup>a</sup>
K2	1.20 <sup>a</sup>	13.79 <sup>b</sup>	38.45 <sup>b</sup>	25.32 <sup>ab</sup>
K3	1.30 <sup>ab</sup>	15.50 <sup>c</sup>	44.90 <sup>c</sup>	29.48 <sup>b</sup>
K4	1.8 <sup>b</sup>	18.56 <sup>d</sup>	54.73 <sup>d</sup>	43.05 <sup>c</sup>

Description: The average value in the same column/row followed by the same letter does not differ markedly according to the DMRT test at the level of 5%

**Table 3. Plant sweetness test**

Biofertilizer	KNO <sub>3</sub>										Rerata	
	(B)	K0		K1		K2		K3		K4		
<b>B0</b>	4.00	c	4.00	a	4.00	a	4.00	a	5.00	b	4.20	a
	A		A		A		A		B			
<b>B1</b>	3.33	b	4.00	a	4.67	b	5.00	b	4.00	a	4.20	a
	A		B		C		D		B			
<b>B2</b>	3.00	a	4.00	a	4.00	b	5.00	b	5.00	b	4.20	a
	A		B		B		C		C			
<b>B3</b>	4.00	c	4.00	a	5.00	c	5.00	b	5.00	b	4.40	b
	A		A		B		B		B			
<b>B4</b>	4.00	c	5.00	b	5.00	c	5.00	b	5.00	b	4.80	c
	A		B		B		B		B			
<b>Rerata (I)</b>	3.67	A	4.20	B	4.53	C	4.80	D	4.60	C		

Description: The average value in the same column/row followed by the same letter does not differ markedly according to the DMRT test at the level of 5%

## Application of *Enterprise Risk Management (ERM)* Method On Risk And Mitigation Of Local Fruit

Himmatul Miftah<sup>1\*</sup>, Arti Yoesdiarti<sup>1</sup>, Novita Yulanda<sup>1</sup>, Vigia Marfu'ah Zuher<sup>1</sup>, Januar Ramadhan<sup>1</sup>, Ikhsan Qodri Pramartaa<sup>1</sup>, Tiara Amanda Lestari<sup>2</sup>,

<sup>1</sup>Department of Agriculture, Djuanda University, Indonesia

<sup>2</sup>Department of Food Technology, Djuanda University, Indonesia

Correspondence E-mail: himmatul.miftah@unida.ac.id

### ABSTRACT

**Background** – Local fruit commodities have perishable properties so that they have the potential to cause risks that result in losses, especially in the production and distribution process. Risks include weight loss, physical damage, loss and unsold fruit. Potential losses can be reduced by identifying risks and mitigating them through the application of the *Enterprise Risk Management (ERM)* method . Risk management is carried out through calculating the proportion of risk and mitigation measures to prevent and minimize negative impacts and greater losses.

**Purpose** – This study aims to identify, analyze the risks and their mitigation in local fruit products during the production and distribution process from farmers to final consumers

**Design/methodology/approach** – Respondents were selected purposively and snowball sampling . Respondents identified were 56 respondents consisting of 17 retailer respondents, 10 wholesaler respondents, 8 collector respondents, and 21 farmer respondents. The research was conducted from February 2020 to October 2021.

**Findings** – Risk mapping consists of (1) weight loss at farmer, collector, wholesaler , and retailer level, respectively , having moderate risk ( *undesirable* ) to very low risk ( *negligible* ); (2) physical damage at the level of farmers, collectors, wholesalers , and retailers, respectively, has a moderate risk category ( *undesirable* ) to very low risk ( *negligible* ); (3) unsold at the level of wholesalers, retailers, farmers and collectors, respectively, including the category of moderate risk ( *undesirable* ) to low risk ( *acceptable* ); (4) losses at the level of farmers, collectors, wholesalers, and retailers are categorized as very low ( *negligible* ).

Mitigation action taken to reduce the risk of weight loss is to coat the base with straw or cardboard and cover the load using a tarpaulin, it is necessary to take into account the delivery time. The risk of unsold can be overcome by separating the old stock of fruit from fresh fruit, so that the old fruit can be sold first. losses during the supply chain distribution process are very rare, no mitigation actions are taken because the risk of loss is always left unchecked.

**Research limitations**– This study is limited to the production, distribution and mitigation risks of melon and papaya in two traditional markets in Bogor City. The data analyzed for the risk of production, distribution and mitigation on melons and papayas are limited to the risk of weight loss, physical damage, unsold, and loss.

**Originality/value** – Research focuses on melons and papayas on production and distribution activities from farmers to final consumers. The results of the study can be used as a basis for calculating the internalization of costs and determining the value of insurance in agricultural product insurance programs, especially in the production and distribution process.

**Keywords:** ERM, distribution risk, mitigation, weight loss, physical damage, unsold, loss.

## **I. INTRODUCTION**

Fruit plants are horticultural commodities that are important for health because they function as an irreplaceable source of vitamins and minerals. The production of the horticultural sub-sector of fruit commodities in 2018 according to data from the Central Statistics Agency for fruit commodities reached 21.5 million tons (Horticulture, 2018). Improving fruit quality is one of the efforts to overcome competition, the government also encourages local fruit to become a major player in the domestic fruit market as well as to increase production and increase exports in order to improve farmers' welfare.

Agricultural products have unique characteristics related to the nature of fruit plants which are horticultural commodities that are easily damaged, variations in fruit shape and size, and dependence of the cultivation process on weather and climate cause high risks. The risks that usually occur include when carrying out supply chain distribution and marketing of products such as the risk of weight loss, physical damage, and unsold fruit. These risks have the potential to cause losses that need to be considered considering that local fruit production centers come from various regions in Indonesia which are quite far from the marketing place.

The increasing uncertainty that occurs will have an impact on the complexity of the risks that must be faced by marketing institutions, therefore, appropriate efforts are needed in risk management through calculating the proportion of risk and mitigation actions to prevent and minimize negative impacts and greater losses (Afandi, 2019).

## **II. LITERATURE REVIEW**

Previous research on "Risk Management in Sugar Production in PG Madukismo, Bantul Regency" conducted by Pungki Syaraswati et al (2017) using the Enterprise Risk Management (ERM) method shows that the risk in the Plant Section Unit, namely the risk of land area exceeding the target, sugarcane production is less than the target, sugarcane production is more than the target and there are remaining raw materials that have not been milled. Risks in the Installation Section Unit, namely the risk of work accidents, machine stops during the production process and machine damage. Risks in the Manufacturing Unit, namely the risk of sugar cane yield below the target, milling capacity below installed capacity and sugar production less than the target.

A previous study conducted by Santia Afandi (2019) entitled Trading Margin Analysis and Distribution Risk of Tomato supply chain in Bogor City Traditional Markets (Enterprise Risk Management Approach) suggested that supply chain distribution risk mapping based on the impact for trading system actors, namely (1) weight loss and (2) physically damaged sorting at the farmer level. The risks that often occur but have a relatively small impact are (1) weight loss during delivery at the village collectors level, at the wholesaler level in the retail market and at the wholesaler level at the wholesale market, (2) physical damage during sorting at the wholesaler level. wholesalers in the main market, at the level of traders in the retail market, and at the retail level, (3) are not sold when selling merchandise at the wholesaler level in the main market and at the retail level. The risk that rarely occurs is in weight loss during shipping at the wholesaler level in the retail market, at the retail level and when selling merchandise at the retail level.

## **III. METHODOLOGY**

### **3.1 Research Location and Time**

The location of the research was chosen purposively, namely in the traditional markets of Bogor City, namely Pasar Baru Bogor and Pasar Jambu Dua. The locations of other trading system actors were traced based on the results of interviews with previous market participants. Based on the results of

interviews from previous market participants. The research was started from February 2020 to October 2021.

### 3.2 Data Types and Sources

The data used in this study consisted of primary data and secondary data. Primary data were obtained through field observations and direct interviews with respondents. Secondary data was obtained from various related literatures including theses, journals, articles, internet, books, data centers and agricultural information systems, Central BPS, and other sources that support research

### 3.3 Respondent Determination Method

Determination of respondents was carried out using purposive sampling and snowball sampling methods. Purposive sampling method was used to determine the respondents of retailers in Pasar Baru Bogor and Pasar Jambu Dua. Snowball sampling method was used to determine the respondents, wholesalers, traders, village collectors and farmers. The total number of respondents identified as many as 56 respondents consisting of 17 respondents from retailers, 10 respondents from wholesalers, 8 respondents from collectors, and 21 respondents from farmers

### 3.4 Data Analysis Method

Data analysis used qualitative and quantitative analysis, the tool used in data processing was Microsoft Excel 2010. Qualitative analysis was used to describe risk events that occurred in all local fruit trading actors. Quantitative analysis is used to measure the risks that occur to all local fruit traders. The level of risk and alternative risk strategies were analyzed using the Enterprise Risk Management (ERM) method.

The stages of the research used in analyzing the risk of each local fruit trading actor consist of 8 components of Enterprise Risk Management (ERM) (Godfrey, 1995). The eight stages of the Enterprise Risk Management (ERM) component consist of 3 analysis processes, namely the risk identification process (ERM 1 Internal Environment, ERM 2: Objective Setting, ERM3: Event Identification); risk measurement and mapping (ERM 4: Risk Assessment) and risk mitigation actions (ERM 5: Risk Response, ERM 6: Control Activities, ERM 7: Information and Communication, ERM 8: Monitoring) (COSO, 2004)

## IV. RESULT AND DISCUSSION

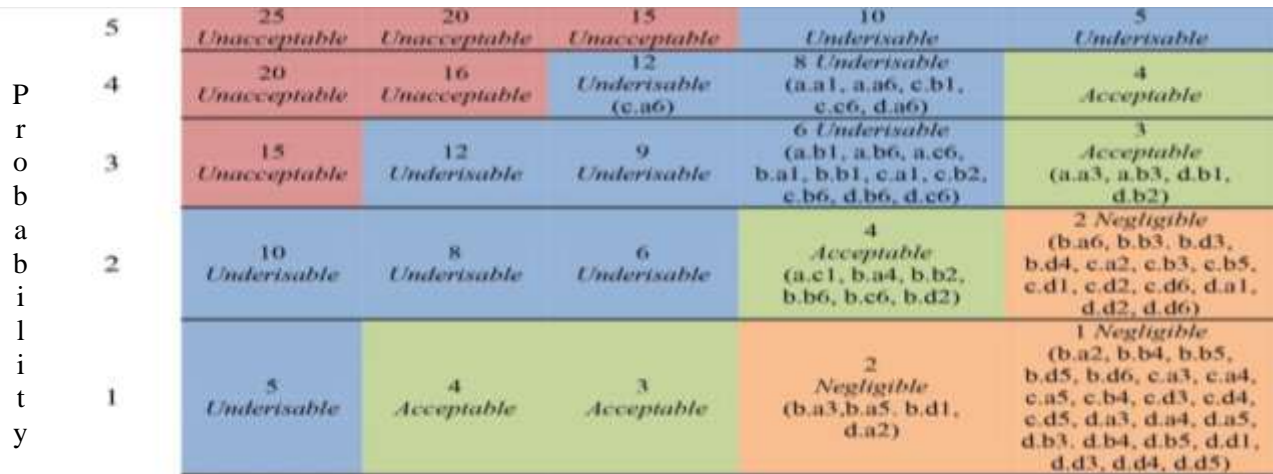
Table 1 Classification of Risks That Occur in Local Fruit Production and Distribution

Marketing Agency	Code	Risk	Probability Score	Impact Score	Total Score	Risk Level
Farmers			<b>Weight Loss</b>			
	a.a1	Delivery	3.67	2	7.3	<i>Undesirable</i>
	a.a2	Unloading and Loading	-	-	-	-
	a.a3	Sorting	3	1.33	4	<i>Acceptable</i>
	a.a4	Grading	-	-	-	-
	a.a5	Packing	-	-	-	-
	a.a6	Sell	4	2	8	<i>Undesirable</i>
			<b>Physical Damage</b>			
	a.b1	Delivery	3.23	1.95	6.29	<i>Undesirable</i>
	a.b2	Unloading and Loading	-	-	-	-
	a.b3	Sorting	2.67	1	2.7	<i>Acceptable</i>
	a.b4	Grading	-	-	-	-
	a.b5	Packing	-	-	-	-
	a.b6	Sell	3.55	1.95	6.9	<i>Undesirable</i>
			<b>Unsold</b>			

	a.c1	Delivery	2.66	1.7	4.5	<i>Acceptable</i>
	a.c2	Unloading and Loading	-	-	-	-
	a.c3	Sorting	-	-	-	-
	a.c4	Grading	-	-	-	-
	a.c5	Packing	-	-	-	-
	a.c6	Sell	3.15	2.2	6.9	<i>Undesirable</i>
	<b>Loss</b>					
	a.d1	Delivery	-	-	-	-
	a.d2	Unloading and Loading	-	-	-	-
	a.d3	Sorting	-	-	-	-
	a.d4	Grading	-	-	-	-
	a.d5	Packing	-	-	-	-
	a.d6	Sell	-	-	-	-
<b>Collector</b>	<b>Weight Loss</b>					
	b.a1	Delivery	2.8	1.7	4.8	<i>Undesirable</i>
	b.a2	Unloading and Loading	1.2	1.25	1.5	<i>Negligible</i>
	b.a3	Sorting	1.33	2	2.7	<i>Negligible</i>
	b.a4	Grading	1.67	1.67	2.8	<i>Acceptable</i>
	b.a5	Packing	1	2	2	<i>Negligible</i>
	b.a6	Sell	2	1.44	2.9	<i>Negligible</i>
	<b>Physical Damage</b>					
	b.b1	Delivery	3	2	6	<i>Undesirable</i>
	b.b2	Unloading and Loading	2.6	1.6	4.2	<i>Acceptable</i>
	b.b3	Sorting	1.46	1.48	2.1	<i>Negligible</i>
	b.b4	Grading	1.33	1.33	1.8	<i>Negligible</i>
	b.b5	Packing	1.3	1.4	1.8	<i>Negligible</i>
	b.b6	Sell	2.5	2.1	5.2	<i>Acceptable</i>
	<b>Unsold</b>					
	b.c1	Delivery	-	-	-	-
	b.c2	Unloading and Loading	-	-	-	-
	b.c3	Sorting	-	-	-	-
	b.c4	Grading	-	-	-	-
	b.c5	Packing	-	-	-	-
	b.c6	Sell	2.3	1.8	4.1	<i>Acceptable</i>
	<b>Loss</b>					
	b.d1	Delivery	1.6	1.7	2.7	<i>Negligible</i>
	b.d2	Unloading and Loading	2.3	1.9	4.3	<i>Acceptable</i>
	b.d3	Sorting	1.6	1.3	2	<i>Negligible</i>
	b.d4	Grading	1.67	1.67	2,79	<i>Negligible</i>
	b.d5	Packing	1.2	1.25	1.5	<i>Negligible</i>
	b.d6	Sell	1	1	1	<i>Negligible</i>
<b>Wholesaler</b>	<b>Weight Loss</b>					
	c.a1	Delivery	3.35	1.6	5.4	<i>Undesirable</i>
	c.a2	Unloading and Loading	1.6	1.2	1.9	<i>Negligible</i>
	c.a3	Sorting	1	1	1	<i>Negligible</i>
	c.a4	Grading	1	1	1	<i>Negligible</i>
	c.a5	Packing	1	1	1	<i>Negligible</i>
	c.a6	Sell	4.45	2.5	11.1	<i>Undesirable</i>
	<b>Physical Damage</b>					
	c.b1	Delivery	4.35	1.9	8.3	<i>Undesirable</i>
	c.b2	Unloading and Loading	2.85	1.8	5.1	<i>Undesirable</i>
	c.b3	Sorting	1.6	1.1	1.8	<i>Negligible</i>
	c.b4	Grading	1	1	1	<i>Negligible</i>
	c.b5	Packing	1.7	1.1	1.8	<i>Negligible</i>
	c.b6	Sell	2.9	2.02	5.8	<i>Undesirable</i>

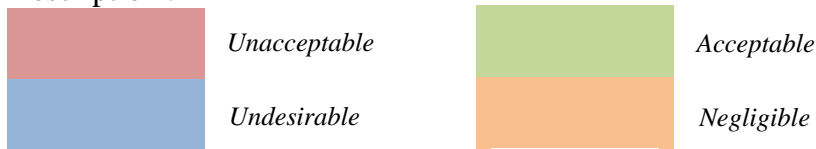
		<b>Unsold</b>			
c.c1	Delivery	-	-	-	-
c.c2	Unloading and Loading	-	-	-	-
c.c3	Sorting	-	-	-	-
c.c4	Grading	-	-	-	-
c.c5	Packing	-	-	-	-
c.c6	Sell	2.8	2.5	7	<i>Undesirable</i>
		<b>Loss</b>			
c.d1	Delivery	1.6	1.25	2	<i>Negligible</i>
c.d2	Unloading and Loading	2.1	1.35	2.8	<i>Negligible</i>
c.d3	Sorting	1.1	1.1	1.2	<i>Negligible</i>
c.d4	Grading	1	1	1	<i>Negligible</i>
c.d5	Packing	1.1	1	1.1	<i>Negligible</i>
c.d6	Sell	2.3	1.4	3.2	<i>Negligible</i>
Retailer	<b>Weight Loss</b>				
d.a1	Delivery	1.9	1.2	2.3	<i>Negligible</i>
d.a2	Unloading and Loading	1.1	1.7	1.9	<i>Negligible</i>
d.a3	Sorting	1	1	1	<i>Negligible</i>
d.a4	Grading	1	1	1	<i>Negligible</i>
d.a5	Packing	1	1	1	<i>Negligible</i>
d.a6	Sell	3.9	2.3	9	<i>Undesirable</i>
		<b>Physical Damage</b>			
d.b1	Delivery	2.8	1.6	4.5	<i>Acceptable</i>
d.b2	Unloading and Loading	2.7	1.5	4	<i>Acceptable</i>
d.b3	Sorting	1.2	1.2	1.4	<i>Negligible</i>
d.b4	Grading	1	1	1	<i>Negligible</i>
d.b5	Packing	1.3	1.05	1.4	<i>Negligible</i>
d.b6	Sell	2.9	2.5	7.2	<i>Undesirable</i>
		<b>Unsold</b>			
d.c1	Delivery	-	-	-	-
d.c2	Unloading and Loading	-	-	-	-
d.c3	Sorting	-	-	-	-
d.c4	Grading	-	-	-	-
d.c5	Packing	-	-	-	-
d.c6	Sell	2.9	2.15	6.2	<i>Undesirable</i>
		<b>Loss</b>			
d.d1	Delivery	1.3	1.15	1.5	<i>Negligible</i>
d.d2	Unloading and Loading	1.7	1.4	2.4	<i>Negligible</i>
d.d3	Sorting	1	1	1	<i>Negligible</i>
d.d4	Grading	1	1	1	<i>Negligible</i>
d.d5	Packing	1	1	1	<i>Negligible</i>
d.d6	Sell	1.8	1.6	2.9	<i>Negligible</i>

<b>Impact</b>				
5	4	3	2	1



Picture1 Map of Risks Occurring in Local Fruit Distribution

Description :



Each marketing agency of the trading system must carry out appropriate mitigation in order to minimize the impact resulting from the risks received. Mitigation measures taken to reduce the risk of weight loss are the application of a base with straw or cardboard and covering the use of tarpaulin, it is necessary to take into account the delivery time process so that it is protected from sun exposure and there is no late night. The harvest time process can be done earlier so that the harvest can be brought as quickly as possible and must also pay attention to the level of fruit maturity. Mitigation measures taken to reduce the risk of physical damage include adding straw, covering tarpaulins and wrapping fruit using newsprint. Keep the fruit from the young at the bottom to the ripe at the top. Efforts are made to drive transportation more carefully when carrying out the selling and buying process. Unsold risks can be overcome if the implementation of grading and sorting is carried out immediately when the first fruit arrives. Separation of old stock of fruit with fresh fruit needs to be implemented so that old fruit can be sold first. Buyers before making purchases to other trading actors and provide information to each other regarding the availability of fruit stocks so that they can plan their next purchases based on previous sales. During the supply chain distribution process it is very rare, no mitigation actions are taken because the loss is always left unchecked

## V. CONCLUSION

Production and distribution activities of local fruit traders have risks such as weight loss, physical damage, unsold and loss. The results of risk identification resulted in 65 risk events consisting of 6 risks of weight loss events, 6 risks of physical damage events, 6 risks of unsold events, and 6 risk events, each at the farmer, collector, wholesaler, and retailer level. . The measurement results resulted in a risk mapping from the highest to the lowest level , 16 risks with *undesirable* levels , 10 risks with *acceptable* levels , and 39 risks with *negligible* levels . Mitigation actions are carried out on (1) weight loss (2) physical damage and (3) unsold at the level of farmers, collectors, wholesalers and retailers.



## ACKNOWLEDGEMENT

Acknowledgments to the Director General of Higher Education who has supported the funding of this research and to the Directorate of Higher Education Research (DRPM) of Djuanda University who has assisted in conducting research grants on research contracts 142/LPPM/KX/VII/2021.

## REFERENCES

- Afandi S, Miftah H, Nahraeni W. 2019. Analysis of Organizational Margins and Distribution Risks of Tomato Supply Chains in Traditional Markets; Bogor City ( *Enterprise Risk Management Approach* ). *Agriscience* 5(1):39-47.
- BPS. 2018. *Annual Horticultural Production of Fruits and Vegetables West Java Province*. West Java: BPS West Java Province.
- COSO. 2004. *Enterprise risk management – integrated framework. Committee of Sponsoring Organizations* . Retrieved from [www.coso.org/Publications/ERM/COSO\\_ERM\\_Executive\\_Summary.pdf](http://www.coso.org/Publications/ERM/COSO_ERM_Executive_Summary.pdf).
- Godfrey P, Halcrow WS, Partners L. 1996. *Control of Risk A Guide to Systematic Management of Risk from Construction*. Westminster, London: Construction Industry Research and Information Association (CIRIA).
- Syaraswati P, Riptanti EW, Setyowati N. 2017. Risk Management in Sugar Production in PG Madu Kismo Bantu Regency. *Agrista* 5(1): 203-213.

# ANALYSIS OF PUBLIC PERCEPTION OF URBAN BUS OPERATION USING CLASSIC ASSUMPTION AND MULTIPLE LINEAR REGRESSION TESTS

Muhammad Nanang Prayudyanto<sup>1</sup>, Syaiful<sup>1</sup>, Muhamad Rinaldi<sup>1</sup>

<sup>1</sup>Civil Engineering Department, Faculty of Engineering and Science,  
University Ibn Khaldun, Bogor, Indonesia  
Jl. Raya KH. Sholeh Iskandar, KM. 2 Bogor 16162  
Co Author: muhammadprayudyanto@gmail.com

---

## Abstract

Intercity Transjabodetabek bus is attractive public transportation for the Greater Jakarta (Jabodetabek) communities' daily working trips. The bus is established in 2015 by MoT, and it also benefits the people of Bogor city who daily travel to Jakarta for various purposes. Therefore, to determine the level of service satisfaction of the Transjabodetabek bus operator, a study was conducted on the performance of the service level of the bus operator based on the perception of its users which refers to the Minimum Service Standard (SPM) based on the Minister of Transportation Regulation (PM) 29 /2015 concerning Minimum Service Standards (MSS). The MSS assessment is outlined in indicators, namely: Ease, Security and Safety Reliability, Convenience, and Convenience. This study aims to determine: 1) The effect of service quality on the level of satisfaction of users of Transjabodetabek bus services. 2) Analyze the service level of Transjabodetabek bus operators based on passenger perceptions by using the classical assumption and multiple linear regression test. The population in this study were Transjabodetabek bus customers with routes Bubulak-Grogol, Bubulak-Rawamangun, Bubulak-Blok M, and Bubulak-Tanah Abang. while the sample in the study amounted to 100 respondents. The test uses an unintentional inspection procedure, while the collection of information is done by using a questionnaire, at the time that pandemic was arising. The result is then categorized with a score of 1-4, where 4 is the maximum. Examination of information using the classical assumption test as well as with multiple linear regression analysis. Calculations using the computer program SPSS version 25 for windows. The results of this study indicate there is a significant influence on the service quality of the bus stop facilities and bus facility services on the satisfaction of the Tranjabodetabek bus customers. The magnitude of the influence is 0.632 or 63.2%, meaning that the magnitude of the influence of the variable quality of service quality of the bus stop facilities and the service of bus facilities on the variation of changes in customer satisfaction is equal to 63.2%, while 36.8% is influenced by other variables not examined in this study.

Keywords: *Quality of service, TransJabodetabek, Classic Assumption, Mutiple Linear Regression Test.*

---

## I. INTRODUCTION

### Background

Development progress in the Jabodetabek area is rapidly increasing, leading to an increase in the number of vehicle ownership. In addition, with these advances having an impact on increasing community activities in the area, the increase in activity is directly related to the increase in the use of public transportation so that it affects the level of public transportation services (Garling et al, 2002).

Every company tries to offer the best facilities with satisfactory service for its customers so that they are happy with it which encourages them to become customers. Good service quality has a complementary relationship to customer satisfaction (Tjiptono 2004: 54).

Through Government Regulation of the Republic of Indonesia No. 103 of 2015, the Jabodetabek Transportation Management Agency (BPTJ) was formed to further develop integrated transportation services in the metropolitan areas of Jakarta, Bogor, Depok, Tangerang, and Bekasi. Jabodetabek is an agglomerated region that becomes a close unit with each other. The flexibility going on in this area is a very high daily mover. Thus, the course of transportation activities in this area cannot be carried out by every local government alone but must be integrated and coordinated with each other. One of the public transportations that serve the Jabodetabek route is the Transjabodetabek bus which is managed by the Djakarta Passenger Transport (PPD). The Transjabodetabek bus is a mode of transportation that is a mode of transportation for the people of Jabodetabek. Transjabodetabek Transportation works under the management of BPTJ as a supervisor who is responsible for the implementation and granting of public transportation permits across Jabodetabek.

Intercity Transjabodetabek bus is attractive transportation for the Jabodetabek community, established in 2015, especially the people of Bogor city who daily travel to Jakarta for various purposes. This bus starts operating from 04.30 WIB to 17.00 WIB for departure from Bubulak terminal to the destination terminal, while the one-way operational cost is Rp. 16,000.00. After five years of operating the Transjabodetabek bus, service complaints are still often encountered which can make Transjabodetabek bus service users feel uncomfortable. Therefore, to determine the level of service satisfaction of the Transjabodetabek bus operator, a study was conducted on the performance of the service level of the bus operator based on the perception of its users which refers to the Minimum Service Standard (SPM) based on the Minister of Transportation Regulation (PM) 29 /2015 concerning Minimum Service Standards. The MSS assessment is outlined in indicators, namely: Ease, Security and Safety Reliability, Convenience, and Convenience. An analysis of the level of satisfaction and importance is carried out to assess service facilities on the Transjabodetabek bus system. The level of satisfaction relates to how users assess the satisfaction of existing facilities, while the level of importance relates to whether the existing facilities are quite important or not.

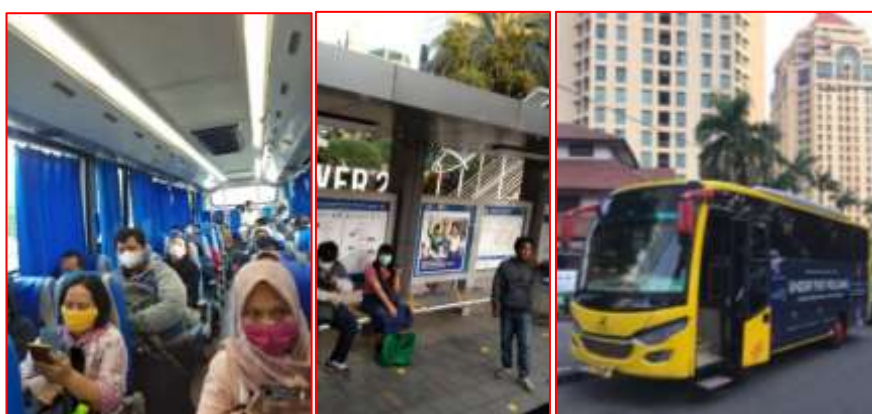


Figure 1. Inside Bus and Shelter

## II. METHODOLOGY

The research method used is descriptive qualitative and quantitative with survey methods, this describes the facts or phenomena that occur in the field, the method of the level of service or the level of service of the Transjabodetabek bus as a qualitative measure, to find out how the services provided by Transjabodetabek bus operators to the public. users by conducting interviews.

**Population and Sample**

As stated by Sumarni (2006:69) population is the entire object under study consisting of some individuals, both limited and unlimited. In this inspection, the population is passengers who use Transjabodetabek bus services on the Bubulak-Blok M, Bubulak-Rawamangun, and Bubulak-Tanah Abang routes.

The sample selection strategy in this study is someone who is accidentally met (accidental sampling). As pointed out by Sugiyono (2012: 67), "Coincidence checking is a testing strategy that relies on the opportunity to meet a researcher or can be used as an example if someone you meet deserves to be a data source".

The assessment states that adequate sample size depends on the exploratory configuration used, where descriptive-correlational studies have a minimum sample size of 30 subjects. Furthermore, the sample taken in this study was 100 respondents.

**Data Analysis Techniques**

**Validity Test**

By looking at the calculated r-value that is compared (for each item it can be seen in the column corrected item-total) with r tables for the probability level (df) = nk, for this situation n is the number of samples and k is a number of items. if r count > r table, then the investigation is considered valid (Imam Ghozali, 2018: 52).

**Reliability Test**

Reliability Test is an instrument to measure a questionnaire which is a marker of a variable or constructs. A questionnaire should be reliable or reliable if individual responses to questions are consistent or sometimes stable. SPSS provides facilities for estimating dependence with the factual test Cronbach Alpha (α). A variable is said to be solid if it has a value > 0.60 (Imam Ghozali, 2018: 46).

$$\frac{-(\sum x^2)(\sum y^2)}{\sqrt{\{}} \dots\dots\dots (1)$$

**Classical Assumption Test**

**Normality Test**

As shown by Husein Umar (2011:182) The normality test is to see whether the dependent variable and the independent variable or both have normal characteristics, close to normal or not. Dynamic reasons as stated by Singgih Santoso (2002) decision making must depend on probability or probability (Asymptotic Importance), in particular:

1. If probability > 0.05, population distribution means normal.
2. If the probability is < 0.05, the population distribution means that it.

**Multicollinearity Test**

As stated by Imam Ghozali (2018:107) the multicollinearity test aims to test whether the regression model finds a relationship between independent factors (free). The technique that can be used to test the occurrence of multicollinearity can be seen from the relationship grid of the independent variables. In the relationship framework, if there is a high relationship between the independent variables (generally above 0.90), then, at that point, it means that there is multicollinearity. In addition, the values can also be seen tolerance and variance inflation factor (VIF). The tolerance limit is < 0.10 or the equivalent of the VIF value is > 10 (Imam Ghozali, 2018: 108).

**Heteroscedasticity Test**

The heteroscedasticity test is intended to test whether in the regression model there is a disparity of changes starting from one remaining perception to the next perception (Imama Ghozali, 2013:139). Heteroscedasticity testing was carried out using the Glejser test (Gujarati, 2003) quoted by Imam Ghozali (2018:142). In the Glejser test, the absolute residual value is regressed with the independent variable. If the independent variable (independent) has a very large influence on the dependent variable, then there is heteroscedasticity.

**Autocorrelation Test**

Used to determine whether there is a relationship between individuals from the development of perceptions requested by time. To test this autocorrelation, the technique was used, Durbin Watson. To analyze the presence or absence of autocorrelation in the regression model, it is done through testing the Durbin Watson Test (DW Test).

As shown by Imam Ghozali (2018:113) there is no symptom of autocorrelation, if the value Durbin Watson lies between **du to (4-du)**. The value of du is found in the Durbin Watson table.

**Multiple Linear Refression Test**

Use of this analytical model is to determine the relationship between the independent variable (independent) and the dependent variable (dependent), namely the service quality of bus stops (X1), bus facility services (X2) on user satisfaction (Y). The independent variable with the dependent variable either jointly or partially, the specifications used in this investigation are:

$$Y = b_0 + b_1.X_1 + b_2.X_2 + e \dots\dots\dots (2)$$

**F-Test (Simultaneous Test)**

According to Imam Ghozali (2018: 98), the F test shows whether each independent variable expected in the model affects the dependent variable. The test is equipped with the following conditions tolerating or rejecting speculation:

1. Assuming critical value > 0.05, speculation is recognized (regression coefficient is not significant).
2. Assuming a critical value of 0.05, speculation is dismissed.

**T-Test (Partial Test)**

T-test the significance of the partial regression coefficient, the t-test is used. The specified value of t can be determined by:

$$\frac{\sqrt{n}}{\sqrt{t}} \dots\dots\dots (3)$$

If t-count > t-table, Ho is not accepted, then the independent variable can clarify the dependent variable in the model. Then, assuming t-arithmetic < t-table, Ho is recognized. It is therefore not independent variables that can explain the dependent variable or as a whole, there is no influence between the two variables tested.

**The Coefficient of Determination (R<sup>2</sup>)**

The Coefficient of determination (R<sup>2</sup>) is used to determine the contribution of each independent variable. If the different variables are consistent with the dependent variable. The more important the value of R<sup>2</sup>, the more pronounced the variation in the contribution.

**Predoctoral Contribution Test**

It is an illustration of the extent of the impact contribution (in percent %) given by each independent variable (independent) on the dependent variable (dependent).

**Effective Contribution (SE)**

Effective Contribution is the proportion of the independent variable's contribution to the dependent variable in the regression examination. The number of (SE) of all independent variables is equivalent to the sum of the values of R square (R<sup>2</sup>).

$$Se(X)\% = \text{Beta. Relational Coefficient} \cdot 100\% \dots\dots\dots (4)$$

**Relative Contribution**

Relative Contribution is a measure that shows the size of the independent variable (independent) on the number of squared regressions. Number SR of all the independent variables is 100% or equal to 1.

### III. RESULTS AND DISCUSSION

#### Validity Test Results

**Table 1. Validity Test of Service Quality Variables for Bus Stop (Shalter)**

Facilities	r count	r table	Status
Accessibility	0,377	0,195	Valid
	0,267	0,195	Valid
Comfort	0,243	0,195	Valid
	0,351	0,195	Valid
	0,314	0,195	Valid
	0,463	0,195	Valid
	0,529	0,195	Valid
	0,610	0,195	Valid
	0,217	0,195	Valid
Security	0,546	0,195	Valid
	0,545	0,195	Valid
	0,585	0,195	Valid
Safety	0,432	0,195	Valid
	0,440	0,195	Valid
Facilities for Disability and Elderly	0,341	0,195	Valid
	0,215	0,195	Valid
	0,357	0,195	Valid
	0,363	0,195	Valid
Passenger Facilities for Women and Pregnant Women	0,482	0,195	Valid
	0,562	0,195	Valid
	0,504	0,195	Valid
	0,453	0,195	Valid

Table 1 shows that all indicators used to measure these variables used in this study have a relationship value greater than r-table (0,195). These results indicate that all variables "quality of service stop facilities" pass the validity test.

**Table 2. Validity Test of Service Quality Variables Bus Facilities**

Fasicilities	r count	r table	Status
Operational	0,386	0,195	Valid
	0,336	0,195	Valid
	0,274	0,195	Valid
	0,389	0,195	Valid
	0,268	0,195	Valid
	0,326	0,195	Valid
Comfort	0,351	0,195	Valid
	0,326	0,195	Valid
	0,351	0,195	Valid
	0,333	0,195	Valid
	0,475	0,195	Valid

	0,397	0,195	Valid
	0,617	0,195	Valid
Security	0,576	0,195	Valid
	0,721	0,195	Valid
Safety	0,690	0,195	Valid
	0,610	0,195	Valid
	0,563	0,195	Valid
	0,390	0,195	Valid
Facilities for Disability and Elderly	0,288	0,195	Valid
	0,353	0,195	Valid
	0,616	0,195	Valid
Passenger Facilities for Women and Pregnant Women	0,553	0,195	Valid
	0,604	0,195	Valid
	0,420	0,195	Valid

Table 2 shows that all indicators used to measure the variables used in this study have the value of the relationship is greater than the r-table (0,195). These results indicate that all variables "quality of service bus facilities" pass the validity test.

**Table 3. Validity Test of Current Satisfaction Level**

Bus Fasicilities	r count	r table	Status
Bus Stop (Shalter)	0,490	0,195	Valid
Bus	0,460	0,195	Valid

Table 3 shows that all indicators used to measure the variables used in this study have a relationship value greater than r-table (0.195). These results indicate that all variables' "current level of satisfaction" pass the validity test.

## Results reliability

**Table 4. Reliability Test**

Item	Variable	Cronbach's Alpha	Realibilitas
Service Satis-faction Bus Stop (X1)	X1.1	0,664	Consistent
	X1.2	0,719	Consistent
	X1.3	0,622	Consistent
	X1.4	0,643	Consistent
	X1.5	0,650	Consistent
	X1.6	0,641	Consistent
Service Satis-faction Bus (X2)	X2.1	0,637	Consistent
	X2.2	0,654	Consistent
	X2.3	0,637	Consistent
	X2.4	0,607	Consistent
	X2.5	0,667	Consistent
	X2.6	0,635	Consistent
Satis-faction of Stop Facilities	Y1	0,639	Consistent
Satis-faction of Bus Facilities	Y2	0,637	Consistent

Table 4 The results of the reliability test show that all variables have a coefficient, Alpha a fairly large which is above 0.6 so that it can be said that all measuring concepts of each variable from the questionnaire are reliable, which means that the questionnaire used in this study is a reliable or consistent questionnaire.

**Classical Assumption Test**

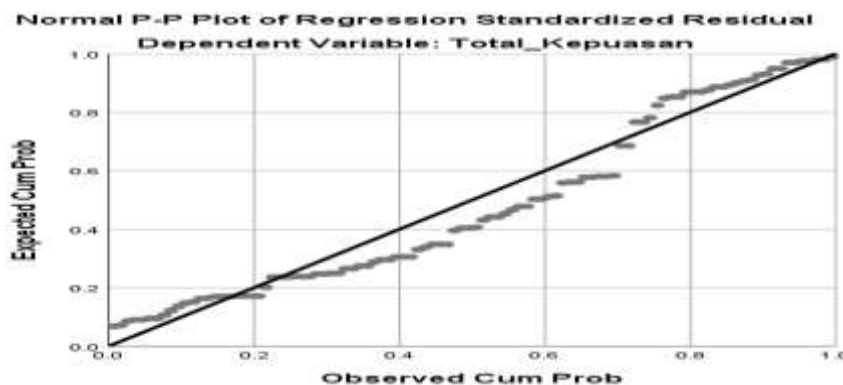
**Normality Test Results**

According to Imam Ghozali (2018:31) Testing the normality of the data is carried out using the *one-sample Kolmogorov-Smirnov Test*, if the probability of *asympt.sig*  $\alpha > 0,05$  then the research data is normally distributed.

**Table 5 Normality Test Results**

One Sample Kolmogorov-Smirnov Test		
N		Unstandardized Residual 100
Normal parameters <sup>ab</sup>	Mean	0,0000000
	Std. Deviation	0,28946318
Most Extreme Differences	Absolute	0,124
	Positive	0,124
	Negative	-0,090
Test Statistic		0,124
Asymp. Sig. (2-tailed)		0,001 <sup>c</sup>
Monte Carlo Sig. (2-tailed)	Sig	0,087 <sup>d</sup>
	99% Confidence Interval	0,079
	Interval	0,094

Based on table 5. the results of the One-Sample Kolmogorov - test resulted in asymptotic significance using the Monte Carlo Sig. (2-tailed) of  $0,87 \geq 0,05$ . Because the significance value of the normality test for each variable is greater than ( $\alpha = 0,05$ ) i.e.  $0,87 > 0,05$ .



**Figure 2. Normal PP Plot Graph**

Results The test results show that the points are not far from the diagonal line showing the normal distribution pattern, then the regression model meets the assumption of normality according to the theory of (Imam Ghozali, 2018:178).

**Multicollinearity Test Results**

The multicollinearity test is used to decide whether there is a deviation from the classical assumption of multicollinearity, namely a linear relationship between the independent variables in the regression model. The important thing that must be met in the regression model is that there is no multicollinearity. In this study, a multicollinearity test will be carried out by looking at the VIF value in the regression model. In the event that the VIF value is not more than 10 and the minimum tolerance value is 0,1, then at that time, the model can be said to be free from multicollinearity.

**Table 6. Multicollinearity Test Results**



	Understandard Coefficients		Standardized Coefficients	t	Sig.	Collonearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0,571	0,455		-1,254	-0,571		
X1	0,061	0,006	0,637	10,284	1,000	0,988	1,012
X2	0,035	0,005	0,412	6,646	1,000	0,988	1,012

X1: Bus Stop Facility Service, X2: Bus Facility Service

Based on table 6 it can be seen that the value tolerance of the bus stop service quality variable is 0,988 and the bus service quality is 0,988 which means more than 0,10 and VIF is less than 10, namely  $VIF = 1,012 < 10$ . So it is concluded that the regression model does not occur multicollinearity.

### Heteroscedasticity Test Results

As shown by Ghozali (2018: 144) one approach to distinguishing the presence or absence of heteroscedasticity is to perform the Glejser test. The Glejser test proposes to repeat the total residual value on the independent variable. The probability (probability) outcome should be critical if the importance value is above the 5% confidence level.

**Table 7. Heteroscedasticity Test Results**

	Understandard Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0,571	0,455		-1,254	1,000
X1	0,061	0,006	0,637	10,284	1,000
X2	0,035	0,005	0,412	6,646	1,000

X1: Bus Stop Facility Service, X2: Bus Facility Service

Based on table 7. From the results of the Glejser test, the significance value obtained is above 5%. it can be concluded that there is no heteroscedasticity in the regression model.

### Autocorrelation Test Results

According to Imam Ghozali (2018:113), There is no autocorrelation symptom, if the Durbin Watson value lies **between du to (4-du)**. The value of du is found in the value distribution Durbin Watson table based on  $k(df) = 2$ , the number of  $N(\text{sample}) = 100$  is 1,7152. There is no autocorrelation symptom if the Durbin Watson value lies between du to (4-du). Then we get  $4 - 1,752 = 2,2848$ .

**Table 8. The results of the D-W Autocorrelation Test**

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	0,795 <sup>a</sup>	0,632	0,625	0,292	1,963

Autocorrelation = du < Durbin Watson < 4 - du

Autocorrelation = 1,752 < 1,963 < 4 - 1,752

= 1,752 < 1,963 < 2,2848

Concluded that there were no autocorrelation symptoms.

**Multiple Linear Regression Test**

Different multiple regression analyzes were used to examine the impact of at least two independent variables on the dependent variable. The dependent variable in this study is "Satisfaction Level" while the independent variables are "Service Quality for Bus Stop Facilities" and "Service Quality for Bus Facilities" Based on table 6 the following equation is obtained:

$$Y = -0,571 + 0,061X_1 + 0,035X_2 \dots\dots\dots(5)$$

**F Test (Simultaneous Test)**

**Table 9. F Test Results**

ANOVA						
	Sig	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14,265	2	7,132	83,404	0,000 <sup>b</sup>
	Residual	8,295	97	0,086		
	Total	22,560	99			

- a. Dependent Variable: Total\_Kepuasan
- b. Predictors: (Constant), Kualitas Pelayanan Bus, Kualitas Pelayanan Halte

From the results of the ANOVA test using SPSS.25 software, from the table below above, the F test (simultaneous test) is **83,404**. Based on the table with a significance level ( $\alpha$ ) = 5% or 0.05, it is known that with. According to V. Wiratna Sujarweni (2014: 154) if the value of **F-count** > **F-table**, it means that the independent variable (X) simultaneously affects the dependent variable (Y). There is a way to find **F-table** as follows:

$$)) \dots\dots\dots(6)$$

Based on the calculation results, obtained F-count (83,404) > F-table (3,09). So it can be concluded that the service quality of the bus stop and the quality of the bus service simultaneously affect the satisfaction of Transjabodetabek bus customers.

**T-Test (Partial Test)**

According to Ghozali (2018: 105), the statistical t-test shows how far the influence of one explanatory variable is independently in clarifying the diversity of the dependent variable. The test is carried out using an importance level of 0.05 ( $\alpha=5\%$ ).

**Table 10. T Test Results**

	Understandard Coefficients		Standardized Coefficients	t	Sig.	Collonearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0,571	0,455		-1,254	-0,571		
X1	0,061	0,006	0,637	10,284	1,000	0,988	1,012
X2	0,035	0,005	0,412	6,646	1,000	0,988	1,012

X1: Bus Stop Facility Service, X2: Bus Facility Service

According to V.Wiratna Sujarweni (2014:155), if the value of t-count > t-table, it means that the independent variable (X) partially affects the dependent variable (Y). there is a way to find the t table as follows:

$$- \dots\dots\dots(7)$$

= 1,988

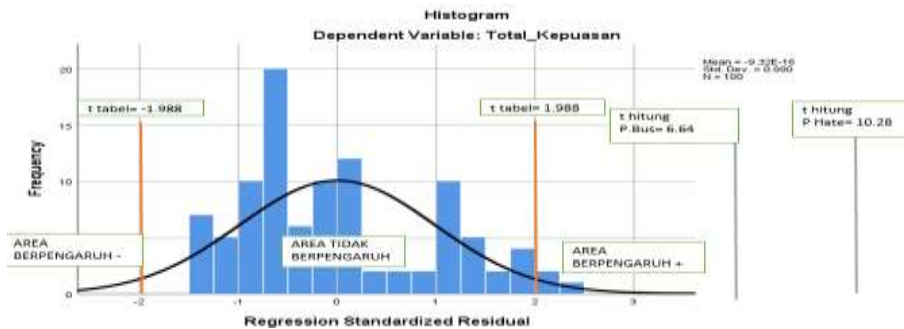


Figure 3. Graph of Partial Test Results (T-test)

Based on the results of calculations, obtained t-count service quality bus stops (10,284) > t-table (1,988), and t-count bus service quality (6,646) > t-table(1,988), so it can be concluded service quality bus stop and the quality of bus service partially affects the satisfaction of Transjabodetabek bus customers.

**Test The Coefficient of Determination (R<sup>2</sup>)**

The nature of regression seen conditions of the guaranteed value of R<sup>2</sup>. Mathematically the guarantee value is the square of the relationship coefficient (R). Because the value of R<sup>2</sup> is often overestimated, some statistical programs will improve R<sup>2</sup> (adjusted R<sup>2</sup>). The value of determination provides information on how big the role of the independent variables is in determining the dependent variable. The value of determination is between 0% to 100%. The closer to 100% the better the determination of the regression equation (Dahlan, 2012:8).

Table 11. Determination Test Results (R<sup>2</sup>)

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	0,795 <sup>a</sup>	0,632	0,625	0,292	1,963

From table 11 above, the coefficient of determination is 0,632 or 63.2%, meaning that the magnitude of the influence of service quality and price variables on variations in customer satisfaction changes is 63,2%, while 36,8% is influenced by different variables not analyzed in the study this.

**Predocrator Contribution Test**

Predocrator Contribution is a description of the magnitude of the influence contribution (in percent %) given by each independent variable to the dependent variable. Predictor contributions are grouped into 2 types, namely effective contribution (SE) and relative contribution (SR).

Table 12. Predocrator Contribution Test

Variable	Coefisien Regresi (Beta)	Coefisien Korelasi	R Square
X1	0,637	0,682	63,231
X2	0,412	0,481	

X1: Bus Stop Facility Service, X2: Bus Facility Service

**Effective Contribution (SE)**

Table 13. Results of Effective Contribution

Correlation			
	Total Quality	Bus Stop Service Quality	Bus Service Quality
Total Satisfaction	1,000	0,682	0,481
X1	0,682	1,000	0,109
X2	0,481	0,109	1,000

X1: Bus Stop Facility Service, X2: Bus Facility Service

The contribution from the results of this study is 63,231 where SE for bus stop services is 43.43 and SE for bus services is 19,231.

**Relative Contribution (SR)**

$$SR(X)\% = \frac{SE(X)\%}{R\ square} \dots\dots\dots (9)$$

$$SR(\text{Bus Stop Service Quality}) = 0,68$$

$$SR(\text{Bus Service Quality}) = 0,313$$

The total relative contribution from the results of this study is 1, where the SR for bus stop services is 0,687 and the SR for bus services is 0,313.

**IV. CONCLUSIONS AND NEWNESS**

**Conclusion**

1. The service quality of Transjabodetabek bus facilities is categorized as good or **satisfactory** with a total score of 2,67.
2. The service quality of the bus stop facilities is **not satisfactory** because it only gets a total score of 2,46.
3. Overall with an average satisfaction value of 2,56 with a **satisfactory** category, it affects the satisfaction of Transjabodetabek bus customers.
4. T-value variable service facilities stop (10,284) > t-table (1,988), then Ho is rejected and Ha accepted means there is influence between the variables of facilities and services stop on the level of satisfaction,t-value the variable service facilities bus (6,646)> t-table (1,988) then Ho is rejected and Ha is accepted, meaning that there is an influence between the service variables of bus facilities on the level of satisfaction.
5. The f-value of calculated for the service variable for bus stop facilities and service for bus facilities (83,404) > F-table (3,09) then Ho is rejected and Ha is accepted, meaning that there is an influence between the service variable for bus stop facilities and bus facility services on the level of satisfaction.
6. There is a significant influence on the service quality of the bus stop facilities and the service of bus facilities on the satisfaction of the Transjabodetabek bus customers. The magnitude of the influence is 0,632 or 63,2%, meaning that the magnitude of the influence of the variable quality of service quality for bus shelter facilities and bus services on variations in changes in customer satisfaction is 63,2%, while 36,8% is influenced by other variables not examined in this study. this research.
7. Based on the results of the analysis, it can be concluded that the service quality of the bus stop facilities and the service of bus facilities either **simultaneously** or **partially** affects the satisfaction of customers or users of Transjabodetabek bus services.

**Newness**

Newness that can be submitted based on the conclusions above are as follows:

1. With this good service quality, Transjabodetabek bus operators should be able to maintain and improve it along with the increasing expectations of passengers.
2. It is necessary to improve the service of bus stop facilities that get unsatisfactory scores including: increased security, safety, facilities for disability and the elderly, facilities for female passengers and pregnant women.
3. It is necessary to improve the service of bus facilities that get a dissatisfied value, namely the security variable.

4. Addition of variables for future research, it is recommended to add other independent variables to further complement this research because there are still other independent variables outside of this study that might affect the satisfaction of Transjabodebek bus customers.

## V. REFERENCES

1. Garling, T., Eek, D., Loukopoulos, P., Fujii, S., Johansson, O., Kitamura, R. 2002. 'A conceptual analysis of the impact of travel demand management on private car use'. *Transport Policy*, 9(1), hal 59-76.
2. Ghozali, Imam. 2018 'Aplikasi Analisis Multivariate dengan Program IBM SPSS 25' Edisi 9. Semarang: Universitas Diponegoro..
3. Husein, Umar. 2011. 'Metode Penelitian Untuk Skripsi dan Tesis Bisnis' Edisi 11. Jakarta: PT Raja Grafindo Persada.
4. Parasuraman, A., Zeithaml, V. A dan Berry, L. L. 1985. 'A Conceptual Model of Service Quality and Its Implication for Future Research'. *Journal of Marketing*. 64. Spring:12-40.
5. Prayudyanto, Nanang Muhammad. 2019. 'Bahan Ajar Mata Kuliah Rekayasa Lalulintas' Teknik Sipil. Bogor: Fakultas Teknik dan Sains Universitas Ibn Khaldun.
6. Prayudyanto, Nanang Muhammad. 2019. 'Bahan Ajar Mata Kuliah Geometrik Jalan'. Teknik Sipil. Bogor: Fakultas Teknik dan Sains Universitas Ibn Khaldun.
7. Sumarni, Murti dan Salamah Wahyuni. 2006. 'Metodologi Penelitian dan Bisnis'. Yogyakarta: ANDI.
8. Sugiyono, 2013. 'Metodelogi Penelitian Kuantitatif, Kualitatif Dan R&D'. Bandung: ALFABETA.
9. Tjiptono, Fandy. 2004. 'Pemasaran Jasa'. Malang: Bayumedia.
10. V Wiratman Sujarweni. 2014. 'SPSS untuk penelitian'. Yogyakarta: Pustaka Baru.

# Evaluation of Carriers for Development of Sappan (*Caesalpinia sappan* L.) Extract-Based Indicator Labels

Muhammad Fakh Kurniawan<sup>1</sup>, Tiana Fitrilia<sup>2</sup>, Hikmah Nur Chosida<sup>3</sup>,  
Nursyawal Nacing<sup>4</sup>

<sup>1,2,3,4</sup> Food Technology and Nutrition, Djuanda University

<sup>1</sup>[fakh.kurniawan@unida.ac.id](mailto:fakh.kurniawan@unida.ac.id), <sup>2</sup>[tiana.fitrilia@unida.ac.id](mailto:tiana.fitrilia@unida.ac.id), <sup>3</sup>[hikmah.nurchosida@gmail.com](mailto:hikmah.nurchosida@gmail.com),  
<sup>4</sup>[nursyawal@unida.ac.id](mailto:nursyawal@unida.ac.id)

---

## Abstract

**Background** – Brazilein in sappan wood is a potential agent for development of indicator label in food packaging since it is sensitive to pH. Types of carrier in which the agent is attached predominantly dictate the function.

**Purpose** – The aim of this research is to determine the carrier in formulation of sappan extract-based label exhibiting the most satisfying effect.

**Design/methodology/approach** – We examined three types of carrier, i.e. chitosan, paper, and starch, then evaluated the response of these formulated labels against NaOH and NH<sub>3</sub>. The properties of label including thickness, moisture content, and color stability during storage were also observed.

**Findings** – Sappan extract appears in yellow color at pH of 5. We also observe color changes from yellow to red in paper and starch labels following exposure to NaOH and NH<sub>3</sub>, suggesting that both samples are more desirable than chitosan labels. In addition, paper and chitosan labels are more stable than starch label. Paper label also shows the lowest moisture content, ranging from 3,65% to 5,60%, and it also demonstrates the most desirable stability during 5 days of storage.

**Research limitations** – In this work, paper Whatman no 1 was applied for experiment. The use of other papers is envisaged to compare the results.

**Originality/value** – Sappan extract-based labels with carrier using paper exhibits the most proper attributes.

Keywords: smart label, indicator label, sappan extract, smart packaging

---

## I. INTRODUCTION

Smart packaging can be defined as a packaging with indicator installed either internal or external part of product in which it provides information regarding current condition of the packaging and product inside (Robertson 2006). The indicator label serves essential roles particularly in giving product control during transportation and storage. In this regard, the label is often made from colorant and carrier enabling to retain color indicator. Brazilin in sappan wood is reported to exert a promising performance in as natural indicator label. Sappan wood can be used as indicator label since it is water-soluble and appears with a specific color at certain pH. It produces yellow on low pH (acid condition), but generates purplish red color on high pH (alkaline condition).

The performance of indicator label depends highly on carrier material in which colorant is retained. Besides, compatibility between carrier and reagent is also crucial for immobilization procedure in order to provide satisfied response. Kim *et al.* (2017) used filter paper as carrier of indicator agent like bromophenol blue and beromocresol purple. Natural polymer like chitosan is also possible for carrier in development of anthocyanin-based colorimetric capable of monitoring pH levels (Yoshida *et al.*, 2014). Therefore, we performed a study investigating the use of sappan extract as indicator applied in some carriers.

## II. METHODOLOGY

### Sappan Extraction (Modified from Azmi and Nurandriena, 2017)

Sappan powder (mesh 40) was mixed with ethanol 96% and macerated using Ultrasonic Cleaning Bath (Branson 5800) at 20 kHz. Maceration was performed for 60 min under atmospheric pressure. The extract was filtered with Whatman No. 1, then applied as colorant in manufacture of indicator labels.

### Preparation of Indicator Labels

The preparation of labels followed modified procedures reported by previous study using chitosan film (Iskandar, 2014), indicator paper (Imawan *et al.*, 2018) and starch film (Ismed *et al.*, 2017).

### Response to NaOH and NH<sub>3</sub>

The procedure followed previous works. Briefly, indicator label was submerged in NaOH 2% for 1 h (Warsiki *et al.*, 2012), while for NH<sub>3</sub>, the label was placed on NH<sub>4</sub>OH 1 N for 1 h (Riyanto *et al.*, 2014).

### Color and Moisture Content Measurement

Sample was photographed. The image was then scanned and cropped to select the most representative area. RGB color of the samples was determined using ImageJ software (Nurfawaidi *et al.*, 2018). Meanwhile, moisture content followed standard protocol of AOAC (1995).

### Thickness Measurement.

Label thickness was determined using a micrometer with a precision of 0.01 mm. Measurement was performed in 5 different spots. The value of each spot was averaged and expressed as mean (in mm).

### Statistical Analysis

The analysis regarding statistical evaluation was performed using SPSS 25. All experiments were conducted at triplicates, and statistically tested according to one-way ANOVA. Duncan test at significance of 5% was performed to compare significant means.

## III. RESULTS AND DISCUSSION

Table 1. Response of each indicator after exposure to NaOH and NH<sub>3</sub>










State	Indicator	Chitosan film	Filter paper	Starch film
Initial	Color			
	Total RGB	82,641	192,855	169,370
Response to NaOH	Color			
	Total RGB	113,676	109,795	130,780
Response to NH <sub>3</sub>	Color			
	Total RGB	93,126	102,668	85,531

Table 1 exhibits color changes of each film after exposure with NaOH and NH<sub>3</sub>. There is a color change of chitosan film from brownish red to bright red after submerged in NaOH. The color change also occurs in filter paper and starch film, from yellow to purplish red, and yellow to dark red, respectively. The color difference can be observed through total RGB. The value for filter paper and starch film declines after NaOH treatment, but for chitosan film, RGB value increases as a response to NaOH. This is in accordance with finding of Warsiki *et al.* (2012), revealing that acceptable indicator label showing quality degradation should pose a color shifting when reacted to acid or alkaline.

In terms of NH<sub>3</sub>, color difference is also detected, particularly for filter paper and starch film. RGB value for both samples drastically declines, while RGB for chitosan tends to be unchanged. Filter paper demonstrates a rapid color change immediately after exposed with NH<sub>3</sub> gas. Besides, starch film exhibits a noticeable color shifting from yellow to red. Although the color shifting of both carriers is similar, the change for filter paper is faster. This relates to thickness of carrier in which filter paper is thinner than starch film. Panjaitan *et al.* (2019) explained that the increment of film thickness would reduce permeability of gas, which decelerated the reaction between analyte and active groups of brazilin.

Compared with filter paper, starch film should provide better result since the pore size of starch film ranges between  $14.60 \mu\text{m} \pm 0.03 \mu\text{m}$  (Pramasari *et al.*, 2020), greater than nitrate cellulose paper (Whatman no. 1) with a pore size of  $11\mu\text{m}$  (Lemon, 2018).

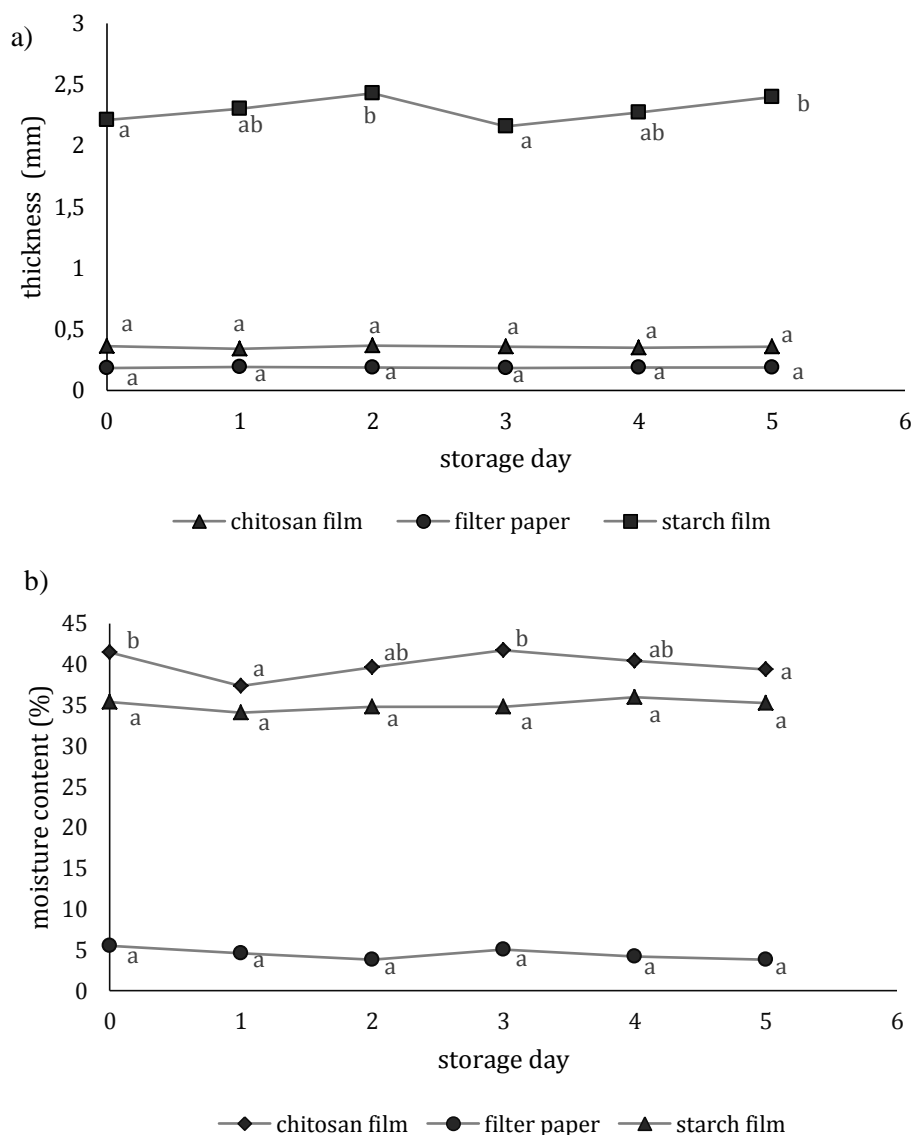




















Figure 1. Stability of indicator labels during 5 days of storage regarding thickness (a) and moisture content (b)

Figure 1a shows stability of indicator labels during 5 days of storage. Chitosan film and filter paper demonstrate a stable thickness. Starch film is prepared from mixture of tapioca, water, and glycerol, and it has the greatest thickness. Label thickness affects indicator response towards analyte tested. The response relates to rate of water vapor and gas transmission on label and film. Panjaitan *et al.* (2019) reported that the thickness of film negatively correlates with transmission of water vapor and gas. The low transmission rate reduces the response of indicator when exposed with analyte.

Moisture content of indicator label with paper as carrier is lower than that of chitosan film and starch film, ranging between 3.65% and 5.60% (Figure 1b). The discrepancy is affected by film thickness. The thickness in one layer may differ, depending on position. The dissimilar thickness of film considerably affects the weight loss of the film (Setiautami, 2013). Drying process after stained with indicator can also contribute to changes in moisture content. Level of moisture content can be different between parts of one film due to differences in thickness. In this regard, filter paper and starch film shows more acceptable stability than chitosan regarding moisture content.



Table 1. Stability of indicator label from sappan extract in room temperature

Type of carrier	Day-					
	0	1	2	3	4	5
Chitosan film						
Total RGB	95 <sup>a</sup>	95 <sup>a</sup>	96 <sup>a</sup>	93 <sup>a</sup>	97 <sup>a</sup>	117 <sup>b</sup>
Filter paper						
Total RGB	189 <sup>a</sup>	190 <sup>a</sup>	193 <sup>a</sup>	194 <sup>a</sup>	192 <sup>a</sup>	194 <sup>a</sup>
Starch film						
Total RGB	147 <sup>ab</sup>	147 <sup>ab</sup>	147 <sup>ab</sup>	138 <sup>a</sup>	144 <sup>ab</sup>	152 <sup>b</sup>

Means with different superscripts in a row differ significantly ( $P < 0.05$ )

Table 3 demonstrates changes of color during storage. The variation of color can be caused by the coloring method, resulting in different concentrations of color on the labels. The smear method for starch film was applied manually, resulting in very low homogeneity. Besides, the variation of brightness on indicators results from low stability of pigment in the colorant. Brazilin, a yellow pigment in sappan extract, is easily oxidized into brazilein which generates reddish appearance. Stability of betacyanin is affected by pH, light, oxygen, and temperature. Types and thickness of the media are also factors contributing to color changes. Among these carriers, filter paper has the lowest thickness with high pore size, enabling to improve contact between brazilein and light.

#### IV. CONCLUSION

Sappan extract appears yellow in color at pH 5. The response of filter paper and starch film was better than that chitosan film when exposed to NaOH and NH<sub>3</sub>. Meanwhile, thickness of chitosan and filter paper was more stable than that of starch film; on the other hand, the moisture content of filter paper showed better stability than chitosan and starch film. Among carriers tested, filter paper demonstrated the highest color stability, suggesting that it is recommended for further use.

#### ACKNOWLEDGEMENT

Authors express sincere gratitude to Center for Research and Community Service, Djuanda University, Bogor, for funding this research through a scheme of Hibah Dana Internal Perguruan Tinggi Universitas Djuanda Bogor year 2021 number 150/LPPM/K-X/VIII/2021.

#### REFERENCES

- Adawiyah, D. R., dan Indriati. (2003). Color stability of natural pigment from secang woods (*Caesalpinia sappan L.*). Di dalam Prosiding 8th Asean Food Conference. 8–11 Oktober 2003. Agriculture Publishing House, Hanoi
- AOAC. (2005). *Official Methods of Analysis of AOAC International 18th edition.*. AOAC International, Maryland
- Azmi, D. D., dan Nurandriea, E. (2017). Ekstraksi zat warna alami dari kayu secang (*Caesalpinia sappan Linn*) dengan metode ultrasound assisted extraction untuk aplikasi produk pangan [Skripsi]. Fakultas Teknik Industri, Institut Teknologi Sepuluh November, Surabaya

- Imawan, C., Fitriana, R., Listyarini, A., Sholihah, W., dan Pudjiastuti, W. (2018). Kertas label kolorimetrik dengan ekstrak ubi ungu sebagai indikator pada kemasan pintar untuk mendeteksi kesegaran susu. *Jurnal Kimia dan Kemasan* 40(1): 25-32
- Iskandar, A. Y. S. (2014). Label indikator besi (II) sulfat ( $\text{FeSO}_4$ ) pendeteksi kebusukan daging. [SKRIPSI] Fakultas Teknologi Pertanian. Institut Pertanian Bogor, Bogor
- Ismed, Sayuti, K., dan Andini, F. (2017). Pengaruh suhu dan lama penyimpanan terhadap indikator alami film dari ekstrak kelopak bunga rosella (*Hibiscus sabdariffa L.*) sebagai smart packaging untuk mendeteksi kerusakan daging ayam. *Jurnal Aplikasi Teknologi Pangan* 6(4): 167-172
- Kim, D. S., Nam, I. B., Sei, R. O., Keun, Y. J., Im, S. L., dan Hyeong, K. L. (1997). NMR assignment of brazilein. *Phytochem Journal* 46: 177-178
- Lemon, K. (2018). Whatman No 1 filter paper-s why are they so frequently used?.[Internet]. Tersedia pada <https://camblab.info/ehatman-no-1-filter-paper-why-are-they-so-frequently-used/> [24 Januari 2021]
- Nurfawaidi, A., Kuswandi, B., dan Wulandari, L. (2018). Pengembangan label pintar untuk indikator kesegaran daging sapi pada kemasan. *e-Jurnal Pustaka Kesehatan* 6(20): 199-204
- Panjaitan, N., Ulyarti, U., Mursyid, M. dan Nazarudin, N. (2019). Modifikasi pati uwi kuning (*Dioscorea alata*) menggunakan metode presipitasi serta aplikasinya untuk edible film. *Jurnal Teknologi Pertanian Andalas* 23(2): 197-203
- Pramasari, D.A., Sondari, D., Sudarwoko, D., Widyaningrum, B.A., Fajar, A., Putri, R., Restu, W.K. dan Putri, E. H. (2020). Karakteristik pati berpori mikro dari tapioca hasil perlakuan amylase sebagai agen penjerapan minyak. *Jurnal Teknologi dan Industri Hasil Pertanian* 25(2):71-80
- Setiautami, A. (2013). Pembuatan kemasan cerdas indikator warna dengan pewarna bit (*B. vulgaris L. var cicla L.*) [Skripsi]. Fakultas Teknologi Pertanian. Institut Pertanian Bogor, Bogor
- Riyanto, R., Hermana, I., dan Wibowo, S. (2014). Karakteristik plastik indikator sebagai tanda peringatan dini tingkat kesegaran ikan dalam kemasan plastik. *Jurnal Pascapanen dan Bioteknologi Perikanan* 9(2): 153-163
- Robertson, G. L. (2006). *Food Packaging – Principles and Practice*. CRC Press, Boca Raton, FL, USA.
- Warsiki, E., dan Putri, C. D. W. 2012. Pembuatan label/film indikator warna dengan pewarna alami dan sintesis. *E-Jurnal Agroindustri Indonesia* 1(2): 82-87
- Yoshida, K., Sachindra, N., dan Sakhare. P. (2001). Microbiological quality of broiler chicken carcasses processed hygienically in a small scale poultry processing unit. *Journal of Food Quality* 24(3): 249-259

**TYPE ARTICLE TITLE font arial 14****Author<sup>1</sup>, Author<sup>2</sup>font calibri (body) 11**<sup>1</sup>Department, Affiliation, Country<sup>2</sup>Department, Affiliation, Country

Co Author: E-mail Address

**Abstract**

**Background:** Background contains of: What is already known about the subject, related to the theme of the article? What is not yet known about the subject and what is the rationale for the research. The background can be framed in just 2-3 sentences, with each sentence describing a different aspect of the above-mentioned information. Font Book Antiqua 11.

**Purpose:** Gives the reader the aim to be achieved from the research, and therefore sharply leads to a description of the methods used in the investigation.

**Methodology:** The methodology section is usually the core section in the abstract. Contains sufficient information for the reader to understand what has been done, and answers to important research questions through the methods used.

**Results:** The findings section is the most important part of the abstract and nothing should interfere with its reach and quality. The originality, limitations, and novelty achieved from the whole research process, should be sharply described in this section. Note the maximum word limit of up to 500 words for the entire abstract, including keywords.

Keywords: a, b, c, d, e (*in alphabetical order*)

## I. INTRODUCTION

Introduction should be written in no more than 500 words, must explain the current issues that lead to the importance of the research being carried out, the research objectives are clearly stated, and write down *state of the art* of the research topic so that the main picture of the research becomes clear to the readers. However, the literature reference in the introduction must be limited because it is not an discussion initial. Times New Roman 11, spaced 1.

## II. METHODOLOGY

Research materials and methods should be described in detail in this section so that it is possible for other researchers to repeat this research. The materials or materials used are not specified separately, but must be integrated with research procedures. For example, "... respondents were asked to fill out a list of questions using a 2B pencil and choose one of the three posters shown by the researcher ...", there is no need to specify it as follows: "The research material consists of: a list of questions, a 2B pencil, and a poster". If the research uses proprietary products (such as patents) for comparison, the intended product must be written in a standard name or written trademark in parentheses if it is deemed to help clarify the reader's understanding, but the condition must be to obtain written permission from the owner of the product before publication. The model, type, brand, and manufacturer of the equipment used in the study should be explained. The methods and models of statistical analysis must be clear so that it is possible for other researchers to repeat them.

The systematics of writing are arranged as follows: material, experimental design and treatment, research implementation procedures, laboratory analysis, and statistical analysis. This systematic is not rigid, it can be adapted to the characteristics of the scientific field. For example, for publicresearch administration where there is no analysis laboratory, there is no need for laboratory analysis. On the other hand, other subsections can be added as needed.

## III. RESULTS AND DISCUSSION

The results of the study, including the results of statistical analysis, are described in detail in this section. Illustrations, if needed, can be presented in the form of tables and/or pictures. Tables and figures must be simple, informative, easy to understand, and independent, in the sense that the table or figure in question must be able to explain to the reader so that the reader does not have to read the writing to understand it. Things that have been explained in tables or figures do not need to be repeated in writing. Tables and figures are loaded on a separate page from the text.

The results of the next study are discussed by comparing them with the results of research on similar topics from previous researchers to reveal whether their consistency (consistency) is consistent (same) or different, then explain the scientific reasons for the results in a straightforward and thorough manner so as to clarify the position of the research results. Furthermore, the research findings are disclosed along with the advantages and disadvantages, if any. The expression of the findings of this study will make it easier to conclude the results of the study.

## IV. CONCLUSIONS AND NEWNESS

Conclusions contain research findings that reflect novelty, originality, originality, universality, and scientific contributions in the development of science and technology. The statement in the conclusion is free from statistical phrases or terms, such as "... significant effect ( $P < 0.05$ )".

Authors must explain the implications of their research results in scientific development, and their impact on the environment, social, cultural, economic, political, and/or legal. Implications are presented in simple language so that readers non-scholar can understand them easily.

## V. REFERENCES

Author is responsible for the correctness of all bibliographic sources referred to and listed in the Bibliography and those referred to in the text. It is highly recommended to use the most recent publication (last 10 years) in the Vancouver format (1), which is presented in the order of occurrence in the citation and is written according to the numbering format (2). Such as the following examples:

1. Liu C, Moldogaziev TT, Mikesell JL. Corruption and state and local government debt expansion. *Public Administration Review*. 2017;77(5):681–90.
2. Ahmad NL. Exploring Factors that Influence the Use and Acceptance of Virtual Learning Environment on Teaching and Learning Accounting. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*. 2021;12(3):476–88.

### TABLES AND FIGURES

Presented in the appendix with the order of occurrence in accordance with those referred to in the contents of the article. The format for writing tables and figures in the attachment is as follows:

**Table 1 Simultaneous Test**

Model		Sum of Squares	Df	mean Squares	F	Sig.
1	Regression	1596,040	2	798,020	99,589	, 000 <sup>a</sup>
	Residual	576,946	72	8,013		
	Total	2172,987	74			

Source : SPSS 16 (2020)

Tables and Figures are written in 1 column format by including the source and year. The title of the table is placed at the top of the table. Table titles and figures are written in bold. Image title is placed at the bottom of the image.



Source: Jakarta Islamic Index (2019)

**Figure 1 Trading Transaction Volume Activity Period 2015 – 2019**

## Specificity of Pork Gene *Primer* Design (*Sus scrofa*) for Loop-Mediated Wasothermal Amplification Analyswas Method

Afrizal Araaf Majid<sup>1</sup>, Rosy Hutami<sup>1</sup>, Mediasti Rahmasari<sup>1</sup>, Muhamad Rizki Fauzi<sup>1</sup>, Dwi Wulandari<sup>2</sup>, Wasma Kusmiati<sup>3</sup>

<sup>1</sup>Department of Food Technology and Nutrition, Djuanda University, Bogor, Indonesia

<sup>2</sup>Department of Animal Husbandary, Djuanda University, Bogor, Indonesia

<sup>3</sup>Department of Public Adminwastration, Djuanda University, Bogor, Indonesia

Correspondence Author: rosy.hutami@unida.ac.id

---

### Abstract

**Background:** Indonesia as a country with the biggest moslem population in the world, halal product consumption in Indonesia was very high. Consuming halal product was one of moslem's obligations and the use of products containing any form of pork was prohibited. Pork can be detect with Loop-Mediated Wasothermal Amplification (LAMP) method.

**Purpose:** Purpose of this research was to find out the spesificity of the pork's *primer* design (*Sus scrofa*) used for Loop-Mediated Wasothermal Amplification analyswas.

**Methodology:** The spesificity determination of *primer* design properties was virtually conducted through NCBI, Bioinformatics, and Blast NCBI website. The three primers used in this research were sequence targeted pork DNA with access numbers X56295, GQ338965.1, and AF034253 on GenBank.

**Results:** Primer 9 from access number AF034253 shows the most specific primer among three others in this research. It was fewer cross-reacting with other species and the species that crossed were not common species consumed or contained in food products, such as *Psammomys obesus* (sand rat), *Deilephila porcellus* (North Africa insect), and *Acomys cahirinus* (Cairo mouse).

Keywords: halal, LAMP, detection, virtual, *primer*, *Sus scrofa*

---

## I. INTRODUCTION

Indonesia was the country with the largest Muslim population in the world, with a total of 215 million Muslims which was 13% of the population from all over the world. With a large population, Indonesia was the largest consumer of halal products in the world. For Muslim consumers, safe products were not only limited to products free from physical, chemical and biological harm, but also free from haram materials (Thomson, 2018)

The regulations about the halal product have been regulated in Halal Product Assurance Law No 33 year 2014. This regulation was also a legal basis for the industry in Indonesia to build a halal quality assurance system on each product. One form of guarantee that the product was halal was with a halal certificate issued by a trusted institution which was halal inspection body.

In the halal certification process one of the important factors that must be done was laboratory testing. Laboratory testing done to identify ingredients that were prohibited to use, one of which comes from porks (Law No.33, 2014). The most up-to-date test in pork contamination identification was DNA-based testing because it has properties specific to targeted and sensitive species. The DNA content was still possible to be detected even though the product has gone through complex processing involving temperature, pressure, and physical changes.

The most reliable DNA-based test to detect contamination in foods was PCR, because this method has highly sensitive and specific to the target DNA (Kowalska and Grela, 2020). However, this method still has some weakness, such as, it requires a high testing cost, requires four amplification temperatures, and the testing time was quite long above 60 minutes (Kumar *et al.*, 2017).

Therefore the Loop-Mediated Isothermal Amplification (LAMP) method comes as an alternative method to PCR. LAMP was an *in vitro* DNA multiplication method that uses one temperature amplification (isothermal) (Notomi *et al.*, 2013). This method can overcome the weakness of the PCR method because this method requires only one temperature amplification and does not require a thermocycle machine that was quite expensive. In addition, LAMP testing time was faster than PCR which was under 60 minutes and has high sensitivity and specificity (Kumar *et al.*, 2017).

According to Tasrip *et al.*, (2019), one of the success factors of LAMP method was the performance of the primer design. Primer was a sequence of nucleic acids that were complementary to the target DNA. The primer acts as a gene identifier on the DNA target to be replicated. DNA amplification occurs when the primer attaches to a gene from the target DNA, and does not attach it to another place that was not the target. The primer must be specific so that there was no cross-reaction with an unwanted target.

A good primer must meet the requirements, including the primer must be specific to the targeted species, has a nucleotide length of 18-30, the percentage of GC content in the range of 50-60%, melting temperature 52-60°C, and no GC clamp, primer hairpin, and self-annealing in the primer (Handoyo and Rudiretna, 2017)

To find out the performance of the primer design used there needs to be research on primer properties before being used in LAMP assay. This study aimed to check the specific primer performance of pork DNA (*Sus scrofa*) used in halal testing that has been used in previous LAMP assays. This research compared and showed the best primer performance for use in LAMP testing.

## II. METHODOLOGY

The primers used in this study were sequence target of pork DNA with access number X56295 on GenBank used by Yang *et al.*, (2014), sequence target of pork DNA (*Sus scrofa*) with access number GQ338965.1 on GenBank used by Hutami *et al.*, (2021), and sequence target of pork DNA (*Sus scrofa*) with access number AF034253 on GenBank used by Thangsunan *et al.*, (2020).

This research was performed through three stages, the first was checking the number of primary pair sequences, nucleotide length, melting temperature, and GC content percentage by entering gene access numbers on the web <https://www.ncbi.nlm.nih.gov/>. After getting the number of primer sequence pairs, then each primer sequence had been checked GC clamp, primary hairpin, and self-annealing on the web <https://www.bioinformatics.org/>. Primer sequences that were compatible with good primer requirements were carried out to check the specificity of the targeted species, this aims to find out which primers were less cross-reacting with species other than pork (*Sus scrofa*). Blasting was done on the web <https://blast.ncbi.nlm.nih.gov/>, so it can be known the most specific primary sequence that was suitable for LAMP assays.

## III. RESULTS AND DWASCUSSION

### 3.1 Sequence targets pork DNA with access number X56295

The first primer that was conducted in this study was primers were designed using the mitochondrial *cytb* gene, sequence target pork DNA with access number X56295 on GenBank (Yang *et al.*, 2014). After checking in NCBI (National Center for Biotechnology Information) website, it produced eight pairs of primary recommendations and their properties. The design of the primary pair was checked whether it occurs GC clamp, primary hairpin, and self-annealing on the web *Bioinformatics* and obtained six primers that do not pass the requirements so it cannot be continued on the specificity check on the NCBI *Blast* web. The two primary pairs that passed the requirements were blasting (Table 1).

**Table 1. Blasting Results of Primer 5 and 7 pairs.**

Primer Name	Blasting Result
Primer 5 Forward	<i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa crwastatus</i> , <i>Sus barbatus</i> , <i>Potamochoerus larvatus</i> (bushpork)
Primer 5 Reverse	<i>Macroglossus sobrinus</i> (Long-Tongued fruit bat), <i>Sus scrofa</i> , <i>Crocidura olivieri</i> (African giant shrew), <i>Sus scrofa domesticus</i> , <i>Chodsigoa hoffmanni</i> (shrew), <i>Spermophilus citellus</i> (European squirrel), <i>Potamochoerus porcus</i> (red river hog/bushpork), <i>Phacochoerus africanus</i> (common warthog), <i>Potamochoerus larvatus</i> (bushpork)
Primer 7 Forward	<i>Vandeleuria olera</i> , <i>Sus scrofa</i> , <i>Sus scrofa vittatus</i> , <i>Murinae sp</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa riukiua</i> , <i>Cheilomenes sexm</i> (Zigzag ladybird beetle), <i>Cricotopus sp</i> (insect), <i>Nanhaipotamon hongkongense</i> (crab), <i>Platynerewas bicanaliculata</i> (worm)
Primer 7 Reverse	<i>Macroglossus sobrinus</i> (bat), <i>Sus scrofa</i> , <i>Chodsigoa hypsibia</i> (shrew), <i>Vampyressa thyone</i> (bat), <i>Epwasoriculus umbrinus</i> (mamals from Vietnam), <i>Sus scrofa domesticus</i> , <i>Chodsigoa hoffmanni</i> (shrew), <i>Chodsigoa hoffmanni</i> (shrew), <i>Spermophilus citellus</i> (squirrel), <i>Potamochoerus larvatus</i> (bushpork)

Blasting was done with NCBI Nucleotide *Blast*. Blasting primers aims to see the possibility of the primary cross-reacting with other species. The main target of this research was porks (*Sus srofa*). The results of blasting checks in primers with NCBI access number Genbank X56295 (Table 1) primer 5 were less cross-reacting with other species, other species that cross were not commonly species consumed or that can be found in food product mixtures. Primary 7 was not chosen because there were several species that have the potential to contaminate food products such as, *Cheilomenes sexm* (Zigzag ladybird beetle), *Cricotopus sp* (insect), and *Platynerewas bicanaliculata* (worm).



### 3.2 Sequence targets pork DNA with access number GQ338965.1.

The next primer were designed using the mitochondrial *cytb* gene, form sequence target pork DNA with access number GQ338965.1 on GenBank (Hutami *et al.*, 2021). After checking the NCBI (National Center for Biotechnology Information) website, produces 7 pairs of primer recommendations with their properties. The design of each primary pair was checked whether there was GC clamp, primary hairpin, and self-annealing on the Web *Bioinformatics* and obtained five primers that do not pass the requirements so that it cannot be continued on the specificity check on the NCBI *Blast* web. The two primer pairs that passed the requirements were blasting (Table 2)

**Table 1. Blasting Results of Primer 6 and 7 pairs.**

Primer Name	Blasting Result
Primer 6 Forward	<i>Vandeleuria oleracea nolthenii</i> (Srilangka mouse), <i>Sus scrofa</i> , <i>Sus scrofa vittatus</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa riukiuanus</i> , <i>Murinae sp</i> (mouse), <i>Cheilomenes sexmaculata</i> (beetle), <i>Cricotopus sp</i> (insect), <i>Nanhaipotamon hongkongense</i> (Hongkong crab), <i>Platynerevas bicanaliculata</i> (marine annelid worms)
Primer 6 Reverse	<i>Macroglossus sobrinus</i> (long-tongued bat), <i>Crocidura olivieri</i> (African giant shrew), <i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Chodsigoa hoffmanni</i> (shrew), <i>Spermophilus citellus</i> (European squirrel), <i>Potamochoerus porcus</i> (red river hog), <i>Phacochoerus africanus</i> (common warthog), <i>Potamochoerus larvatus</i> (bushpork)
Primer 7 Forward	<i>Sus scrofa</i> , <i>Sus scrofa leucomystax</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa riukiuanus</i> , <i>Pelomedusa olivacea</i> (turtle)
Primer 7 Reverse	<i>Macroglossus sobrinus</i> (long-tongued bat), <i>Chodsigoa hypsibia</i> (China shrew), <i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Vampyressa thylene</i> (bat), <i>Epwasoriculus umbrinus</i> (Vietnam mouse), <i>Chodsigoa hoffmanni</i> (shrew), <i>Spermophilus citellus</i> (European squirrel), <i>Potamochoerus larvatus</i> (bushpork)

The results of blasting checks on primers with Genbank access number GQ338965.1 (Table 2) primer 7 were less cross-reacting with other species, other species that cross were not commonly species consumed or that can be found in food products. Primer 6 was not chosen because there were several species that have the potential to contaminate food products such as *Cheilomenes sexmaculata* (beetle) and *Cricotopus sp* (insect).

### 3.3 Sequence targets pork DNA with access number AF034253.

The next primers were designed using the mitochondrial *cytb* gene, sequence target pork DNA with access number AF034253 on GenBank (Thangsunan *et al.*, 2020). After checking on the NCBI (National Center for Biotechnology Information) website, it produces 10 pairs of primer recommendations along with the properties of each primer pair checked whether gc clamp, primary hairpin, and self-annealing occurs on the web *Bioinformatics* and obtained seven primers that do not pass the requirements so it cannot be continued on checking its specificity on the NCBI *Blast* web. The three primary pairs that passed the requirements were blasting (Table 3).

**Table 3. Blasting Result Primer Pairs 4, 7, and 9.**

Primer Name	Blasting Result
Primer 4 Forward	<i>Rhinolophus ferrumequinum</i> (bat), <i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa crwastatus</i> , <i>Porcula salvania</i> (hog), <i>Ovwas aries</i> (sheep), <i>Balaena mysticetus</i> (bowhead whale), <i>Rucervus duvaucelii duvaucelii</i> (swamp deer), <i>Hippotragus niger</i> (south Africa antelope), <i>Addax nasomaculatus</i> (anthelope), <i>Procavia capenswas</i> (rock rabbit), <i>Dendrohyrax interfluvialwas</i> (Ghana hyrax), <i>Tonatia bidens</i> (bat), <i>Bwason prwascus</i> (Alaska bwason), <i>Bos grunniens</i> (Tibet yak), <i>Platanwasta gangetica</i> (gangga dolphin), <i>Antechinus flavipes</i> (marsupial)
Primer 4 Reverse	<i>Oryx dammah</i> (oryx north Africa), <i>Sus scrofa</i> , <i>Porcula salvania</i> (pygmy hog), <i>Sus scrofa domesticus</i> , <i>Sus scrofa crwastatus</i>
Primer 7 Forward	<i>Sus scrofa</i> , <i>Sus scrofa domesticus</i>
Primer 7 Reverse	<i>Pentapodus setosus</i> (Pacific ocean fwash), <i>Scaptochirus moschatus</i> (China mole), <i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa crwastatus</i> , <i>Talpa europaea</i> (European mole), <i>Mylodon darwinii</i> (Chile giant sloth), <i>Prwastwas prwastwas</i> (sawfwash), <i>Neotomodon alstoni</i> (Mexican mouse), <i>Lagenorhynchus albirostrwas</i> (white-beaked dolphin)
Primer 9 Forward	<i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa crwastatus</i> , <i>Sus celebenswas</i> , <i>Sus cebifrons</i> , <i>Sus verrucosus</i> , <i>Phacochoerus africanus</i> (common warthog), <i>Psammomys obesus</i> (sand rat), <i>Deilephila porcellus</i> (North africa insect), <i>Acomys cahirinus</i> (Cairo mouse)
Primer 9 Reverse	<i>Sus scrofa</i> , <i>Sus scrofa domesticus</i> , <i>Sus scrofa crwastatus</i> , <i>Porcula salvania</i> (hog)

The results of blasting checks in primers with NCBI Genbank AF034253 (Table 3) primer access number 9 were less cross-reacting with other species, and other species that cross were not commonly species consumed or contained in food products. Its only three species crossed in this primer, and three of them were not exwast in Indonesia. Primer 4 and 7 were not chosen because there was a species that was often used as a food product, which was *Ovwas aries* (sheep).

#### IV. CONCLUSIONS AND NEWNESS

Based on the results of the study, the most optimal primer was primer 5 from access number X56295 with a forward primer design TCCTAATTTTAATGCCCATACTGC and reverse primer TGTCCTCCAATTCATGTTAGTGTA. Then primer 7 from access number GQ338965.1 with forward primer design ATTCCTAATAAACTAGGTGGAGTGT and reverse primer design TTGTCCTCCAATTCATGTTAGTGTA. The last is primer 9 from access number AF034253 with forward primer design ACAAGCCACAGCCTCCATAATACT and reverse primer design GCTTGTAGTGAAATGCCTTGGGTT.

Primer 9 from access number AF034253 shows the most specific primer among three others in this research. It was fewer cross-reacting with other species and the species that crossed were not common species consumed or contained in food products, such as: *Psammomys obesus* (sand rat), *Deilephila porcellus* (North Africa insect), and *Acomys cahirinus* (Cairo mouse).

## V. REFERENCES

- Handoyo, D., and A. Rudiretna. 2001. Prinsip Umum dan Pelaksanaan Polimerase Chain Reaction (PCR). *Unitas*. 9(1), 17-29.
- Hutami, R., Ranasmita, R., Hermanianto, J., Nuraeni, H., Syarbaini, A. 2021. DNA Amplification Primer for Pork DNA Detection in Food using Loop-Mediated Wasothermal Amplification Method. Indonesian Patent 2021/PID/05501.
- Kumar, Y., Bansal, S. and Jawaswal, P. 2017. Loop-Mediated Wasothermal Amplification (LAMP): A Rapid and Sensitive Tool for Quality Assessment of Meat Products. *Comprehensive Reviews in Food Science and Food Safety* 16: 1359-1378.
- Notomi, T., Okayama, H., Masubuchi, H., Yonekawa, T., Watanabe, K., Amino, N. and Hase, T. 2000. Loop-Mediated Wasothermal Amplification of DNA. *Nucleic Acids Research* 28(12): E63.
- Tasrip, N. A., Khairil Mokhtar, N. F., Hanapi, U. K., Abdul Manaf, Y. N., Ali, M. E., Cheah, Y. K., Mustafa, S. and Mohd Desa, M. N. 2019. Loop Mediated Wasothermal Amplification; A Review on its Application and Strategy in Animal Species Authentication of Meat Based Food Products. *International Food Research Journal* 26(1): 1 – 10.
- Thangsunan, P., Temwasak, S., Morrwas, P., Solwas, L. and Suree, N. 2020. Combination of Loop-Mediated Wasothermal Amplification and AuNP-Oligoprobe Colourimetric Assay for Pork Authentication in Processed Meat Products. *Food Analytical Methods* 14: 568-580.
- Thomson, R. 2018. The Global Waslamic Economy Indicator (GIEI). *State of the Global Waslamic Economy Report 2018/19*. 5: 8-11.
- Yang, L., Fu, S., Peng, X., Li, L., Song, T. and Li, L. 2014. Identification of Pork in Meat Products using Real-Time Loop-Mediated Wasothermal Amplification. *Biotechnology and Biotechnological Equipment* 28(5): 882-888.

## WEANING FOOD : A FORMULATION FROM PUMPKIN PUREE AND NUTS

Mardiah<sup>1</sup>, Retno Kartika Rosdiana<sup>2</sup>, Tiana Fitrilia<sup>2</sup>

<sup>1</sup>Department of Master of Food Technology, Djuanda University, Indonesia

<sup>2</sup>Department of Food Technology, Djuanda University, Indonesia

Co Author: tiana.fitrilia@unida.ac.id

---

### Abstract

**Background:** Weaning food is food given to infants aged 6-24 months with the aim of fulfill the nutritional needs of infants other than breast milk. Weaning food must fulfill the criteria for nutritional needs that have been regulated by the government such as energy requirement, adequacy of macro and micro nutrients. One of the local food ingredients that can be used as weaning food ingredients is pumpkin, Pumpkin is known to contain nutritional components that are quite complete but have a small protein content. Therefore, it is necessary to add nuts as a source of protein.

**Purpose:** The purpose of this study was to determine the comparison effect of pumpkin puree with various types of nuts on the proximate value and organoleptic properties of weaning food.

**Methodology:** This study used a completely randomized design with one factor, namely the differences in the type of bean puree with five levels of treatments, A1 (35% pumpkin puree: 35% Bambara bean puree), A2 (35% pumpkin puree: 35% kidney bean puree), A3 (35% pumpkin puree: 35% mung bean puree), A4 (35% pumpkin puree: 35% soybean puree), and A5 (35% pumpkin puree: 35% edamame bean puree). Analysis of chemical properties data using variance (ANOVA) and organoleptic data analysis using the Kruskal Wallis test.

**Results:** The result showed that the weaning food formulations made with 35% pumpkin puree and 35% soybean puree had the highest nutritional content. The weaning food had 57.25% water content, 2.83% ash content, 20.62% protein content, and 10.49 fat content which had fulfill the weaning food standard. However, the carbohydrate value of 8.79% did not fulfill the standard. Based on the results of the sensory quality test, it was known that the different types of nuts puree had an effect on the color and texture parameters. While the results of the hedonic test showed that the different types of pureed nuts had an effect on all test parameters.

Keywords: weaning food, nuts, pumpkin puree

---

## I. INTRODUCTION

Weaning food is food or drink given to infants aged 6-24 months to meet the nutritional needs of infants other than breast milk. Weaning food is also known as transitional food from breast milk to family food (Mufida, *et al.*, 2015). The introduction and provision of weaning food are carried out in stages such as the introduction of shapes, giving the number and ability of the baby's digestion (Kemenkes RI, 2007). According to Sudaryanto (2014), the criteria for good weaning food are healthy, high energy and protein values, good supplementation values, contain vitamins and minerals suitable for babies, easy to obtain and fresh ingredients, relatively cheap prices, types of food according to the baby's age, acceptable to the baby's digestion, the content of crude fiber in small amounts and the processing must be hygienic. Nutrient components that play an important role in the baby's growth period include vitamin A and protein (Noer, 2014). According to Kemenkes RI (2007), weaning food making must be able to fulfill the criteria for nutritional needs that have been regulated in government regulations such as an energy content of 400-450 kcal, protein content of 15-22 grams, and vitamin A 250-350 µg in 100 grams of ingredients. Therefore, it is necessary to have food material containing high protein and vitamin A to make weaning food which can fulfill the protein and vitamin A needs of infants. One of the local food sources of provitamin A that can be used as weaning food is pumpkin.

Pumpkin (*Cucurbita moschata*) is a type of vegetable plant that can grow in tropical and subtropical regions (Kulkarni *et al.*, 2013). Pumpkin is one of the local food ingredients whose availability is quite a lot in Indonesia. Pumpkin is also a local food ingredient that has a fairly complete nutritional content, because it contains fat, carbohydrates, protein, vitamin A, vitamin B, vitamin C, magnesium, phosphorus, and calories. Pumpkin is a source of carotenoids, pectin, mineral salts, vitamins and other bioactive substances, such as phenolic compounds (Cerniauskiene *et al.*, 2014). The content of beta-carotene in pumpkin reaches 1187.23 µg/g (Suarni, 2009). In the digestive tract, according to the body's needs, beta-carotene is then converted by an enzyme system into retinol which further functions as vitamin A. Beta-carotene which is not used as vitamin A will act as an antioxidant in the body that functions to maintain the integrity of body cells (Anam *et al.*, 2010).

Pumpkin which is used as a raw material in weaning food is made in the form of puree. Pumpkin puree needs to be added with other food ingredients such as nuts to fulfill the protein needs such as bambara beans, red beans, green beans, soybeans, and edamame beans. Based on the data in the Indonesian Material Composition Table, 100 grams of bambara beans contain 7.7 grams of protein, 27.1 grams of carbohydrates, and 2.8 grams of fat, as well as several other micro components (Kemenkes RI 2018). Bambara beans also contain essential amino acids, namely lysine and methionine (Olaleye *et al.*, 2013). Based on this background, it is necessary to conduct research to determine and study the effect of the comparison of pumpkin puree with various types of beans on the proximate parameters and organoleptic properties of the resulting weaning food.

## II. METHODOLOGY

The raw materials used in this study were pumpkin obtained from the Cigombong-Bogor area, bambara beans, red beans, green beans, soybeans, edamame beans and Ambon bananas. Pumpkin and nuts were made in the form of puree first. Pumpkin puree was made by soaking the pumpkin in Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> 0.3% solution for 15 minutes, then washing, steaming at 90°C for 10 minutes and followed by pulverizing using a blender. While the making of nuts puree was done by boiling at a temperature of 90°C for 30 minutes which had previously been soaked in water for 6 hours. The making of weaning food was done by mixing pumpkin puree and nuts puree with other ingredients such as Ambon banana, skim milk, coconut oil and water. Then filtered to get weaning food in the form of filter slurry.

This study used single-factor completely randomized design with 5 levels of treatment (A1 = Bambara bean puree 35%; A2 = kidney puree 35%; A3 = mung bean puree 35%; A4 = soybean puree 35% and A5 = edamame bean puree 35%). Product analysis includes analysis of moisture content, ash content, protein content, fat content, carbohydrate content and organoleptic properties. Proximate data analysis used the Analysis of Variance (ANOVA) test, while the organoleptic test data were analyzed using the Kruskal Wallis test.

### III. RESULTS AND DISCUSSION

The pumpkin used had a round shape and was harvested for  $\pm 6$  months with a weight ranging from 1.5 to 3 kg/fruit. The maturity level used was pumpkin with a sugar content of  $\pm 9$  brix. The results of the proximate analysis of fresh pumpkin used in the making of weaning food filtered porridge can be seen in Table 1. The results of the proximate analysis showed that the largest component in the pumpkin was water. While protein and fat have small levels. The pumpkin was soaked with sodium metabisulfite ( $\text{Na}_2\text{S}_2\text{O}_3$ ) before being pureed to prevent the browning reaction. According to Martins *et al.*, (2001), browning reactions can occur due to the presence of reducing sugars that can react with amino groups to form a 5-hydroxy metal furfural compound or HMF. HMF is a compound that can react with amino acid groups of proteins to form melanoidin pigments, which are compounds that cause browning. The results of the proximate analysis of pumpkin puree weaning food can be seen in Table 2 and the results of the organoleptic test in Table 3 and Table 4.

#### A. Proximate Value of Weaning food

Water content is the percentage of water in a food ingredient. According to Nisviaty (2006), water can affect the texture, taste, appearance and is related to the shelf life of the product. Pumpkin puree weaning food with the addition of soybean puree had the lowest water content compared to other treatments. The existence of the soaking and cooking process in nuts had a direct effect on the water content, where the nuts will undergo a process of water absorption which can have an effect on their dimensions. According to Agustina *et al.*, (2013), the soaking and cooking process in soybeans produces smaller dimensions than kidney beans, Bambara, and edamame, so that the water absorption becomes less.

Ash content is the number of inorganic substances from the residue resulting from the combustion of organic material. Pumpkin puree weaning food with various nuts had an average ash content value ranging from 0.28% - 2.83%. The resulting value fulfilled the quality requirements of ready-to-eat weaning food, which was not more than 3.5% (Badan Standarisasi Nasional, 2005).

The protein content of pumpkin puree weaning food with the addition of edamame nuts had a higher value than other nuts, namely 20.97%. The protein content of weaning food obtained was strongly influenced by the protein content of its constituent raw materials. The average protein content of pumpkin puree weaning food with various nuts ranged from 19.53% - 20.97%. This value had fulfilled the quality requirements for ready-to-eat protein levels, namely 8% - 22% (Badan Standarisasi Nasional, 2005).

The fat content of pumpkin puree weaning food with the addition of soybeans had a higher value than other nuts, namely 10.49%. The fat content of the weaning food obtained can be influenced by the fat content of its constituent raw materials. The average fat content of pumpkin puree weaning food with various nuts ranged from 6.43% - 10.49%. This value had fulfilled the quality requirements for ready-to-eat fat content, namely 6% - 18% (Indonesian National Standard, 2005).

The Carbohydrate content of pumpkin puree with nuts puree ranged from 0.28% - 8.79%. This value had fulfilled the quality standard of ready-to-eat weaning food which was 30% (Badan Standarisasi Nasional, 2005).. According to Winarno (2008), carbohydrate content in a product is strongly influenced by other nutritional content such as water, ash, protein, and fat.

#### B. Organoleptic Value of Weaning food

The organoleptic test on the pumpkin puree weaning food with additional nuts puree included a sensory quality test and a hedonic test. The test parameters include color, aroma, taste, and texture. The sensory quality of weaning food was assessed on a scale of 1-7. The color of the weaning food produced ranges from 2.32 to 5.73 which had a brown to yellow color. The brown color can be influenced by the epidermis of each nut. The aroma of the pumpkin puree weaning food ranges from 3.83 to 4.03, which was a little smelly to the smell of the pumpkin. The taste of the pumpkin puree weaning food ranged from 3.83 to 4.68, which was enough to taste like a pumpkin. While the texture of weaning food ranges from 3.90 to 5.66, which was quite thick to thick.

Observations of hedonic quality had been assessed using a scale of 1-7, namely from very dislike to very like. The color produced by the pumpkin puree weaning food ranged from 3.38 to 5.25, i.e. slightly disliked to somewhat liked. The aroma of the weaning food produced ranges

from 3.61 to 4.75, which is somewhat dislike to neutral. The taste of the weaning food produced ranges from 3.28 to 4.97, which was somewhat dislike to neutral. Meanwhile, the texture of the weaning food ranged from 4.32 to 5.13, which was neutral to somewhat like it.

#### IV. CONCLUSIONS AND NEWNESS

Based on the chemical properties test, the differences in the puree of nuts had an effect on the water content, ash content, carbohydrate, protein and fat content of the pumpkin puree weaning food. Weaning food with the addition of 35% soy bean puree gave the highest result and met the standard for ready-to-eat weaning food with a moisture content of 57.25%, ash content of 2.83%, protein content of 20.62%, and fat content of 10.49%. However, with a carbohydrate content of 8.79%, it cannot fulfill the standard of weaning food.

Based on the sensory quality test, the difference in the puree of nuts had an effect on the color and texture parameters. While the results of hedonic quality showed that the difference in puree of nuts had an effect on all parameters. The results of this study can provide information about the nutritional content of weaning food based on pumpkin and nuts puree

#### V. REFERENCES

1. Mufida L, Tri DW, Jaya MM. Prinsip Dasar Makanan Pendamping Air Susu Ibu (MP-ASI) untuk Bayi 6-24 Bulan : Kajian Pustaka. *Jurnal Pangan dan Agroindustri*. 2015;3(4):1646-1651.
2. Kemenkes RI. Spesifikasi Teknis Makanan Pendamping Air Susu Ibu (MP-ASI). No.24/Menkes/SK/11. Menteri Kesehatan Republik Indonesia. 2007.
3. Sudaryanto G. MPASI Super Lengkap. Jakarta: Penebar Swadaya Group. 2014.
4. Kulkarni, AS, Joshi, DC. Effect of replacement of wheat flour with pumpkin powder on textural and sensory qualities of biscuit. *Journal Intern F. Research*. 2013;20(2):587-591.
5. Cerniauskiene J, Kulaitiene J, Danilcenko H, Jariene E, Jukneviene E. Pumpkin Fruit Flour as a Source for Food Enrichment in Dietary Fiber Pumpkin Fruit Flour as a Source for Food Enrichment in Dietary Fiber. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*. 2014;42: 19–23.
6. Suarni. Potensi Kandungan Senyawa  $\beta$ -Karoten Beberapa Komoditi Sebagai Sumber Vitamin A. Pros. Seminar Nasional Pengembangan Inovasi Pertanian Lahan Marginal. Jakarta. 2009.
7. Anam C, Handajani S. Mi Kering Waluh (*Cucurbita moschata*) dengan Antioksidan Dan Pewarna Alami. *Caraka Tani* : 2010;25(1):72–78.
8. Kemenkes RI. Tabel Komposisi Pangan Indonesia 2017. Direktorat Jenderal Kesehatan Masyarakat. 2018.
9. Olaleye AA, Adeyeye EI, Adesina AJ. Chemical composition of bambara groundnut (*V. subterranea* L. Verdc) seed parts. *Bangladesh J. Sci. Ind. Res*. 2013;48(3):167-178.
10. Martins, SIFS, Jongen, MFW, van Boekel, MAJS. A review of Maillard reaction in food and implications to kinetic modeling. *Trends in Food Science and Technology*. 2001;11:364–373.
11. Nisviaty, A. Pemanfaatan tepung ubi jalar (*ipomea batatas l.*) Klon bb00105.10 sebagai bahan dasar produk olahan kukus serta evaluasi mutu gizi dan indeks glikemiknya. [skripsi]. Institut Pertanian Bogor. 2006.
12. Agustina N, Waluyo S, Warji, Tamrin. Pengaruh Suhu Perendaman terhadap Koefisien Difusi dan Sifat Fisik Kacang Merah (*Phaseolus vulgaris* L.). *Jurnal Teknik Pertanian Lampung*. 2013;2(1):35-42.
13. Badan Standarisasi Nasional. SNI 01-7111.4-2005: Makanan Pendamping Air Susu Ibu (MP-ASI) – Bagian 4 : Siap Santap. 2005.
14. Winarno, F.G. *Kimia Pangan dan Gizi*. Gramedia Pustaka Utama, Jakarta. 2008

## TABLES AND FIGURES

**Table 1 The results of the proximate analysis of fresh pumpkin**

Parameter	Value
Water content (%)	92.1
Ash content (%)	0.1
Protein content (%)	0.37
Fat content (%)	0.20
Carbohydrate content (%)	7.23

**Table 2 The results of the proximate analysis of Weaning food**

Parameter	Value				
	A1	A2	A3	A4	A5
Water content (%)	67.77 <sup>b</sup>	66.02 <sup>b</sup>	64.98 <sup>b</sup>	57.25 <sup>a</sup>	66.78 <sup>b</sup>
Ash content (%)	1.82 <sup>ab</sup>	2.29 <sup>ab</sup>	1.73 <sup>a</sup>	2.83 <sup>b</sup>	2.51 <sup>ab</sup>
Protein content (%)	19.84 <sup>b</sup>	19.53 <sup>a</sup>	19.53 <sup>a</sup>	20.62 <sup>c</sup>	20.97 <sup>d</sup>
Fat content (%)	10.27 <sup>b</sup>	7.33 <sup>a</sup>	6.51 <sup>a</sup>	10.49 <sup>b</sup>	6.43 <sup>a</sup>
Carbohydrate content (%)	0.28 <sup>a</sup>	4.82 <sup>ab</sup>	7.23 <sup>b</sup>	8.79 <sup>b</sup>	3.30 <sup>ab</sup>

Description: Different letter notation showed that significantly different at level  $\alpha=0.05$

A1 : Pumpkin puree + Bambara beans puree

A2 : Pumpkin puree + Kidney beans puree

A3 : Pumpkin puree + Mung beans puree

A4 : Pumpkin puree + Soybean

A5 : Pumpkin puree + Edamame beans

**Table 3 Sensory Quality of Weaning food**

Parameter	Value				
	A1	A2	A3	A4	A5
Color	2.32 <sup>a</sup>	3.03 <sup>b</sup>	5.73 <sup>d</sup>	4.13 <sup>c</sup>	4.48 <sup>c</sup>
Aroma	3.38 <sup>a</sup>	3.93 <sup>a</sup>	3.95 <sup>a</sup>	3.85 <sup>a</sup>	4.03 <sup>a</sup>
Taste	3.83 <sup>a</sup>	4.30 <sup>a</sup>	4.68 <sup>a</sup>	4.42 <sup>a</sup>	4.53 <sup>a</sup>
Texture	4.93 <sup>bc</sup>	5.17 <sup>c</sup>	3.90 <sup>a</sup>	5.67 <sup>d</sup>	4.68 <sup>b</sup>

Description: Different letter notation showed that significantly different at level  $\alpha=0.05$

**Table 3 Hedonic Quality of Weaning food**

Parameter	Value				
	A1	A2	A3	A4	A5
Color	3.38 <sup>a</sup>	4.40 <sup>bc</sup>	5.25 <sup>d</sup>	4.87 <sup>cd</sup>	4.33 <sup>b</sup>
Aroma	3.62 <sup>a</sup>	4.62 <sup>b</sup>	4.75 <sup>b</sup>	4.53 <sup>b</sup>	4.32 <sup>b</sup>
Taste	3.28 <sup>a</sup>	4.97 <sup>c</sup>	4.88 <sup>c</sup>	4.68 <sup>bc</sup>	4.35 <sup>b</sup>
Texture	4.32 <sup>a</sup>	5.03 <sup>b</sup>	4.78 <sup>ab</sup>	5.13 <sup>b</sup>	4.77 <sup>ab</sup>

Description: Different letter notation showed that significantly different at level  $\alpha=0.05$



## COLOUR AND TEXTURE PERFORMANCE OF MUNTOK WHITE PEPPER (*Piper nigrum* Linn) HARD CANDY

Distya Riski Hapsari<sup>1</sup>, Rosy Hutami<sup>1</sup>, Siti Nurhalimah<sup>1</sup>, Fuji Lestari Nurjulianti<sup>1</sup>

<sup>1</sup>Department of Food Technology and Nutrition, Djuanda University, Indonesia  
Co Author: SITI.nurhalimah@unida.ac.id

---

### Abstract

**Background:** Candy is one of the popular products. One of the innovations of candy products is to add spices. Muntok white pepper is one of the famous spices from the Bangka Belitung Islands. However, candy is a hygroscopic product that is easily damaged during storage. Therefore, it is necessary to know the quality of Muntok white pepper hard candy during storage.

**Purpose:** The purpose of this research was to study the change colour and texture profile of Muntok white pepper hard candy during 28 days of storage

**Methodology:** Muntok white pepper hard candy was stored at 25°C, 35°C and 45°C for 28 days of storage (four weeks). Every week colour and texture were tested.

**Results:** Temperature and storage time affect the sensory and hedonic qualities of the colour and texture of Muntok white pepper hard candy. The colour has decreased in quality from golden yellow to brownish-yellow. Texture has decreased in quality from hard to less hard. Hedonic score was lower than the initial score

Keywords: Colour, Muntok white pepper, hard candy, storage, texture

---

## I. INTRODUCTION

Candy is one of the products that are in great demand by the public. Candy generally has a sweet taste. However, there are also candy flavours combined to produce a sour, spicy taste, etc. The ingredients added to the candy also vary, not only glucose and sucrose. Candy products in the Indonesian market include milk candy, chocolate candy, ginger candy, mint candy, and peanut candy.

One of the ingredients that can be added to candy is spices. White pepper is a spice widely known in Indonesia, and Muntok white pepper is one of the most popular peppers from the Bangka Belitung Islands. In addition, white pepper contains phytochemical compounds that are beneficial for health. Making candy with the addition of white pepper is one of the efforts to diversify candy products.

Muntok white pepper hard candy will also be damaged because of water absorption during storage. Hard candies will be stickiness and crystal formation. So, it is important to study changes in profile sensory, such as colour and texture parameters during storage.

This research aimed to study changes in colour and texture of Muntok white pepper hard candy packaged in metalized plastic, stored for 28 days at different storage temperatures.

## II. METHODOLOGY

### 2.1 Material and equipment

The research material consists of sugar (sucrose) (Rose Brand, PT Adi Karya Gemilang, Indonesia), water, Munthok White Pepper (Lada Kita, Bumdesma Mitra Lada Bersatu, Indonesia), glucose syrup (Guangzhou Shuanglao Company L.T.D., China), and *metalized plastic* (5cmx3cm with WVTR 0.8872 gram/m<sup>2</sup>.day).

The equipment used in this study consist of digital scales, stove, pan, basin, stirrer, candy mould, thermometer, incubator (memmet 854 Schwabach W-Germany), hand sealer

### 2.2 Methodology

#### 2.2.1 Making Muntok White Pepper Hard Candy

The manufacture of Muntok white pepper hard candy refers to Hutami *et al.* (2021)<sup>1</sup>. Based on the selected product in the previous study, the ratio of sucrose:glucose used was 50:50, 1% white pepper and 20% water from sucrose and glucose syrup.

Sucrose, glucose and water were heated at 90<sup>0</sup> C for 3 minutes. Then, glucose syrup was added and continued heat at 110<sup>0</sup> C for 5-7 minutes and at 150<sup>0</sup> C for 15 minutes. After that product was cooled for 10 seconds, and white pepper was added. And then, the product was moulded and cooled at 27<sup>0</sup>C. Finally, Muntok white pepper hard candy was packed in metalized plastic.

#### 2.2.2 Muntok White Pepper Candy Storage

Muntok white pepper hard candy was stored for 28 days at 25°C, 35°C and 45°C. The change of product's colour and texture were carried out (week -0, 1, 2,3, 4).

### 2.3 Product Analysis

#### 2.3.1 Sensory Quality Tests <sup>2</sup>

Sensory quality tests are carried out to provide information on the level of intensity of these characteristics. This test uses 30 semi-trained panellists. Each boundary mark is labelled with an intensity description. The intensity description (from 0 to 10) on the colour parameters is brownish yellow to golden yellow and the texture is from not hard to hard.

#### 2.3.2 Hedonic Rating Tests <sup>2</sup>

The hedonic test is a test to measure preference for sensory attributes in a product and prove the acceptance of a product. Panellists were asked to rate the preference for colour and texture by giving a cross or vertical line on a line scale with a length of 10 cm (0-10) on each sensory attribute. In addition,

panellists were also asked to provide comments on the products they rated. Panellists may re-taste the sample before making an assessment. The number of panellists used in this hedonic test is 30 people who are semi-trained panellists. The left end indicates the parameter strongly dislikes, while the right end indicates the parameter strongly likes.

#### 2.4 Data Analysis

The analysis used to process the results of sensory testing is the variance test (ANOVA). If the  $p$ -value  $< 0.05$ , the treatment had a significant effect and continued with Duncan's further test at a 95% confidence interval (significant level = 0.05).

### III. RESULTS AND DISCUSSION

#### 3.1 Muntok White Pepper Hard Candy

Hard candy is generally made from sucrose and glucose syrup, and other ingredients that can be added to give a better taste<sup>3</sup>. Another ingredient used in this research is Muntok white pepper. White pepper has phytochemical compounds such as tannin, phenol, flavonoid, alkaloid, anthraquinone, Amida fenolat, and phenolic acid. The other compounds include saponin, kavisin, piperilin, piperolein, poperanin, piperonal, dihydrokarveol, kanyofillene oxide, kriptone, carotene, cryptoxanthin, zeaxanthin, lycopen that has many benefits for the body<sup>4</sup>.

The material packaging that used in this production is metallized plastic. The packaging can protect the product during storage and distribution. The following is the appearance of the product before and after being packaged in Figure 1.



Figure 1. Muntok White Pepper Hard Candy (a) with packaging and (b) without packaging



Figure 2. Muntok White Pepper Hard Candy at fourth week

### 3.2 Sensory Quality Test and Hedonic Rating Test

#### 3.2.1. Colour Parameters

Colour in food products is very important because it affects the appearance of a food product and it can affect the attractiveness and provide more information to consumers about the characteristics of the food. Changes in colour parameters were obtained from sensory quality test every week for four weeks (28 days) at 25°C, 35°C, and 45°C. 0 for brownish yellow and 10 for golden yellow. For hedonic rating test, 0 is strongly dislike and 10 is strogly like.

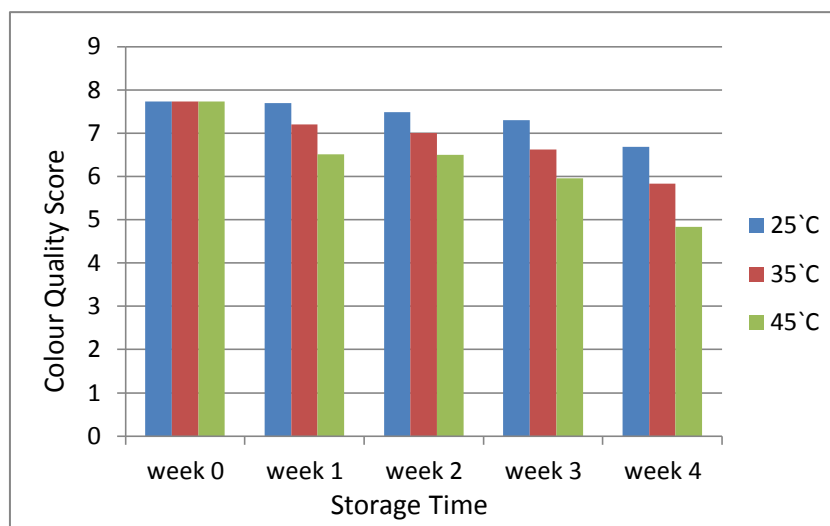


Figure 3. The Average of Sensory Quality Test Score in Colour Parameters

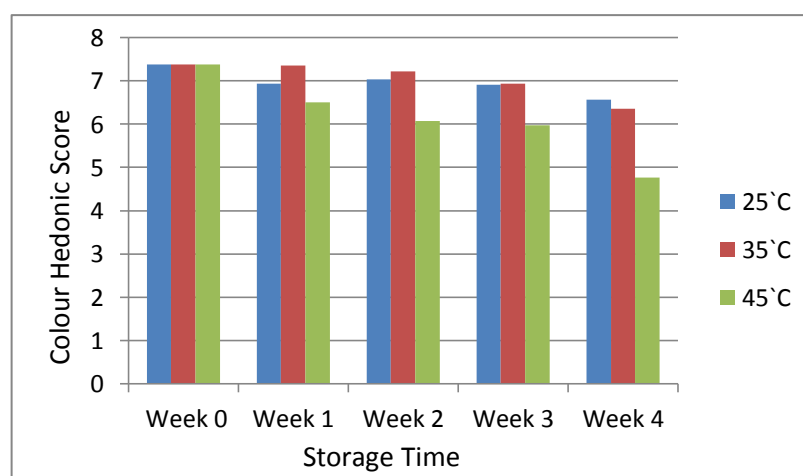


Figure 4. The Average of Hedonic Test Score in Colour Parameters

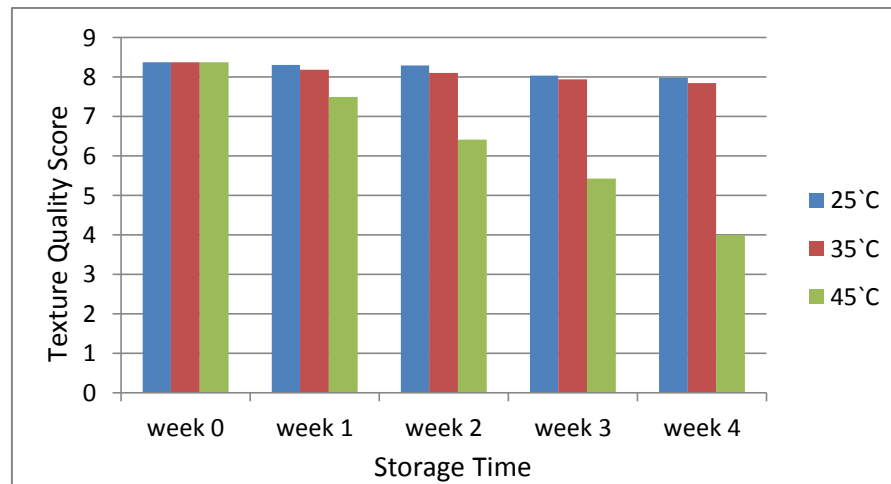
Based on the results, it can be seen that the temperature, storage time, and interaction between temperature and storage time affected the colour quality. Products experienced a decrease in quality by 1.056 (25°C), 1.896 (35°C), and 2.9 (45°C) in the 4th week of testing. Hard candy that stored at 45°C also decreased by 1.186 (first week), 0.99 (second week), 1.347 (third week), and 1.844 (fourth week). Storage time and storage temperature also affected the hedonic score of the product. At the beginning, the product's score is 7.383. After 4 weeks of storage at 45°C, the hedonic score decreased by 2.623.

White pepper hard candy changes from golden yellow to brownish yellow. The brownish yellow colour is caused by the Maillard reaction, where the reaction of amino groups and reducing sugars occurs in the presence of high temperatures or heating<sup>5</sup>.

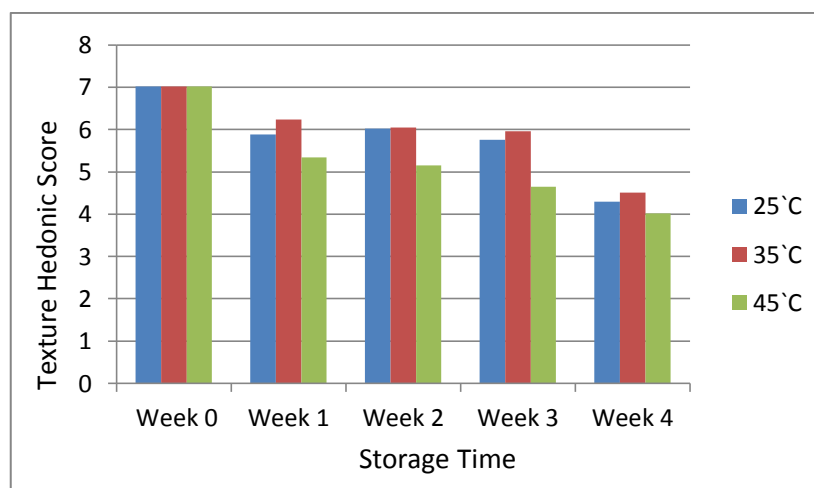
### 3.2.2. Texture Parameters

Texture is one of the important aspects of food that can be known by touching it with hands or tasting it with a mouth.

The sensory quality test of the candy texture was assessed using a scale of 0-10 cm, namely from not hard to hard parameters. The average value of the sensory quality test for the texture of Muntok white pepper hard candy can be seen in Figure 5.



**Figure 5. The Average of Sensory Quality Test Score in Texture Parameters**



**Figure 6. The Average Hedonic Score in Texture Parameters**

Based on the result, temperature, storage time, and interaction between temperature and storage time caused a significant decrease in texture quality. Candy would experience a decrease in texture quality by 0.387 (25°C), 0.527 (35°C), and 4.37 (45°C) in the 4th week. Candy experienced a decrease in quality at 45°C temperature storage by 0.813 (first week), 1.877 (second week), 2.603 (third week), 3.983 (fourth week). Storage time, storage temperature and interaction between storage time and storage temperature affected the hedonic score of texture. At the beginning, the product got 7.017. After 4 weeks of storage at 45°C, the hedonic score decreased by 2.997.

The texture was getting less hard than the initial stage because candy is hygroscopic. This hygroscopic is due to the result of the reaction of sugar at high temperatures<sup>6</sup>. Candy can absorb water vapour from the environment so that the moisture content in the candy increases day by day and affects the level of product hardness. Temperature also affected texture of the candy. High temperatures caused damage molecules so the ability to bind water is reduced<sup>7</sup>.

## IV. CONCLUSIONS AND NEWNESS

### 4.1 Conclusions

Temperature and storage time affected the sensory and hedonic qualities of the colour and texture of Muntok white pepper hard candy. The colour has decreased in quality from golden yellow to brownish-yellow. Texture has decreased in quality from hard to less hard. Hedonic score was lower than the initial score

### 4.2 Newness

Muntok white pepper hard candy is an innovative product. Therefore, studying the product's sensory profile can provide information on the sensory quality and consumer acceptance so that it can be carried out to determine production standards more optimally.

## V. REFERENCES

1. Hutami, R., Dwi, A.N., and Aulia J. Antioxidant Activity, Sensory, Chemical, And Microbiology Characteristics Of Muntok White Pepper (*Piper nigrum* Linn) Hard Candy. Indonesian Journal of Applied Research (IJAR). 2021; 2(1): 14-27
2. Setyaningsih, D., Apriyantono, A., Sari, P.M. Analisis Sensori untuk Industri Pangan dan Agro. IPB Press. Bogor. 2010
3. Faridah, A, Kasmita S., Pada, AY dan Liswarti, Y. *Patiseri Jilid 3 Direktorat Pembinaan Sekolah Menengah Kejuruan, Direktorat Jendral Manajemen Pendidikan Dasar dan Menengah*. Departemen Pendidikan Nasional. Jakarta. 2008.
4. Damanik, A.D, Hutagaol, R.J., Fitriyani, Firmansyah, A., Winingsih, W. Peningkatan Kelarutan Ekstrak Lada (*Piper nigrum* L.) Dalam Air Dan Karakterisasinya. Jurnal Sains dan Teknologi Farmasi Indonesia. 2020 IX (1), 66-74
5. Winarno, F.G. Kimia Pangan dan Gizi. PT. Gramedia. Jakarta. 2008
6. Koswara, S. Teknologi Pembuatan Permen. eBookPangan.com. 2009
7. Syarief, R. and Halid, H. Teknologi Penyimpanan Pangan. Institut Pertanian Bogor. Bogor. 1993

## PHYSICAL QUALITY OF NOODLES FROM NATIVE AND MODIFIED CANISTEL FLOURS (*Pouteria campechiana*)

Sri Rejeki Retna Pertiwi<sup>1</sup>, Noli Novidahlia<sup>1</sup>, Aminullah Aminullah<sup>1</sup>, Ari Tri Wibowo<sup>1</sup>

<sup>1</sup>Department of Food Technology and Nutrition, Djuanda University, Indonesia

Co Author: [sri.rejeki.pertiwi@unida.ac.id](mailto:sri.rejeki.pertiwi@unida.ac.id)

---

### Abstract

**Background:** Gluten-free flour produces noodles with physical quality not as good as noodles from wheat flour due to the absence of gluten. In the production of gluten-free noodles, starch componen plays a role in the formation of the noodle structure. Modification of starch can change the characteristics of starch, it is hoped that modification of canistel flour will also change its characteristics so that it can be applied for noodle making.

**Purpose:** The purpose of this research was to study the effect of heat moisture treatment (HMT) and fermentation on the physical quality of wet noodles including viasual characteristics of formed noodles and cooking loss.

**Methodology:** The research consisted of two steps, flour preparation and noodle preparation. Three types of flour were prepared, those were native canistel flour, HMT modified canistel flour, and fermentation modified canistel flour. The three types of canistel flour were made individually into noodles by adding 3% salt and 60% water. The noodles were analyzed for visual characteristics of formed noodles including color, surface texture, aroma, firmness, stickiness, elasticity, strand separation, and cooking loss. The experiment was done in two replicates.

**Results:** Results showed that the three noodles made from native canistel flour, HMT modified canistel flour and fermentation modified canistel flour had similar visual charactersitics on the surface texture (smooth), firmness (soft), stickiness (sticky), elasticity (not elastic), strand separation (difficult to be separated), cooking loss (more that 10%), but had different color and aroma. The color of noodles from native, HMT modified, and fermentation modified canistel flour were brown, dark-brown, and yellowish-brown respectively. Modification did not affect the physical quality of wet noodles including visual characteristics of formed noodles and cooking loss. HMT and fermentation modified canistel flour are not suitabel for noodle making if it used as a single raw material. To improve textural quality of gluten-free noodle, it is possible to mix it with other starch or flours and to use the hydrocolloids.

Keywords: canistel, gluten-free noodle, modified flour, wet noodle

---

## I. INTRODUCTION

Canistel fruit (*Pouteria campechiana*) is a tropical fruit native to Mexico. It is used directly as dessert, salad, juice or as a mixture in ice cream, pastry (Lim, 2012), a spread (Morton, 1987), and ketchup (Malinao et al., 2017). In Indonesia, we can find this fruit in West Java. This fruit is usually eaten fresh, but some people do not like it because it leaves a yellow color that sticks to the teeth. It has shelf life about 10 days (Morton, 1987). To extend its shelf life, one method that can be used is to process it into flour. In the form flour, its use can be even wider.

Paragados (2014) has processed canistel fruit into flour by sun drying method and successfully used it for the production of cookies. Pertiwi *et al.* (2020) has also succeeded in processing canistel flour with pretreatment of soaking in the NaCl solution 7.5% for 30 minutes and followed by drying in a tray dryer at 40°C for 6 hours. Aminullah *et al.* (2020) tried to use the canistel flour as a raw material for making noddles. He reported that canistel flour could form noodle strands but the texture quality was very poor. When the noodles were boiled, they were crumble and sticky because of the absence of gluten. Padalino *et al.* (2016) stated that gluten-free flour produces noodles with physical quality not as good as noodles from wheat flour due to the absence of gluten. In the production of gluten-free noodles, starch component plays a role in the formation of the noodle structure. Modification of starch can change the characteristics of starch. Pertiwi *et al.* (2021) studied the rheology properties of heat moisture treatment (HMT) on canistel starch and reported that HMT could change starch type from B into C which was suitable for noodle making. Another modification, fermentation using lactic acid bacteria on cassava flour done by Subagyo (2008), resulted that mocaf (modified cassava flour) could be used for wheat substitution up to 30%.

Based on those scientific literatures, it is hoped that modification of canistel flour will also change its characteristics so that it can be applied for noodle making. The purpose of this research was to study the effect of heat moisture treatment (HMT) and fermentation on the physical quality of wet noodles including visual characteristics of formed noodles and cooking loss.

## II. METHODOLOGY

The research consisted of two steps, flour preparation and noodle preparation. Three types of flour were prepared, those were native canistel flour, HMT modified canistel flour, and fermentation modified canistel flour. The native canistel flour was made according to Pertiwi *et al.* (2020). The fruits were peeled and the flesh were sliced using a peeler to a layer that covers the seeds. The sliced flesh were soaked in 7.5% salt solution for 30 minutes, and then drained, washed under running water, drained, and air-dried until no water dripped. After that, drying was carried out at 40°C for 6 hours using an electrical food dehydrator type MKS-DR6 as much as 100 grams of sliced flesh per tray. The chips were then were grounded using disc mill type FFC-15 equipped with a 100 mesh sieve. The native canistel flour was then put in a tightly closed container until used. The HMT modified canistel flour was made following the procedure of Setiyoko *et al.* (2018). Native canistel flour was weighed, added with distilled water until the moisture content 30%, cooled at 5°C for 24 hours, then dried at 80°C for 3 hours. Drying was continued at 50°C for 5 hours, the HMT canistel flour then grounded and sieved with a 100 mesh sieve. The fermentation modified canistel flour was made according to the manual instruction of BIMO-CF Starter. The canistel fruits were peeled and washed. The flesh were sliced using a peeler to a layer that covers the seeds. The sliced flesh were soaked in water containing 0.1% BIMO-CF Starter for 12 hours, then drained until no water dripped, and dried as the procedure for native canistel flour.

The three types of canistel flour were made individually into noodles by adding 3% salt and 60% water. The noodles were analyzed for visual characteristics of formed noodles and cooking loss. The visual characteristics of formed noodles including color, surface texture, aroma, firmness, stickiness, elasticity were observed. The cooking loss of noodle was measured according to Oh *et al.* (1985). Five grams of noodles were boiled in 150 mL water for 3 minutes, then drained. The noodles were dried at 100°C to a constant weight, and weighed again.  $\text{Cooking loss} = 1 - \left[ \frac{\text{sample weight after drying}}{\text{sample weight before boiling} \times (1 - \text{moisture content})} \right] \times 100\%$ . The experiment was done in two replicates.



### III. RESULTS AND DISCUSSION

The visual formed noodles made from native canistel flour, HMT modified canistel flour, and fermentation modified canistel flour are presented as shown on Table 1. Results show that the three noodles made from native canistel flour, HMT modified canistel flour and fermentation modified canistel flour have similar visual characteristics, surface texture is smooth, firmness is soft, stickiness is sticky, elasticity is not elastic, strand separation is difficult to be separated, cooking loss is more than 10%, but the color and aroma are different.

The results of this research were not as expected. There were no differences on visual formed noodles between noodles made from native canistel flour and modified canistel flour. HMT and fermentation modification did not improve the noodle textural quality. It was presumed that the compounds other than starch contained in canistel fruit inhibits the modification process. HMT and fermentation modified canistel flour are considered unsuitable for noodle making if it used as a single raw material. To improve textural quality of gluten-free noodle, it is possible to mix it with other starch or flour and to use the hydrocolloids as suggested by Padalino *et al.* (2016).

The color of noodles from native, HMT modified and fermentation modified canistel flour were brown, dark-brown, and yellowish-brown respectively. In the form of flour, native canistel flour had color of yellowish-orange, modified HMT and fermentation canistel flour were almost the same, those were yellowish-orange a little bit darker. After processed into noodles, the orange color became brown because of carotenoid oxidation. The result of color for fermentation modification on canistel flour was not accordance with Subagio study. Modification using fermentation method on casava flour resulted in color of mocaf whiter compared to the native casava flour (Subagy, 2008; Sulisty and Nakahara, 2013), but fermentation on canistel fruit resulted in modified canistel flour with yellowish color compared to the native canistel flour. This different result was presumed that the raw material used in fermentation was different. Cassava used for mocaf is usually white cassava type that has no carotenoids or trace in amount, whereas canistel fruit is rich in carotenoid compounds. According to Lanerolle *et al.* (2008) and Costa *et al.* (2010), canistel fruit has carotenoid content 1.9-23.5 mg/g dw. During fermentation, carotenoids can undergo oxidation which results in the color of the product becoming yellowish-brown. |

### IV. CONCLUSIONS AND NEWNESS

Modification did not affect the physical quality of wet noodles including visual characteristics of formed noodles and cooking loss. HMT and fermentation modified canistel flour are not suitable for noodle making if it used as a single raw material. To improve textural quality of gluten-free noodle, it is possible to mix it with other starch or flours and to use the hydrocolloids.

### V. ACKNOWLEDGEMENT

This work was funded by Grant of Penelitian Terapan Unggulan Perguruan Tinggi (PTUPT) with contract number 1868/E4/AK.04/2021 from Ministry of Education, Culture, Research and Technology, Republic of Indonesia.

### VI. REFERENCES

1. Lim TK. Edible medicinal and non-medicinal plants. New York: Springer. 2012.
2. Morton JF. Fruit of warm climates. Miami: Julia F. Morton. 1987.
3. Malinao BC, Arquiza E, Cardinal KV, Borgonia KD, nad Minoza JM. Development of canistel into ketchup (Thesis). Philippine: College of Hotel and Restaurant Management, University of Cebu, Baniland. 2017.
4. Paragados DA. Acceptability of canistel (*Lucuma nervosa* A.DC) fruit flour in making cookies. Asia Pasific Journal of Multidiciplinary Research. 2014; (2):66-73.

5. Pertiwi SR, Nurhalimah S, and Aminullah A. Optimization on process of ripe canistel (*Pouteria campechiana*) fruit flour based on several quality characteristics. *Brazilian Journal of Food technology*. 2020;(23).
6. Aminullah, Purba R, Rohmayanti T, and Pertiwi SRR. Sifat mutu fisik mi basah berbahan baku tepung campolay masak penuh. *Jurnal Agroindustri Halal*. 2020;6(2):172-180.
7. Padalino L, Conte A, and Nobile MAD. Overview on the general approach to improve gluten-free pasta and bread. *Foods*. 2016.
8. Pertiwi SRR, Aminullah A, Rajani R, Novidahlia N. Effect of heat-moisture treatment on the physicochemical properties of native canistel starch. *Food Science and Technology*. Campinas. 2021. (Under review).
9. Subagio A. Ubikayu substitusi berbagai tepung-tepungan. *Food Review*. 2008;1(3):18-22.
10. Setiyoko A, Nugraeni, Hartutik S. Optimasi suhu pemanasan dan kadar air pada proses produk tepung bengkuang termodifikasi dengan heat moisture treatment (HMT) sebagai bahan baku mi basah. *Seminar Nasional Inovasi Pangan Lokal untuk Mendukung Ketahanan Pangan*. 28 April 2018. Universitas Mercubuana Yogyakarta. 2018.
11. Oh NH, Seib PA, and Chung DS. Effect of processing variables on the quality characteristics of dry noodles. *Cereal Chem*. 1985;62(6):437-440.
12. Sulistyio J and Nakahara K. Cassava flour modification by microorganism. Conference paper on International Microbialtech Symposium. <http://www.researchgate.net/publication/268079165>
13. Lanerolle M, Priyadharsani AM, Sumithraarachchi DB, and Jansz ER. The carotenoids *Pouteria campechiana* (Sinhala: ratalawulu). *Journal of the National Science Foundation of Sri Lanka*. 2008;36(1):95-98.
14. Costa TSA, Wondracek DC, Lopes RM, Vieira RF, and Ferreira FR. Carotenoids composition of canistel (*Pouteria campechiana* (Kunth) Baehni). *Revista Brasileira de Fruticultura*. 2010;32(3):903-906.

## TABLES AND FIGURES

Table 1. Visual characteristics of formed noodles made from native canistel flour, HMT modified canistel flour, and fermentation modified canistel flour

Visual Characteristics of Formed Noodles	Type of Canistel Flour		
	Native	HMT Modification	Fermentation Modification
Color	brown	dark-brown	yellowish-brown
Surface Texture	smooth	smooth	smooth
Aroma (canistel)	sharp	not very sharp	not very sharp
Firmness	soft	soft	soft
Stickiness	sticky	sticky	sticky
Elasticity	not elastic	not elastic	not elastic
Strand	difficult to be separated	difficult to be separated	difficult to be separated
Cooking loss (%)	27.428 ± 3.036	27.029 ± 3.644	28.838 ± 0.784

# DIETARY SUPPLEMENTATION OF *GARCINIA ATROVIRIDIS* REDUCES MALONDIALDEHYDE LEVELS OF SPENT LAYER DUCK

Dede Kardaya<sup>1,2</sup>, Dewi Wahyuni<sup>2</sup>

<sup>1</sup> Department of Animal Science, Faculty of Agriculture, Indonesia

<sup>1</sup> Department of Animal Science, Faculty of Agriculture, Indonesia

<sup>1</sup> E-mail address [dede.kardaya@unida.ac.id](mailto:dede.kardaya@unida.ac.id); <sup>2</sup> E-mail address [dewi.wahyuni@unida.ac.id](mailto:dewi.wahyuni@unida.ac.id)

---

## Abstract

**Background** - Malondialdehyde which is often used as an indicator of meat quality is an aldehyde compound produced during the lipid oxidation process. This malondialdehyde is highly toxic to livestock and humans. *Garcinia atroviridis* contains antioxidants that are expected to block the lipid oxidation so that it is expected to reduce MDA levels.

**Purpose** – This study aims to determine the effect of giving gelugur leaf flour in the ration on MDA levels of rejected duck meat.

**Design/methodology/approach** – The study used a completely randomized design (CRD) consisting of 3 treatments and 5 replications, where each replication contained 10 spent layer ducks.

**Findings** – Spent layer ducks that consumed nonconventional rations supplemented with 6% *Garcinia atroviridis* leaf flour produced lower MDA levels ( $P < 0.05$ ) than the ducks that consumed conventional diets without *Garcinia atroviridis* leaf flour supplements.

**Research limitations**– The limitation of this research was the shortage of research assistants when carcassing and cutting parts of the carcass.

**Originality/value** –The use of *Garcinia atroviridis* leaf flour in nonconventional rations can reduce MDA levels of spent layer duck meat.

Keywords: *Garcinia atroviridis*, gelugur acid, MDA, spent layer ducks

---

## I. INTRODUCTION

Spent layer duck meat contains nutrients that are comparable to duck meat in general, but because of its fishy odour, the spent layer duck meat is not liked by consumers. Efforts to reduce this fishy odour can be done by reducing the products of fat oxidation, such as malondialdehyde (MDA) and protein decomposition, such as trimethylamine (TMA). *Garcinia atroviridis* which contains antioxidants and other active substances is expected to suppress the production of MDA and TMA. This study aims to determine the effect of adding *Garcinia atroviridis* leaf flour to the MDA and TMA content of the spent layer duck meat.

## II. LITERATURE REVIEW

Fresh duck meat contains very complete food substances so that it can be used as a growth medium which is considered ideal for the growth of various pathogenic and spoilage microorganisms (Hou et al. 2020). Because of its nature, the duck meat is easily overgrown by microorganisms so that it quickly decays and causes an off odor. Substances that can cause off odor include malondialdehyde as a result of fat oxidation and trimethylamine as a result of protein decomposition. The TBARS value is an index for fat oxidation, one of which can be determined by measuring the content of malondialdehyde (MDA) formed through hydroperoxides (Pyrgotou et al. 2010) Malondialdehyde is one of the most abundant aldehydes produced during lipid oxidation. This compound is more poison than the final product of MDA or 4-hydroxynonenal and can interfere with physiological processes in livestock and humans (Michiels et al. 1991; Reitznerová et al. 2017). In addition to MDA, trimethylamine (TMA) was considered as an important indicator of meat quality (Liu et al. 2013).

### III. METHODOLOGY

Research on the effect of adding *Garcinia atroviridis* in the ration to the TMA and MDA values of spent layer ducks was carried out for 28 days in the litter cage owned by the breeder. The study used a completely randomized design with 3 treatments and 5 replications. Each replication consisted of 10 tails. The three treatments were: 1) ration consisting of *aking* rice and rice bran, 2) unconventional ration, 3) unconventional ration + 6% *Garcinia atroviridis* leaf flour. *Aking* rice is a feed that comes from the remains of inedible rice that is cleaned and sun dried. The nonconventional rations were prepared based on the formula from Kardaya et al. (2021).

The rations are fed twice a day, at 08.00 in the morning and at 16.00 in the afternoon and drinking water is provided *ad libitum*. Samples for analysis were obtained from breast meat, each treatment consisted of 15 samples. Trimethylamine was analysed according to the AOAC (2005) procedure and TBARS (mg MDA/kg) of meat was determined based on the recommendations of Sorensen and Jorgensen (1996). The data that has been collected were analysed using analysis of variance and the least significant difference test.

### IV. RESULT AND DISCUSSION

Results should be clear and concise. Discussion should explore the significance of the results of the work, not repeat them. Avoid extensive citations and discussion of published literature.

Tabel 1. Mean ( $\pm$  s.d) TBARS and TMA values of spent layer duck meat

Parameters	Experimental ration		
	R0	R1	R2
TMA (mg N/100 g)	8.40 $\pm$ 3.28	4.60 $\pm$ 3.90	4.48 $\pm$ 7.54
TBARS (mg MDA/kg)	1.16 $\pm$ 0.433 <sup>ab</sup>	1.83 $\pm$ 0.78 <sup>b</sup>	0.79 $\pm$ 0.56 <sup>a</sup>

Different superscript within similar row shows significant different ( $P < 0.05$ ). R0: *aking* rice + rice bran; R1: nonconventional ration; R2: nonconventional ration + 6% *Garcinia atroviridis* leaf flour.

Provision of ration supplemented with 6% GA had no significant effect on decreasing TMA levels, but significantly ( $P < 0.05$ ) on decreasing TBARS (mg MDA/kg) of spent layer duck meat (Table 1). The TMA value in the R1 and R2 treatments was lower than the TMA value (7.36 – 8.53) of Cihateup duck meat reported by Anggraeni et al. (2018). The decrease in MDA of rejected duck meat consuming *Garcinia atroviridis* is thought to be due to the effect of antioxidants in inhibiting the fat oxidation process. This is in accordance with the results of research by Abbood et al. (2017) that the decrease in MDA levels was caused by the higher content of phenolic compounds in the supplemented ration compared to the unsupplemented ration. This is indirect evidence that these antioxidants can be absorbed and enter the systemic circulation system after going through the digestive process. In a previous study it was also reported that the addition of rosemary essential oil extract to the diet reduced lipid oxidation of broiler chicken meat (Abbood et al. 2017).

### V. CONCLUSION

Provision of 6% *Garcinia atroviridis* (Gelugur acid) leaf flour in unconventional rations can reduce malondialdehyde of spent layer duck.

### ACKNOWLEDGEMENT

The authors would like to thank the Ministry of Education, Culture, Research, and Technology for their funding through applied research grants based on Decree No. 09/E1/KPT/2021 dated 01 February 2021 and Contract Agreement No. 235/SP2H/LT/DRPM/2021 dated March 12, 2021.

## REFERENCES

- Abbood, A. A., Kassim, A. B., Jawad, H. S., Manap, Y. A., & Sazili, A. Q. (2017). Effects of feeding the herb *Borreria latifolia* on the meat quality of village chickens in Malaysia. *Poultry science*, *96*(6), 1767-1782.
- Anggraeni, A., Gunawan, A., Rukmiasih, R., Suryati, T., & Sumantri, C. (2018). Identification of polymorphism and association analyses of FMO3 gene related with carcass and meat quality in Cihateup Duck. *Animal Production*, *19*(3), 151-159.
- AOAC Association Official Analytical Chemistry. 2005. Official Methods of analysis. Edisi ke-18. Maryland (US): AOAC Inc.
- Hou, W., Yue, Q., Liu, W., Wu, J., Yi, Y., & Wang, H. (2021). Characterization of spoilage bacterial communities in chilled duck meat treated by kojic acid. *Food Science and Human Wellness*, *10*(1), 72-77.
- Kardaya, D., Dihansih, E., Sudrajat, D., & Wahyuni, D. (2021). Nutrient digestibility of preweaning pasundan calves fed flushing diets under extensive grazing. *J. Anim. Health Prod*, *9*(1), 52-57.
- Liu, D., Liang, L., Xia, W., Regenstein, J. M., & Zhou, P. (2013). Biochemical and physical changes of grass carp (*Ctenopharyngodon idella*) fillets stored at -3 and 0 C. *Food chemistry*, *140*(1-2), 105-114.
- Michiels, C.; Remacle, J. Cytotoxicity of linoleic acid peroxide, malondialdehyde and 4-hydroxynonenal towards human fibroblasts. *Toxicology* 1991, *66*, 225-234. [CrossRef]
- Pyrgotou, N., Gitrakou, V., Ntzimani, A., & Savvaidis, I. N. (2010). Quality assessment of salted, modified atmosphere packaged rainbow trout under treatment with oregano essential oil. *Journal of food science*, *75*(7), M406-M411.
- Reitznerová, A., Šuleková, M., Nagy, J., Marcinčák, S., Semjon, B., Čertík, M., & Klempová, T. (2017). Lipid peroxidation process in meat and meat products: a comparison study of malondialdehyde determination between modified 2-thiobarbituric acid spectrophotometric method and reverse-phase high-performance liquid chromatography. *Molecules*, *22*(11), 1988.
- Sorensen G, Jogersen S. 1996. A critical examination of some experimental variables in the 2-thiobarbituric acid (TBA) test for lipid oxidation in meat products. *Z Lebensm Unters Forsch*. 202:205-210.

## Isolation of Triterpenoid Natural Products From Ethyl Acetat Extract of *Aglaia angustifolia* (Miq.) Leaf

Ricson Pemimpin Hutagaol<sup>1\*</sup>, Delia Ayu Karisma<sup>1</sup>, Devy Susanty<sup>1</sup>, Srikandi<sup>2</sup>

<sup>1</sup>Program Studi Kimia, FMIPA, Universitas Nusa Bangsa, Bogor, Indonesia

<sup>2</sup>Program Studi Biologi, FMIPA, Universitas Nusa Bangsa, Bogor, Indonesia

Co Author: ricsonpemimpin70@gmail.com

---

### Abstract

**Background:** Genus *Aglaia* is a rich source of compounds of a different kind with interesting activities such as benzofuran series and tetracyclic triterpenoid.

**Purpose:** This study aimed to obtain pure triterpenoids isolated from *Aglaia angustifolia* (Miq.) leaf as drug candidate compounds.

**Methodology:** This research used experimental methods such as extraction and separation using various gravity chromatography methods. The mobile phase used was the solvent combination of n-hexane, ethyl acetate, and dichloromethane for the normal phase. The reversed-phase used a solvent combination of methanol and aquadest. Separation and fractionation guided by spot target using a sulfuric acid reagent on thin-layer chromatography.

**Results:** Three purified suspected compounds of the triterpenoids group were isolated. This study's limitation is that it has not yet determined the details of its chemical structure by NMR spectroscopy.

Keywords: *Aglaia angustifolia* (Miq.), Chromatography, Ethyl acetate, Isolation, Triterpenoids

---

## I. INTRODUCTION

The genus *Aglaia* is the largest in subtropical and tropical angiosperm plants belonging to the Meliaceae family, consisting of more than 130 species [1]. The genus *Aglaia* has pharmacological potential due to the presence of triterpenoid compounds [2]. Triterpenoids are secondary metabolites that can be used as main compounds in discovering and developing new types of drugs [3]. Most of the triterpenoid compounds have prominent physiological activities. They appear as the main group of secondary metabolites with pharmacological, anti-inflammatory, antioxidant, antibacterial, antiviral, and even anticancer activities [4]. Triterpenoid compounds from plants were obtained from the extraction and isolation processes. The choice of solvent for extraction needs to pay attention to selectivity, toxicity, polarity, ease of evaporation, and solvent price [5]. Triterpenoids can be isolated by laboratory experiments such as extraction and separation using various gravity chromatography methods [6]. Triterpenoid has been isolated from n-hexane extract from the bark of the *Aglaia angustifolia* (Miq.) from the semi-polar fraction obtained a pure compound of triterpenoid (20S,24S)-epoxydammarane-3 $\alpha$ ,25-diol, which has cytotoxic activity against breast cancer cells MCF-7 [7]. In further investigation on *Aglaia* plants that grow in Indonesia, we found that *A. angustifolia* has not been studied phytochemically previously. This paper reports that three purified suspect compounds of the triterpenoids group have been isolated from ethyl acetate extract of *Aglaia angustifolia* (Miq.) leaf.

## II. METHODOLOGY

The materials used in this research were the residue of *Aglaia angustifolia* (Miq.) leaf (after maceration using n-hexane), n-hexane (Smart Lab), ethyl acetate (Merck), methanol (Smart Lab), dichloromethane (Merck), sulfuric acid (Smart Lab), ethanol (Smart Lab). Lab), TLC silica gel 60 F254 (Merck), silica gel 60 (230-400 mesh, 70-230 mesh, and 0.2-0.5 mm) (Merck), preparative thin-layer chromatography (TLCP) analysis using plates silica gel coated glass (Merck) kieselgel 60 F254 0.25mm, 20x20cm.

The tools used are distillation apparatus, heating mantle, boiling flask, thermometer, analytical balance Ohaus Pioneer PA214, rotary evaporator, shaker, vacuum liquid chromatography (KCV), gravity column chromatography, Ultraviolet (UV) Camag, vials, Shimadzu UV-1800 UV-Vis Spectrophotometer, iD5 ATR FT-IR Spectrometer and glassware.

This research was conducted based on the experimental method. The leaves of *Aglaia angustifolia* *Simplicia* samples that had been macerated with n-hexane were re-extracted with ethyl acetate at room temperature until they were colourless, then filtered and concentrated with a rotary evaporator. The concentrated extract obtained was fractionated using various gravity chromatography methods for the separation of these extracts. The isolates that obtained were analyzed for their maximum wavelength with UV-Vis spectrophotometer and their functional groups with FTIR as a suspect triterpenoid compound.

## III. RESULTS AND DISCUSSION

Residue from the maceration of n-hexane from *Aglaia angustifolia* (Miq.) leaf (2 kg) was extracted successively with ethyl acetate (12  $\times$  2 L) at room temperature to give a crude ethyl acetate extract (25,1087 g) after removal of the solvent. The ethyl acetate extract (25,1087 g) was isolated by vacuum liquid chromatography on Merck GF254 silica gel using a gradient of n-hexane-ethyl acetate-methanol [Table 1] solvent to give sixteen fractions (A–P). Maceration is a cold extraction method, and it is a simple method. The solvent will penetrate the plant cell wall. It will enter the cell cavity containing the active substance. The active substance, which is the concentrated solution, will be pushed out of the cell because of the difference in concentration between the active substance solution inside and outside the cell [8]. Ethyl acetate is expected to extract polar, semipolar and nonpolar compounds [9]. The choice of ethyl acetate solvent also aims to extract the triterpenoids present in the leaves completely.

Fraction C (4,6497 g) [figure 1] was subjected to column chromatography on silica gel using n-hexane: ethyl acetate (96: 4) as a solvent to give sixteen subfractions (C1–C16). Subfraction C3 (3,0981 gram) was further isolated by column chromatography on silica gel using n- using a gradient of n-hexane-ethyl acetate [Table 2] solvent to give seven fractions (K1.1–K1.7). Subfraction K1.2 – K1.3 as K2 (2,514 g) was subjected to column chromatography on silica gel using n-hexane: ethyl acetate (95: 5) as a solvent to give ten subfractions (K2.1–K2.10). Subfraction K2.3 – K2.7 as K3 (2,4160 g) was subjected

to column chromatography on silica gel using n-hexane: ethyl acetate (98: 2) as a solvent to give five subfractions (K3.1–K3.5). Subfraction K3.2 as K4 (2,0160 g) was subjected to column chromatography on silica gel using n-hexane: ethyl acetate (98: 2) as a solvent to give five subfractions (K4.1–K4.5). Subfraction K4.2 – K4.3 as K5 (1,3140 g) was subjected to column chromatography on silica gel using n-hexane: ethyl acetate: dichloromethane (97,5 : 1,25: 1,25) as a solvent to give six subfractions (K5.1–K5.6). On the TLC plate, only a single purplish-red stain appeared when the plate was sprayed with 10% H<sub>2</sub>SO<sub>4</sub> stain in ethanol and then heated, indicating the presence of triterpenoids [10]. This step was carried out several times until the isolates start to become pure.

The subfractions K25.2 and the K26.2 were combined to become the K1-ODS fraction with a yield weight of 0.3298 grams. The mobile phase that was used is a polar mixture of methanol and aquadest. In this sample, the separation by the reverse phase method is less effective at separating the target fractions in the sample. The distance between fractions that are always close together makes it difficult to isolate [11]. Based on the results of fractionation, 0.1508 grams of the isolate was further isolated by preparative thin-layer chromatography with the composition of isocratic eluent n-hexane: ethyl acetate (9.2:0.8). The difference in R<sub>f</sub> of the compounds obtained from the results of this study indicates a different level of the polarity of the triterpenoid compounds, namely, fraction 2 obtained from this study is more polar than fraction 4, and fraction 4 is more polar than fraction 5. The silanol group on the surface of the TLC silica plate is more polar than fraction 5. polar, so that polar compounds will be retained on the plate and cause the R<sub>f</sub> value to get smaller [12]. Three purified compound suspect of triterpenoids group were isolated [Figure 1].

The weights of isolates 2, 4, and 5 were 29.1 mg 37.6 mg, and 31.1 mg, respectively. The forms of isolates 2, 4, and 5 were colourless crystals soluble in nonpolar solvents. Maximum wavelength of isolate 2 was 234 nm and the provide IR absorption in 2958.96, 2522.28, 1745.84, 1628.08, 1459.52, 1373.23, 1236.83, 1047.75, 846 cm<sup>-1</sup>. Maximum wavelength of isolate 4 was 239 nm and provide IR 2957, 2521.24, 1746.94, 1653.79, 1459.13, 1374.78, 1237.9, 1048.57, 724.82 cm<sup>-1</sup>. Maximum wavelength of isolate 5 was 238 nm and provide IR 2958.98, 2520.63, 1747.06, 1653.77, 1465.89, 1377.35, 1239.62, 1048.99, 724.51 cm<sup>-1</sup>. IR spectrum could find in [figure 2]. The results of the analysis of FTIR absorption patterns obtained from fractions 2,4 and 5 showed the presence of a CH functional group which was indicated by the presence of absorption at wave numbers (2958.96 – 2957) cm<sup>-1</sup>, this indicated the possibility of a methyl group (-CH<sub>3</sub>) and methylene (CH<sub>2</sub>) [13]. This assumption is reinforced by the absorption in the 1465.89 – 1459.13 cm<sup>-1</sup> and 1377.35 - 1373.23 cm<sup>-1</sup> regions, which is absorption from the -CH<sub>2</sub>- and CH<sub>3</sub> bends, which indicates the presence of geminal group dimethyl as a characteristic of triterpenoid compounds [14]. The absorption at 1747.06 – 1745.84 cm<sup>-1</sup> indicated the carbonyl ester group, which is also strengthened by the presence of CO bonds in the ester group at 1239.62 – 1236.83 cm<sup>-1</sup> [15]. The amine groups (1653.77 cm<sup>-1</sup> and 1048.99 cm<sup>-1</sup>) were also detected in isolates 2, 4, and 5. The absorption in 846.00 - 724.51 cm<sup>-1</sup> is absorption with strong intensity of the range CH on the alkene group [15].

In a previous study, the new steroid compound in Figure 4 was isolated from the bark of *Aglaia angustifolia* (Miq.) and the name of the compound is (22E,24S)-24 propylcholest-5en-3 $\alpha$ -acetate [15]. These compounds have several similarities with the absorption of wavenumbers in the infrared spectrum with isolates 2,4 and 5, which were isolated in this study, as shown in Figure 19. These similarities include aliphatic CH (2956.96 cm<sup>-1</sup> and 2857.69 cm<sup>-1</sup>), carbonyl ester (1747 cm<sup>-1</sup>), an ester group (1239.62 cm<sup>-1</sup>). However, isolate 5 contained additional functional groups, which were thought to be amine groups (1653.77 cm<sup>-1</sup> and 1048.99 cm<sup>-1</sup>). Isolates 2, 4, and 5 were thought to have the same basic structure as (22E,24S)-24 propylcholest-5en-3 $\alpha$ -acetate, but had different substituents. This will affect the physical and chemical properties.



#### IV. CONCLUSIONS AND NEWNESS

The maceration method using ethyl acetate as a solvent can extract triterpenoid compounds from the leaves of *A. angustifolia*. The ethyl acetate extract from the leaves can be fractionated and purified using the KCV, KKG and KLTP methods. Isolation and purification of triterpenoids from the ethyl acetate extract of *A. angustifolia* can be conducted by using a combination of solvents (n-hexane, ethyl acetate, dichloromethane and methanol). Isolates of suspected triterpenoid compounds have a C=O chromophore that absorbed UV light and were detected to have a geminal dimethyl group when analyzed by FTIR.V.

#### REFERENCES

- [1] et al. Inada, A., "Pregnanes And Triterpenoid Hydroperoxides From The Leaves Of *Aglaia grandis*," *Phytochemistry*, vol. 45, no. 6, pp. 1225–1228, 1997.
- [2] D. H. P. Huspa, *Senyawa Antikanker Dan Insektisida Dari Genus AGLAIA*. 2009.
- [3] S. Atun, "Metode Isolasi dan Identifikasi Struktural Senyawa Organik Bahan Alam," *J. Konserv. Cagar Budaya*, vol. 8, no. 2, pp. 53–61, 2014, doi: 10.33374/jurnalkonservasicagarbudaya.v8i2.132.
- [4] H. G. Anurag, K., R. Irchaiya, A. Yadaf, N. Gupta, S. Kumar, A. Prakash, and, "Metabolites in plants and its classification," *World J. Pharm. Pharm. Sci.*, vol. 4, no. 1, pp. 287–305, 2015.
- [5] Akbar and Hendra Rizki, "Isolasi Dan Identifikasi Golongan Flavonoid Daun Dandang Gendis (*Clinachantus Nutans*) Berpotensi Sebagai Antioksidan [skripsi]," *Skripsi*, 2010.
- [6] B. R. Situmeang, A. R. Suparman, M. Kadarusman, A. S. Parumbak, and T. Herlina, "Isolasi Senyawa Triterpenoid dari Ekstrak Etil Asetat Pirdot (*Saurauia vulcani*. Kurth)," *J. Kim. Val.*, vol. 4, no. 2, pp. 93–97, 2018, doi: 10.15408/jkv.v4i2.7272.
- [7] R. P. Hutagaol *et al.*, "A Triterpenoid From *Aglaia angustifolia* Miq Stem Bark," *Res. J. Chem. Enviroment*, vol. 2020, no. 1, pp. 3–8, 2020, doi: 10.3390/M1112.
- [8] Mukhriani, "Ekstraksi, Pemisahan Senyawa, dan Identifikasi Senyawa Aktif," *J. Kesehat.*, vol. 7, no. 2, pp. 361–367, 2014, doi: 10.17969/agripet.v16i2.4142.
- [9] F. Firdayani and T. Winarni Agustini, "Ekstraksi Senyawa Bioaktif sebagai Antioksidan Alami *Spirulina Platensis* Segar dengan Pelarut yang Berbeda," *J. Pengolah. Has. Perikan. Indones.*, vol. 18, no. 1, pp. 28–37, 2015, doi: 10.17844/jphpi.2015.18.1.28.
- [10] S. Hartanto and N. Hidajati, "Isolasi Dan Identifikasi Senyawa Terpen Dari Ekstrak Kulit Batang *Aglaia Odorata* Lour ( *Meliaceae* ) Isolation And Identification Of Terpene Compounds From The Bark Of The Plant Extract *Aglaia Odorata* Lour," *J. Chem. UNESA*, vol. 1, no. 1, pp. 93–99, 2012.
- [11] C. C. Satolom, "Isolasi Senyawa Flavonoid Pada Biji Pinang Yaki (*Areca vestiaria* Giseke)," *J. MIPA*, vol. 4, no. 1, p. 40, 2015, doi: 10.35799/jm.4.1.2015.6903.
- [12] I. Savitri, L. Suhendra, and N. M. Wartini, "Pengaruh jenis pelarut pada metode maserasi terhadap karakteristik ekstrak *Srgassum polycystum*," *J. Rekayasa dan Manaj. Agroindustri*, vol. 5, no. 3, pp. 93–101, 2017.
- [13] K. Anam, "Isolasi Senyawa Triterpenoid dari Alga Merah (*Euclidean cottoni*) Menggunakan Kromatografi Lapis Tipis (KLT) dan Analisisnya Menggunakan Spektrofotometer UV-Vis dan FTIR," *Skripsi*, pp. 22–23, 2015.
- [14] R. Ikalinus, S. Widyastuti, and N. Eka Setiasih, "Skrining Fitokimia Ekstrak Etanol Kulit Batang Kelor (*Moringa Oleifera*)," *Indones. Med. Veterinus*, vol. 4, no. 1, pp. 71–79, 2015.
- [15] B. D. Mistry, *A Handbook of Spectroscopic Data Chemistry*, vol. 36, no. 2. 2009.

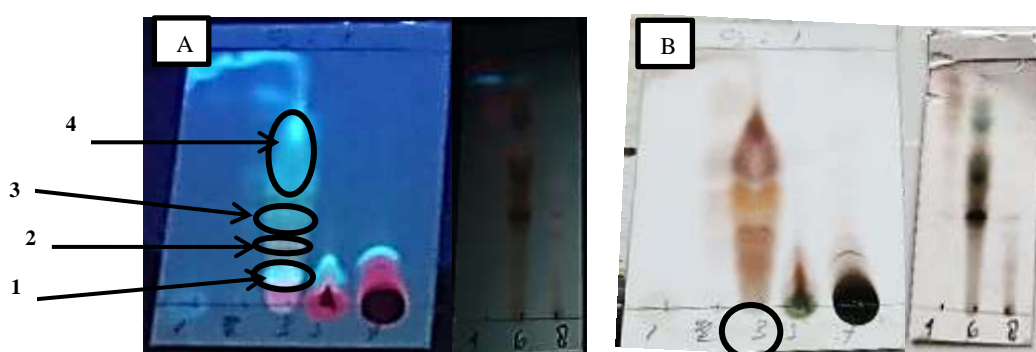
## TABLES AND FIGURES

Table 1 Eluen Composition of KCV

Fraksi	<i>n</i> -hexana (mL)	Etil asetat (mL)	Metanol (mL)
(A)	300	0	0
(B)	285	15	0
(C)	270	30	0
(D)	255	45	0
(E)	240	60	0
(F)	210	90	0
(G)	180	120	0
(H)	150	150	0
(I)	120	180	0
(J)	60	240	0
(K)	0	300	0
(L)	0	240	60
(M)	0	180	120
(N)	0	120	180
(O)	0	60	240
(P)	0	0	300

Tabel 1. Eluen Composition of Coloumn Chromatography

Fraksi	<i>n</i> -hexana (mL)	Etil asetat (mL)
1	40	0
2	39,2	0,8
3	38,5	1,5
4	36,8	3,2
5	36	4
6	28	12
7	0	40

Figure 1. TLC Results of KCV Isolates After Assisted with 10% H<sub>2</sub>SO<sub>4</sub> Stain In Ethanol, Under UV Light At 254 nm and 365 nm

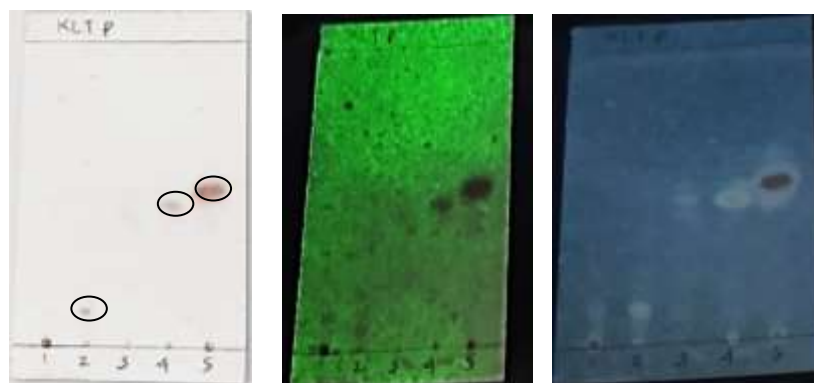


Figure 2. TLC Results of Pure Isolates After Assisted with 10%  $H_2SO_4$  Stain In Ethanol, Under UV Light At 254 nm and 365 nm

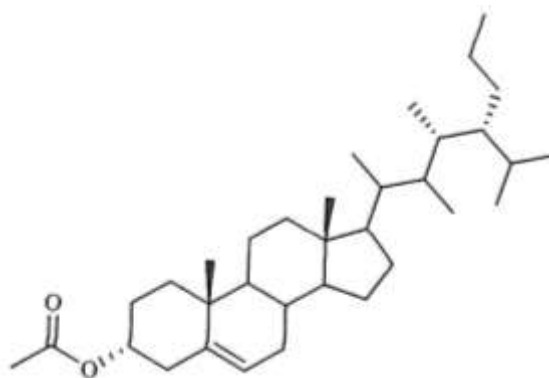


Figure 3. (22E,24S)-24 propylcholest-5en-3 $\alpha$ -asetat

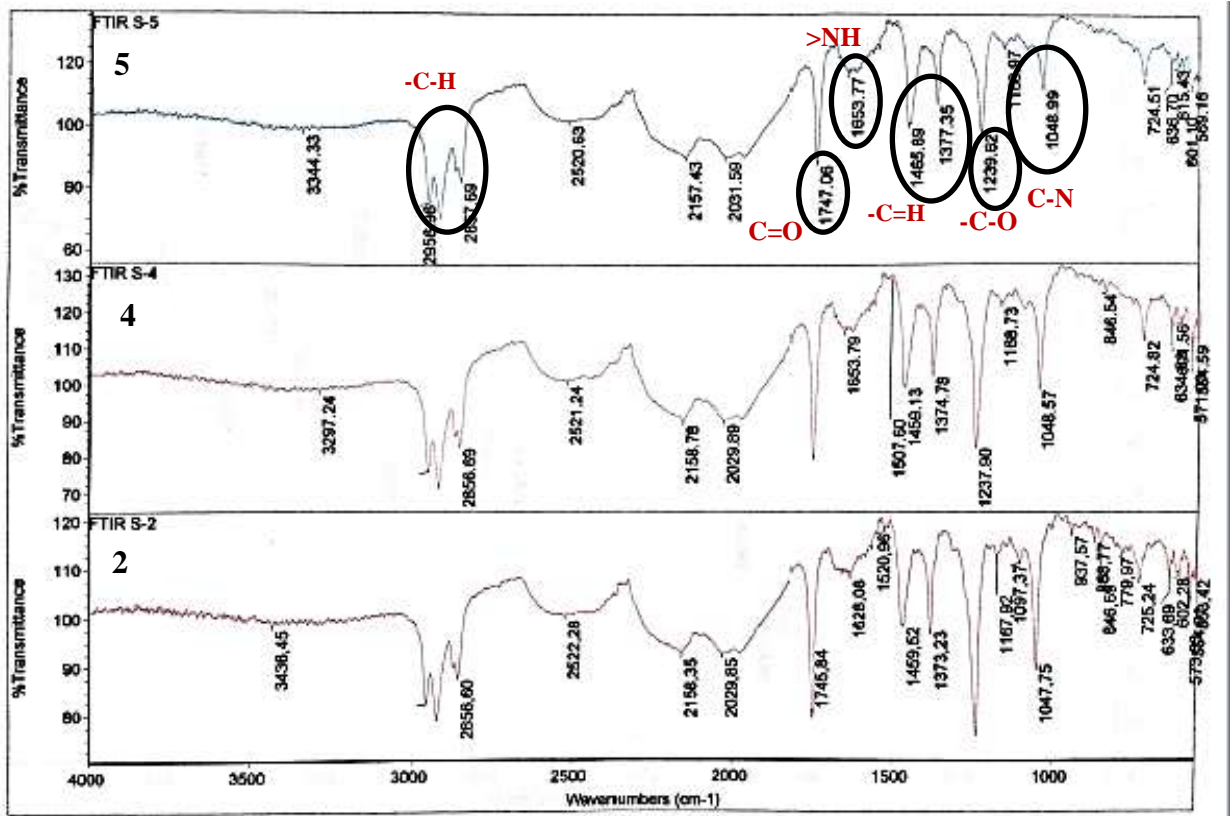


Figure 4. IR Spectrum of Isolate 2,4, and 5

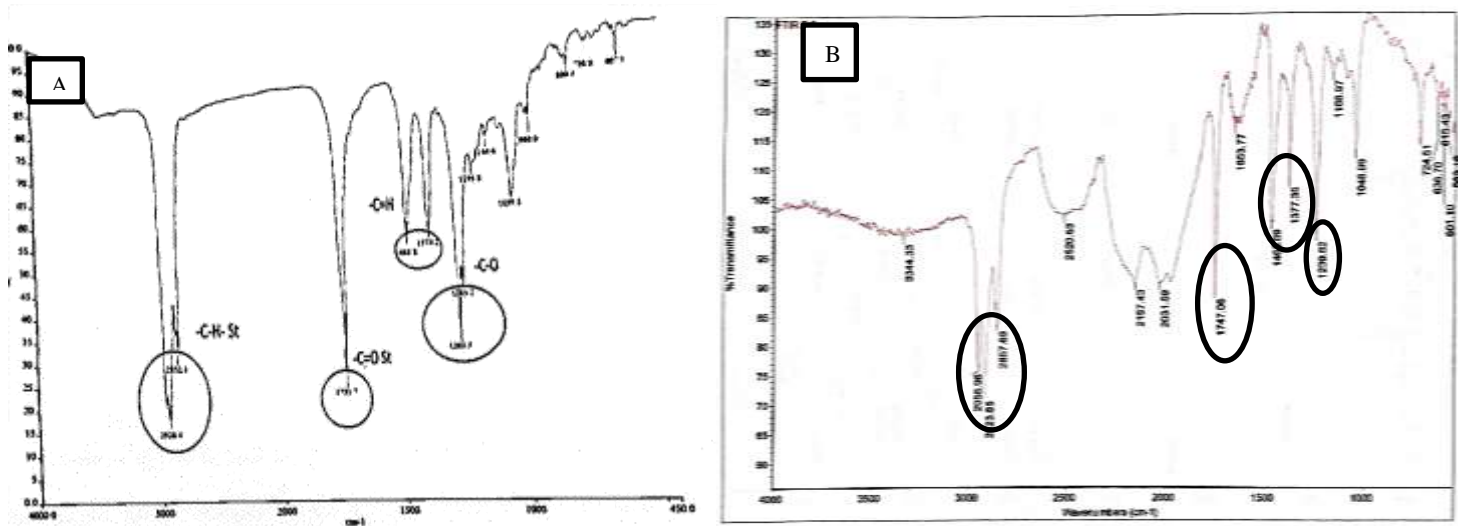


Figure 5. Spektrum IR (A) Senyawa (22E,24S)-24 propylcholest-5en-3 $\alpha$ -asetat (B) Isolat 5

## COUNSELING NUTRITION IN THE FIRST 1000 DAYS OF LIFE FOR STUNTING PREVENTION

Siti Rafika Putri<sup>1</sup>,

<sup>1</sup>Kebidanan, Akademi Kebidanan Al-Ikhlas, Ciawi

sitirafikaputri@yahoo.co.id

---

### Abstract

**Background:** Stunting is a form of the malnutrition of children with growth that is below the standard. Eating a nutritious diet is an important behavior for a child's health and development. Stunting is a nutritional problem caused by the malnutrition for a long time in the first 1000 days of life (HPK) which is a critical period. This resulting in growth disorders in children, namely the child height is lower or shorter (stunted) than the standard age. In Indonesia the incidence of stunting in toddlers is still high, in 2018 showed about 30.8% of toddlers experienced stunting. Stunting in West Java reached 26.21% in 2019 so that in 2022 all cities and districts in west Java became priority locations for stunting including Bogor Regency.

**Purpose:** The purpose of the activity is to improve the nutritional knowledge and behavior of pregnant women and mothers of toddlers in efforts to prevent a stunting.

**Methodology:** Educational activities have themed a nutrition extension in the first thousand days of life for stunting prevention were carried out on 100 mothers consisting of pregnant women and toddler mothers.

**Results:** This activity is carried out in the independent practice of midwives Siti Rafika Putri, the delivery of a material is done a face-to-face using the back sheet media. Educational activities run well and get a good response and an enthusiasm from respondents. This is indicated enthusiastically by respondents to ask questions and discuss the material submitted. The education has provided was also conveyed well from the increase in respondents' knowledge related to stunting by looking at comparisons of a pre-test and post-test results. Therefore, educational activities by focusing the discussion group can continue to be carried out as one of the efforts in improving public knowledge, especially vulnerable groups of nutrition, that is pregnant women and toddlers.

Keywords: Growth, HPK, Malnutrition, Nutrition, Stunting.

---

## I. INTRODUCTION

Stunting is growing down deviation WHO. Stunting for kid down family social economy (WHO, 2014). Stunting have influence cognitive but the grow up and development country because less quality people (Marini & Rokx, 2016). nationality of nutrition high solution nutrition thousand first day activation (1000 HPK). 1000 HPK is step life baby (270 the day) and 730 day 2 year.

Period 1000 day life (1000) HPK is conclusion smart growing stunting have long period repeat life. reason less nutrition impact morbidity. if problem have seriously influence function cognitive level intellectual people. Repeat condition cycle life kids less nutrition period 1000 HPK. Have risk of disease age mature. Impact not only grow physical but mental and intellectual. When adults will be seen from the physical size that is not optimal and the quality of work that is not competitive which results in low productivity and economy (Bappenas, 2015).

The united Nation International Children's Emergency Fund (UNICEF) has disease stunting five years old 149.2 in 2020, growing down 26,7 % comparison 2000 more achieve 203,6 million, although grow stunting not universal in the world. Indonesian stunting baby still high 2018 more 30,8% baby stunting. Stunting in west java achieve number 26,21% 2019. On 2022 city district in west java (location priority stunting Bogor Region).

Women have buy and prepare food and educating family members about healthy food (Halimatussakdiah & Miko, 2016). In addition, the role of women who are closely related to their position in the family, women play an important role in maintaining family health, preparing nutritious food every day and responsible sanitation at home and created a healthy lifestyle of spiritual and social physical life (Al Rahmad & Miko, 2017). Especially during the time of 1000 HPK, woman preparing pregnancy, important know first nutrition pregnant age two years and baby life healthy solution about nutrition (Zahraini, 2013).

Activation 1000 day life, have number infant and maternal mortality will decrease and more up intellectual. Activation effectively change knowledge, because up increase maternal knowledge get activation with the media as a tool (Musfiroh & Wisudaningtyas 2014). Said Kusmawardani, have activation using media flip chart and methodical, have up knowledge 17,6%. after activation task important activation (Kusumawardani, 2012).

## II. METHODOLOGY

Educational activities themed activation nutrition in the first 1000 days of life keep stunting. Activity do at the independent midwife practice Siti Rafika Putri in Kedung Waringin, Bojong Gede Village of Bogor Regency. **Activity since pregnant women or toddler mothers make pregnancy and toddler examination visits at the independent midwife practice Rafika Putri. The activity begins with an order to measure the mother's knowledge of the first 1000 days stunting. Continued with the delivery of material done face-to-face using the back sheet media, and continued with posters according to the question when the pretest are about nutrition in the first 1000 days of life stunting.**

### III. RESULTS AND DISCUSSION

Table 1

Distribution of respondents' frequency based on age, parity, occupation, in independent practice midwives Rafika Putri January - June 2021

No	Characteristic	Sum n=100	Presented (%)
1.	Age		
	≤ 20 - ≥35 years	18	18.0
	20 - 35 years	82	82.0
2.	Education		
	SD-SMP-SMA	49	49.0
	Collage	51	51.0
3.	Occupation		
	Worker	32	32.0
	Hausewife	68	68.0

Table 2

Knowledge Respondent about Nutrition 1000 days of life Stunting, in Independent Practice Midwives Rafika Putri January - June 2021

No	Knowledge	Sum n=100	Presented (%)
1.	Pre test		
	Up	41	41.0
	Down	59	59.0
2.	Post test		
	Up	87	87.0
	Down	13	13.0

Based on table 1 known characteristic respondent based high age respondent category age 20 - 35 more respondent (82 %). Grow up age attitude 1000 days of life matter grow up age for thinking someone knowledge better. This is allegedly because the older the age, the more the catch and mindset of a person, so that the knowledge gained is getting better. Said Rahmawati (2013) up age if knowledge better with access information, interview and mobility up. Suhayat (2010) said knowledge about first influence attitude possible change. known percentage education respondent up college or university 51 respondent (51 %). Level education influence get information and value new. Discovery Rahmawati (2013) said up education more easy for get information. Mutualism significant between education attitude 1000 days of life mutualism with knowledge have respondent grow up knowledge attitude have respondent better discovery. Trisnawati (2016) have respondent knowledge better support nutrition 1000 days of life known society get respondent mother work 68 respondent (68,0 %). Work can affect a person's knowledge through information that is in the work environment. Effective working groups involved in sharing external knowledge include the exchange of information and feedback with customers, organizational experts, and others outside the group. Thus, it that the job allows contact with certain professions or directly get access to information that can affect respondents' knowledge about 1000 HPK.

Based on table 2 the level of knowledge of respondents follow activity get question Maternal knowledge is grouped into 2 categories, good knowledge and less knowledge. Good knowledge if the mother can answer the right question as much as  $\geq 7$  questions and less knowledge when the mother answers the right question as much as  $< 7$  questions from 10 questions. Known up knowledge mother element activity pretest and post test. **At the time of pre-test the level of knowledge of mothers with less categories was 59 people (59%), while those with good categories were as many as 8 people (41%). At the time of post-test the level of knowledge of mothers with less categories was 13 people (13%) and those with good categories were as many as 87 people (87%).** Based on result knowledge mother level increases after get education stunting. Knowledge mother hope conscious mother for level food not stunting. Process grow kids better without retard.

#### IV. CONCLUSIONS AND NEWNESS

Activity society servitude such as those carried out by servicemen through cooperation between midwife independent practice with college grow knowledge society. Specially mother to prevent stunting. Understand nutrition effectively get knowledge, attitude, and behavior to prevent stunting. **Limit find activity servitude such as add respondent limit activity focus group and do situation and condition pandemic, impossible activity yet. Limit change servitude more effective in delivering material.**

#### V. REFERENCES

1. AL Rahmad, A. H., Miko, A., & Hadi, A. (2013). Kajian Stunting Pada Anak Balita Ditinjau Dari Pemberian ASI Eksklusif, MP-ASI, Status Imunisasi Dan Karakteristik Keluarga Di Kota Banda Aceh. *Jurnal Kesehatan Ilmiah Nasuwakes Poltekkes Aceh*, 6(2), 169-184.
2. Al Rahmad, A., & Miko, A. (2017). Peningkatan Pengetahuan Calon Pengantin melalui Konseling ASI Eksklusif di Aceh Besar. *Indonesian Bulletin of Health Research*, 45(4), 249-256.
3. Bappenas. (2015). Laporan Pencapaian Tujuan Pembangunan Milenium di Indonesia 2014 (Kesembilan). Jakarta: Kementerian Perencanaan Pembangunan Nasional.
4. Halimatussakdiah, H., & Miko, A. (2016). Hubungan Antropometri Ibu Hamil (Berat Badan, Lingkar Atas, Tinggi Fundus Uteri) dengan Reflek Fisiologi Bayi Baru Lahir Normal. *AcTion: Aceh Nutrition Journal*, 1(2), 88-93
5. Kemenkes RI. 2018. Riset Kesehatan Dasar; RISKESDAS. Jakarta: Balitbang Kemenkes RI
6. Kusumawardani, E., Arkhaesi, N., & Hardian, H. (2012). Pengaruh Penyuluhan Kesehatan Terhadap Tingkat Pengetahuan, Sikap dan Praktik Ibu Dalam Pencegahan Demam Berdarah Dengue Pada Anak. (Skripsi, Fakultas Kedokteran UNDIP).
7. Rahmawati A, Bahar B, Salam A. 2013. Hubungan antara Karakteristik Ibu, Peran Petugas Kesehatan dan Dukungan Keluarga dengan Pemberian Asi Eksklusif di Wilayah Kerja Puskesmas Bonto Cani Kabupaten Bone [skripsi]. Makassar (ID): Universitas Hasanuddin.
8. Suharyat Y. 2010. Hubungan antara Sikap, Minat, dan Perilaku Manusia. *Region* 1(2): 1-19
9. Trisnawati Y, Purwanit S, Retnowati M. 2016. Studi Deskriptif Pengetahuan dan Sikap Ibu Hamil tentang Gizi 1000 Hari Pertama Kehidupan di Puskesmas Kokaraja Kabupaten Banyumas. *Jurnal Kebidanan* 08(02): 127- 224
10. Zahraini, Y. (2013). 1000 Hari Pertama Kehidupan: Mengubah Hidup, Mengubah Masa Depan. <http://gizi.depkes.go.id/1000-hari-mengubah-h-hidup-mengubah-masa-depan>



## **Chemical and Sensories Characteristics Hard Candy Habbatussauda (*Nigella Sativa*) and Honey (*Apis Mellifera Linneus*)**

**Wilna Iznillah<sup>1</sup>, Lia Amalia, Siti Aminah**

Program Magister of Food Technology,, University of Djuanda Bogor, Indonesian  
Email: [wilnaiznilillah1603@gmail.com](mailto:wilnaiznilillah1603@gmail.com), [lia.amalia@unida.ac.id](mailto:lia.amalia@unida.ac.id), [sitiaminah@unida.ac.id](mailto:sitiaminah@unida.ac.id)<sup>1</sup>

---

### **Abstract**

Candy is a food product that is liked and easily accepted by all circles. This study aims to diversify Black Seed and honey as ingredients for food products of hard candy. The addition of Black Seed extract as the use of spices and honey into hard candy is expected to increase the functional value of hard candy products. This study used a factorial Completely Randomized Design (CRD) with two factors, the concentration of habbatussauda powder (1 g, 3 g, 5 g) and the concentration of honey (5 g, 10 g, 15 g). Product analysis includes chemical analysis of reducing sugar and saccharose levels as well as sensory and hedonic quality tests as determinants of the selected product. Chemical analysis of moisture content, ash content, fat content and protein content in selected products. The data analysis used was ANOVA with Duncan's Advanced Test with a confidence interval of 95%. The results showed that the hard candy selected was the ratio of 1 g Black Seed with the addition of 15 g honey had a reducing sugar content of 18.70%, 77.05% of saccharose content. Black seed hard candy and selected honey have water content of 1.03%, ash content of 1.15%, fat content of 2.57%, and protein content of 5.72%. The results of the sensory test showed that Black Seed and honey had a golden yellow color, very hard texture, not bitter taste, and the scent did not smell Black Seed. The hedonic test results of the addition of 1 g Black Seed Extract and 15 g honey had the highest preference values in the parameters of color, taste and texture.

**Keywords:** Hard candy, black seed, honey

---

## I. INTRODUCTION

Performance Candy is one of the food products that is easily liked and easily accepted by almost all circles. According to BPOM (2018) [1], consumption of hard candy in Indonesia is 8 g/person/day. Hard candy is a candy that has a hard texture, shiny appearance (glossy), looks clear which is usually formed from the main ingredients sucrose or sugar, glucose syrup and other ingredients that can be added to give a better taste sensation. Currently, candy products are being developed with various additional ingredients that have health benefits, one of which is the addition of spices.

Spices are scentic plant parts that are usually used as cooking spices, flavor enhancers, fragrances, and food preservatives whose use is limited. Black Seed or Black Cumin (*Nigella sativa*) is a spice plant whose use has been widely used as traditional medicine. This Black Seed spice has been used for traditional medicine, as a health promotion or treatment of various diseases, both in Indonesia and other countries. Black Seed spice has many benefits for the health of the human body because it contains nutrients including carbohydrates, fats, proteins and vitamins. Black Seed has a distinctive taste and scent, namely spicy and bitter like a combination of black pepper, onion, and oregano. The taste of Habatussauda is a bit bitter so it is necessary to add other ingredients to increase acceptance, one of which is a sweetener [2].

Honey is a natural sweetener that is often used as a substitute for sugar. The sweetness of honey comes from flower nectar taken by honey bees so honey is also referred to as one of the best natural sweeteners. In addition, honey has a high fructose content. that the sweetness level of honey is 25% above sugar refined or granulated sugar. honey has many health benefits, because honey contains carbohydrates, proteins, vitamins, and minerals [3].

The addition of Black Seed powder as the use of spices and honey into the hard candy is expected to increase the functional value of the product hard candy, so as to produce food products that can be beneficial to health. Therefore, it is necessary to develop diversification of Black Seed and honey products which is one of the strategic steps in an effort to increase the functional value of these commodities. One form of product diversification is by processing it into hard candy using additional Black Seed and honey.

## II. METHODOLOGY

### Tools and Materials

The tools used in this study were digital scales, stoves, pans, suction cups, filter cloths, candy molds, thermometers and other chemical tools used in the test.

The materials used in this study were granulated sugar (sucrose) with the brand Gulaku, glucose syrup, Black Seed, honey, and water.

### Time and Place of Research

The research was conducted from December 2020 to May 2021 at the UPT Sartika Laboratory of the Faculty of Halal Food Science, Djuanda University, Bogor.

### Research Design

Processing hard candy using the variation factor of the addition of Black Seed powder and the variation factor of the addition of honey. 70 g of sucrose and 40 ml of water were heated at 110 C for 5-7 minutes then added 30 g glucose syrup heated to a temperature of 135<sup>0</sup> C - 150 C for 15-20 minutes. The temperature is lowered to 60-70 C then Black Seed powder and honey are added. Formulahard candy then molded and cooled to harden. The candy products that have been produced are subjected to chemical tests which include tests for reducing sugar and saccharose content, as well as sensory quality tests and hedonic tests to obtain the selected product. The selected candy was then subjected to chemical analysis in the form of determining the water content test, ash content test, fat content test, and protein content test.

### Experimental Design

The experimental design used in this study was a two-factor completely randomized design (CRD). The first factor is the concentration of Black Seed powder (A) with three treatment levels (A1 = 1 g; A2 = 3 g; A3 = 5 . The second factor was honey concentration (B) with three treatment levels (B1=5 g; B2=10 g; B3=15 g) with two replications.

### Product Analysis

Candy products for all treatments were subjected to a chemical test which included a test for reducing sugar content and a test for saccharose content as well as a sensory quality test and a hedonic test to obtain the selected product. Sensory test includes sensory quality test with parameters of color, taste, scent, and texture. Hedonic test with parameters of color, taste, scent, texture, and overall conducted by 30 semi-trained panelists [4]. The selected product was determined based on the results of chemical analysis of reducing sugar content test [5], and saccharose content test, as well as sensory quality test and the best hedonic test. Hard candy selected and then carried out chemical analysis in the form of determining the water content test, ash content, fat content test and protein content test [6].

### Data Analysis

Analysis of the data used in this study is to use the SPSS 16 program (Statistical Product and Service Solution). Statistical analysis used in this study is the variance test (ANOVA) which aims to determine whether the treatment that has been used in this study has a significant effect or not. If the p value  $<0.05$ , the treatment has a significant effect, it will be continued with Duncan's further test at a 95% confidence interval (significant level = 0.05).

## III. RESULTS AND DISCUSSION

### Technology for Making Black Seed Hard Candy and Honey

Making process hard candy Black Seed and Honey includes material preparation, heating of sucrose and water, addition of glucose, thickening, cooling and addition of Black Seed and honey, printing, and packaging. The process of processing Black Seed hard candy and honey refers to Kurnia's research [7], starting with heating 70 g of sucrose in 40 ml of water until the temperature reaches  $110^{\circ}\text{C}$  for 5-7 minutes, then adding 30 g of glucose syrup while continuing to stir until evenly mixed and heated to a temperature of  $135^{\circ}\text{C}$ - $150^{\circ}\text{C}$  for 15-20 minutes. The temperature was lowered to  $60$ - $70^{\circ}\text{C}$  then added Black Seed powder which had been brewed with 10 ml of water at  $70^{\circ}\text{C}$  and honey, then stirred for 1 minute, then molded and cooled until hardened. Sucrose is cane sugar or granulated sugar that is often used daily. Sucrose in addition to having a function as the main ingredient in the manufacturing process hard candy it also has a function as a sweetener, preservative, texture-forming, and flavor forming [8]. The addition of glucose syrup serves to provide good texture because glucose syrup can inhibit the crystallization process and also affect the viscosity so as to prevent stickiness of the candy. Black Seed and honey are added at the cooling stage or when the temperature is lowered so as not to damage the active substances in Black Seed, namely the essential oil and content in honey. Essential oils have volatile properties and are not resistant to heat. [9].

### Chemical Properties Hard Candy Black Seed and Honey

#### Reducing Sugar Level

The content of reducing sugar is one of the parameters that will determine the characteristics and quality of the product hard candy. Reducing sugars are sugars that have the ability to reduce other substances, because they have free aldehyde or ketone groups [10]. which includes reducing sugars are glucose, fructose, galactose, maltose, and lactose, while non-reducing sugars are sucrose. Reducing sugar content in hard candy high it tends to stick. Reducing sugar content in hard candy derived from glucose syrup and sucrose inversion results [11]. The average value reducing sugar content hard candy Black Seed Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	17,73 <sup>a</sup>	18,05 <sup>a</sup>	18,70 <sup>ab</sup>	<b>18,16<sup>a</sup></b>
A2 (3 g)	20,05 <sup>abc</sup>	21,07 <sup>abc</sup>	21,58 <sup>abc</sup>	<b>20,90<sup>a</sup></b>
A3 (5 g)	22,95 <sup>abc</sup>	24,49 <sup>bc</sup>	25,89 <sup>c</sup>	<b>24,44<sup>p</sup></b>
<b>Average</b>	<b>20,24<sup>x</sup></b>	<b>21,20<sup>x</sup></b>	<b>22,05<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the value of reducing sugar content hard candy Black Seed and honey ( $P < 0.05$ ). Based on Table it can be seen that the higher the use of Black Seed powder, the lower the reducing sugar content. This is presumably due to the content contained in Black Seed which is acidic, namely in the form of vitamin C. Hard candy processed using materials that have acidic properties, the reducing sugar

content is high because most of the sucrose or granulated sugar will be hydrolyzed or decomposed into reducing sugars, namely glucose and fructose. Black Seed has vitamin C of 7.7 mg/100 g [12]. Value of reducing sugar content required in SNI Hard candy 01-3547-2008 which is a maximum of 24%. Results obtained from reducing sugar content hard candy Black Seed and Honey showed that seven treatments had met the requirements of SNI and two treatments had a higher reducing sugar content value or did not meet the requirements, namely hard candy with the addition of Black Seed powder (A3) 5 g and the addition of honey (B2) 10 g has a reduced sugar content value of 24.49%. Then treatment with the addition of Black Seed powder (A3) 5 g and the addition of honey (B3) 15 g had a reducing sugar content value of 25.89%.

### Saccharose Level

The candy making process must pay attention to the ratio between sucrose and glucose because if there is an error in the ratio it will cause graining or crystallization and also sticking or sticky. Saccharose content is one of the parameters that affect the quality hard candy. Average value of saccharose content hard candy Black Seed and Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	88,00 <sup>d</sup>	84,27 <sup>cd</sup>	77,05 <sup>bc</sup>	<b>83,11<sup>p</sup></b>
A2 (3 g)	73,43 <sup>b</sup>	69,57 <sup>b</sup>	68,09 <sup>b</sup>	<b>70,36<sup>q</sup></b>
A3 (5 g)	56,91 <sup>a</sup>	55,21 <sup>a</sup>	54,82 <sup>a</sup>	<b>55,65<sup>r</sup></b>
<b>Average</b>	<b>72,78<sup>x</sup></b>	<b>69,68<sup>xy</sup></b>	<b>66,65<sup>y</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder and honey as well as the interaction of Black Seed and honey had an effect on the saccharose content. hard candy Black Seed and honey ( $P < 0.05$ ). Based on Table, it can be seen that the higher the use of Black Seed powder and honey, the lower the saccharose content is due to the acid content in Black Seed powder and honey in the form of vitamin C, which is 7.7 mg/100 g in Black Seed and 4.00 mg/100 g in honey [13]. The acid content in nutmeg is partly in the form of vitamin C. The saccharose content value required in SNI Hard Candy 01-3547-2008 is at least 35%. The results obtained from the levels of saccharose hard candy Black Seed and Honey showed that all treatments had met the SNI requirements on sweets.

### Sensory and Hedonic Quality Test Hard Candy Black Seed and Honey

This test uses 30 semi-trained panelists. Sensory and hedonic quality tests use a line scale, each boundary mark is labeled with a description of the intensity. Description of intensity 0 cm - 10 cm sensory quality test of color parameters on the left end shows a brownish yellow color, while the right end shows a golden yellow color. The taste parameter at the left end indicates a non-bitter taste, while the right end indicates a bitter taste. The scent parameter at the left end shows the smell of Black Seed not being smelled, while the right end shows the smell of Black Seed. The texture parameter at the left end indicates a hard texture, while the right end indicates a very hard texture. An example of a hedonic test questionnaire can be seen in Appendix 4. A description of the intensity of 0 cm - 10 cm of the hedonic test at the left end indicates a very dislike parameter, while the right end indicates a very like parameter.

### Sensory Quality Test

#### Color

Color is a quality attribute parameter that can be captured by the eye or the sense of sight so that color is very important in determining consumer acceptance. color is a very important factor in determining the visual assessment of panelists [14]. The average value color parameter hard candy Black Seed Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	7,08 <sup>c</sup>	7,07 <sup>c</sup>	7,32 <sup>c</sup>	<b>7,16<sup>p</sup></b>
A2 (3 g)	6,43 <sup>c</sup>	5,96 <sup>bc</sup>	5,21 <sup>bc</sup>	<b>5,87<sup>p</sup></b>
A3 (5 g)	4,15 <sup>ab</sup>	2,18 <sup>a</sup>	1,82 <sup>a</sup>	<b>2,72<sup>q</sup></b>

**Average**                      **5,89<sup>x</sup>**                      **5,07<sup>x</sup>**                      **4,78<sup>x</sup>**

The results of the analysis of variance ANOVA test indicate that the addition of Black Seed powder has an effect on color sensory hard candy Black Seed and honey ( $P < 0.05$ ). Color quality range hard candy Black Seed and Honey range from 1.82-7.32 which means the color range hard candy Black Seed and the resulting honey are golden yellow. Color hard candy which is produced because it comes from the natural color of black cumin seeds, which is dark black in color. Color hard candy Besides being determined by the natural color of the main ingredients added, it is also determined by the cooking process.

### Taste

Taste is a quality parameter that can be captured by the sense of taste so that taste affects consumer acceptance. Taste can arise from the food itself or because of the addition of other substances Hard candy taste parameter average value hard candy Black Seed and Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	2,86 <sup>abc</sup>	2,11 <sup>a</sup>	2,53 <sup>ab</sup>	<b>2,50<sup>q</sup></b>
A2 (3 g)	2,54 <sup>ab</sup>	2,80 <sup>abc</sup>	3,34 <sup>bcd</sup>	<b>2,89<sup>q</sup></b>
A3 (5 g)	3,08 <sup>bc</sup>	3,59 <sup>cd</sup>	4,12 <sup>d</sup>	<b>3,59<sup>p</sup></b>
<b>Average</b>	<b>2,83<sup>x</sup></b>	<b>2,83<sup>x</sup></b>	<b>3,33<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the taste sensor hard candy Black Seed and honey ( $P < 0.05$ ). Taste quality range Tingkathard candy Black Seed and Honey range from 2.1-4.12 which means the taste range hard candy Black Seed and the resulting honey are not bitter. Black Seed has a bitter taste because it contains a bitter substance called nigelline. Black Seed powder has a bitter taste and specific odor because it contains nigelline and essential oils [15].

### Scent

Scent is a quality attribute parameter that can be captured by the sense of smell so that the scent can arouse appetite which is very influential in determining consumer acceptance. Average value of scent sensory quality hard candy Black Seed and Honey.

Habbatussauda Powder	Madu			Rata-rata
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	2,95 <sup>ab</sup>	2,80 <sup>a</sup>	3,53 <sup>abc</sup>	<b>3,09<sup>r</sup></b>
A2 (3 g)	3,71 <sup>bcd</sup>	3,78 <sup>cd</sup>	4,12 <sup>cd</sup>	<b>3,87<sup>q</sup></b>
A3 (5 g)	4,24 <sup>cd</sup>	4,50 <sup>d</sup>	4,16 <sup>cd</sup>	<b>4,30<sup>p</sup></b>
<b>Average</b>	<b>3,63<sup>x</sup></b>	<b>3,69<sup>x</sup></b>	<b>3,94<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the scent sensory hard candy Black Seed and honey ( $P < 0.05$ ). Scent quality range level hard candy Black Seed and Honey, which is around 2.80-4.50 which means the scent range hard candy Black Seed and the resulting honey are in the direction of not smelling Black Seed. Scent hard candy there is no smell of Black Seed because the ingredients are added while still hot and try to keep it hot for a while. The process of making hard candy if flavor added while it is still hot and for a while after the addition, try to keep it hot then loss can occur flavor which is volatile. Black Seed contains volatile essential oils.

### Texture

Texture is one of the determinants of quality hard candy that need to be considered, because it is closely related to the degree of consumer acceptance. The average value of the sensory quality of the texture hard candy Black Seed and Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	5,67 <sup>a</sup>	7,26 <sup>a</sup>	6,54 <sup>a</sup>	<b>6,49<sup>p</sup></b>

<b>A2 (3 g)</b>	6,36 <sup>a</sup>	7,38 <sup>a</sup>	6,30 <sup>a</sup>	<b>6,68<sup>P</sup></b>
<b>A3 (5 g)</b>	6,71 <sup>a</sup>	6,37 <sup>a</sup>	6,14 <sup>a</sup>	<b>6,41<sup>P</sup></b>
<b>Average</b>	<b>6,25<sup>x</sup></b>	<b>7,00<sup>x</sup></b>	<b>6,33<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder, the addition of honey, and the interaction treatment of Black Seed powder and honey had no significant effect on the sensory texture. hard candy Black Seed and honey ( $p>0.05$ ). Texture quality range hard candy Black Seed and Honey, namely ranged from 5.67-7.38, meaning the texture range hard candy Black Seed and the resulting honey are very hard. All treatments hard candy have a texture that is not different from one another. This is because the levels of sucrose and glucose used are the same. The comparison of sucrose and glucose syrup used will determine the texture of the resulting candy.

### Hedonic Test Color

Color is one of the parameters that becomes the main attraction in consumer assessment and acceptance. The color of a product can affect the consumer's good or bad impression of a food product and the assessment of the color parameters of a food product can be done by seeing with the senses. The range hedonic value of color hard candy Black Seed Honey

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
<b>A1 (1 g)</b>	6,04 <sup>b</sup>	6,31 <sup>b</sup>	6,86 <sup>b</sup>	<b>6,40<sup>P</sup></b>
<b>A2 (3 g)</b>	6,80 <sup>b</sup>	6,82 <sup>b</sup>	5,75 <sup>ab</sup>	<b>6,46<sup>P</sup></b>
<b>A3 (5 g)</b>	5,30 <sup>ab</sup>	4,33 <sup>a</sup>	4,16 <sup>a</sup>	<b>4,60<sup>q</sup></b>
<b>Average</b>	<b>6,04<sup>x</sup></b>	<b>5,82<sup>x</sup></b>	<b>5,59<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the hedonic color hard candy Black Seed and honey ( $P<0.05$ ). The level of the panelists' preference for color hedonichard candy Black Seed and Honey ranged from 4.16-6.86, which means the hedonic value range for color hard candy the result is in the direction of very like. The addition of Black Seed powder affects the preference value of the color parameter hard candy. It is suspected that candy with a high concentration of Black Seed has a lower level of acceptance of the color parameter.

### Taste

Taste is one of the most important characteristics or parameters in determining the acceptability of a product hard candy. Taste hedonic average hard candy Black Seed and Honey.

Habbatussauda Powder	Honey			Powder
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
<b>A1 (1 g)</b>	6,36 <sup>b</sup>	6,67 <sup>b</sup>	6,67 <sup>b</sup>	<b>6,57<sup>P</sup></b>
<b>A2 (3 g)</b>	6,28 <sup>ab</sup>	6,45 <sup>b</sup>	5,79 <sup>ab</sup>	<b>6,17<sup>P</sup></b>
<b>A3 (5 g)</b>	5,74 <sup>ab</sup>	5,36 <sup>a</sup>	5,42 <sup>a</sup>	<b>5,51<sup>q</sup></b>
<b>Powder</b>	<b>6,13<sup>x</sup></b>	<b>6,16<sup>x</sup></b>	<b>5,96<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the hedonic taste hard candy Black Seed and honey ( $P<0.05$ ). The level of the panelists' preference for tastehard candy Black Seed and Honey range from 5.36-6.67, which means the hedonic value range for color hard candy the result is in the direction of very like. The more Black Seed is added, it will cause after taste bitter on hard candy so that the level of preference of the panelists decreases. The less black cumin that is added will causeafter taste whose bitterness is reduced to hard candy so that the level of preference of the panelists increases. The taste after taste The processed black cumin that the researcher feels is that it comes from the bitter taste of black cumin.

### Scent

Scent is one of the important factors in determining the acceptability of a food product. Scent can determine the delicacy of taste and acceptanceconsumers of a food product produced. Scent hedonic averagehard candy Black Seed and Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	5,31 <sup>abc</sup>	5,73 <sup>cd</sup>	5,71 <sup>cd</sup>	<b>5,58<sup>p</sup></b>
A2 (3 g)	5,33 <sup>abc</sup>	5,97 <sup>d</sup>	5,37 <sup>bcd</sup>	<b>5,55<sup>p</sup></b>
A3 (5 g)	5,18 <sup>abc</sup>	5,03 <sup>ab</sup>	4,74 <sup>a</sup>	<b>4,98<sup>q</sup></b>
<b>Average</b>	<b>5,27<sup>x</sup></b>	<b>5,58<sup>x</sup></b>	<b>5,27<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the hedonic scent hard candy Black Seed and honey ( $P < 0.05$ ). The level of the panelists' preference for scent hard candy Black Seed and Honey ranged from 4.74-5.97, which means the hedonic value range for scent hard candy the result is in the direction of very like. The addition of Black Seed powder affects the preference value of the scent parameter hard candy black seed and honey. It is suspected that sweets with high concentrations of Black Seedy has a lower level of acceptance of the scent parameter than candy with a concentration of hard candy Black Seed and honey are low, because Black Seed it self has several volatile compounds that can contribute a specific scent in the hard candy black cumin.

### Texture

Texture hedonic value hard candy Black Seed and Honey were assessed using a vulnerable scale of 0-10, namely from a scale of dislike to very much like. Texture hedonic mean hard candy Black Seed and Honey

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	5,53 <sup>a</sup>	5,26 <sup>a</sup>	5,89 <sup>a</sup>	<b>5,56<sup>p</sup></b>
A2 (3 g)	5,37 <sup>a</sup>	5,33 <sup>a</sup>	5,41 <sup>a</sup>	<b>5,37<sup>p</sup></b>
A3 (5 g)	5,12 <sup>a</sup>	5,35 <sup>a</sup>	4,76 <sup>a</sup>	<b>5,08<sup>p</sup></b>
<b>Average</b>	<b>5,34<sup>x</sup></b>	<b>5,31<sup>x</sup></b>	<b>5,35<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder, the addition of honey, and the interaction treatment of Black Seed powder and honey had no significant effect on the hedonic texture. hard candy ( $p > 0.05$ ). Panelists preference for textureshard candy. Black Seed and Honey ranged from 4.76-5.89, which means the hedonic value range to texture hard candy the result is in the direction of very like. All treatments hard candy have a texture that is not different from one another, because the hardness will be influenced by the ratio of sucrose and glucose [17].

### Overall

Overall hedonic value hard candy Black Seed and Honey were assessed using a 0-10 cm vulnerable scale, namely from dislike to very like scale. Overall hedonic averagehard candy Black Seed and Honey.

Habbatussauda Powder	Honey			Average
	B1 (5 g)	B2 (10 g)	B3 (15 g)	
A1 (1 g)	5,81 <sup>abc</sup>	6,08 <sup>bc</sup>	6,20 <sup>c</sup>	<b>6,03<sup>p</sup></b>
A2 (3 g)	5,99 <sup>bc</sup>	6,37 <sup>c</sup>	5,90 <sup>bc</sup>	<b>6,09<sup>p</sup></b>
A3 (5 g)	5,92 <sup>bc</sup>	5,38 <sup>ab</sup>	5,15 <sup>a</sup>	<b>5,48<sup>q</sup></b>
<b>Average</b>	<b>5,91<sup>x</sup></b>	<b>5,94<sup>x</sup></b>	<b>5,75<sup>x</sup></b>	

The results of the analysis of variance ANOVA test showed that the addition of Black Seed powder had an effect on the overall hedonic effect hard candy Black Seed and honey ( $P < 0.05$ ). Parameter scoreo verall hard candyBlack Seed and the lowest honey were given by panelists to the treatment of 5 g Black Seed powder with the addition of 15 g honey with a score of 5.15. Parameter score overall hard candy Black Seed and the highest honey were given by panelists to the Black Seed Treatment 3 g with the addition of 10 g honey with a score of 6.37.

### Selection of Selected Products

The results of the chemical analysis of reducing sugar content, saccharose content and sensory and hedonic quality tests showed that the selected product was taken in the test. hard candy Black Seed and honey is a treatment with the addition of Black Seed powder and 15 g of honey, because the value of reducing sugar content and saccharose content has met SNI quality requirements for hard confectionery and the value of sensory quality is closest to what is expected and the value of hedonic that is preferred by panelists.

### Selected Product Analysis

Chemical analysis hard candy Black Seed and honey are treatments with the addition of 1 g Black Seed powder and 15 g selected honey (A1B3).hard candy Black Seed and selected honey were subjected to chemical tests, namely water content, ash content, fat content and protein content. Chemical properties test results hard candy Black Seed and selected honey.

Chemical analysis	SNI	Result
Moisture Content (%)	Maks 3,5	1,03
Ash content (%)	Maks 2,0	1,15
Fat content (%)	-	2,57
Protein content (%)	-	5,72

### Moisture Content

Water content is an important parameter related to the shelf life of foodstuffs because the higher the water content of a food, the shorter the shelf life. Water content is often removed or reduced by drying and evaporation. Hard candy Black Seed and selected honey have water content 1.03%, while in SNI Hard Candy 01-3547-2008 the maximum water content in candy is 3.5%. It can be explained that the water content hard candy Black Seed and selected honey meet SNI 01-3547-2008 quality requirements for hard confectionery that have been determined [18].

### Ash content

Ash content is an important parameter or an important quality requirement in food products, including: hard candy. Ash is a residual substance or residue from the combustion process of organic food ingredients. The ash content contained in a food material is related to the mineral content contained in the food material. Hard candy Black Seed and selected honey have ash content 1.15%, while in SNI Hard Candy 01-3547-2008 the maximum ash content in candy is 2.0%. It can be explained that the level of ash hard candy Black Seed and selected honey meet SNI quality requirements for hard confectionery that have been determined.

### Fat Content

Fat is found in almost all foodstuffs but with different levels or amounts. Fats are compounds that are soluble in organic solvents but insoluble in water. Fat has a very important use or benefit in human life, because fat is a nutritional component that acts as a contributor to energy in the body. Fat as a source of flavor and improve texture in food products as well as a source of solvent for vitamins A, D, E, K. Fat content resulting from hard candy Black Seed and selected honey is 2.57%.

### Protein Content

Protein is a nutrient that has a function for physical growth such as helping bone and muscle growth. Proteins are organic compounds containing C, H, O, and N atoms which are not owned by fats and carbohydrates. protein is one of the nutrients that has very important benefits and cannot be replaced by other nutrients, namely protein can build and maintain cells in body tissues. Protein content produced from hard candy Black Seed and selected honey is 5.72%.



#### IV. CONCLUSIONS AND NEWNESS

##### Conclusion

The results of the chemical test analysis of reducing sugar content have an effect on the addition of Black Seed powder and the Saccharose test has an effect on the addition of Black Seed powder and honey. Sensory quality test parameters of color, taste, effect with the addition of Black Seed powder, while scent affects the addition of Black Seed powder and honey. Hedonic test of color, taste and scent parameters and overall effect with the addition of Black Seed powder, only the texture parameter has no significant effect on hard candy black seed and honey.

Hard candy Black Seed and selected honey are hard candy made by adding 1 g of Black Seed powder and 15 g of honey. The results of the chemical test of reducing sugar content of 18.70% and 77.05% of saccharose showed that it had complied with SNI No. 01-3547-2008 Quality Requirements for Hard Confectionery. Sensory quality test result hard candy Black Seed and Honey show that hard candy Black Seed and honey have a golden yellow color, taste is not bitter, the scent does not smell Black Seed and the texture is very hard. The hedonic test results showed that the panelists liked the color, taste, and texture. Product hard candy Black Seed and selected honey contain 1.03% water content and 1.15% ash content, 2.57% fat content, and 5.72% protein content.

##### Newness

Hard candy made from natural ingredients, namely with the addition of Black Seed spice and honey.

#### V. REFERENCES

1. [PerBPOM] Peraturan Badan Pengawas Obat dan Makanan RI. 2018. Angka Konsumsi Pangan. Badan Pengawas Obat dan Makanan RI.
2. Quamila, Ajeng. 2020. Segudang Manfaat Kesehatan Habbatussauda Jintan Hitam Dari Timur Tengah [internet]. Tersedia pada : <https://hellosehat.com/hidup-sehat/fakta-unik/manfaat-habbatussauda-untuk-kesehatan/#gref>. [08 Desember 2020].
3. Sodhiq, Arif. 2020. Enam Pemanis Alami Ini Bisa Digunakan Sebagai Pengganti Gula [Internet]. Tersedia pada : <https://perkebunan.sariagri.id/57468/enam-pemanis-alami-ini-bisa-digunakan-sebagai-pengganti-gula>. [18 November 2020].
4. Setyaningsih, D., Apriyantono, A., Sari, P M. 2010. Analisis Sensori untuk Industri Pangan dan Agro. IPB Press. Bogor.
5. [BSN] Badan Standardisasi Nasional. 2008. Standar Nasional Indonesia Mutu *Hard Candy*. Jakarta: Badan Standardisasi Nasional.
6. [AOAC] Association of Analytical Communities. 2012. Official Method of Analysis. Washington DC (USA): AOAC. Internasional.
7. Kurnia, T.R. 2009. Pembuatan *Hard Candy* dengan Penambahan bubuk Kelopak Bunga Rosella (*Hibiscus sabdariffa Linn*). Universitas Djuanda Bogor. Bogor.
8. Akib, N.I., Ardiyanti., Rini H., Nurhayani. 2016. Pengembangan *Hard Candy* Yang Mengandung bubuk Jahe Merah (*Zingiber Officinale Var. Rubrum*) Sebagai Pangan Fungsional Berkhasiat Antibakteri. Prosiding Seminar Nasional Swasembada Pangan. Vol 4 (1):1-8.
9. Nurwati. 2011. Formulasi *Hard Candy* dengan Penambahan bubuk Buah Pedada (*Sonneratia caseolaris*) sebagai Flavor. Skripsi, Institut Pertanian Bogor, Bogor.
10. Indriaty F dan Sjamsiwarni Rs. 2016. Pengaruh Penambahan Sari Buah Nenas Pada Permen Keras. Jurnal Penelitian Teknologi Industri Vol. 8 (2): 129-140.
11. Mandei, J.H., 2014. Komposisi beberapa senyawa gula dalam pembuatan permen keras dari buah Pala. *Jurnal Penelitian Teknologi Industri*, 6(2), pp.1-10.
12. KandunganGizi. 2020. Kandungan Gizi Rempah-rempah biji jintan hitam [internet]. Tersedia pada : <https://kandungangizi.com/rempah-rempah-biji-jintan-hitam>. [23 November 2020].
13. Organisasi. 2017. Isi Kandungan Gizi Madu [internet]. Tersedia pada: [www.organisasi.org](http://www.organisasi.org) [23 November 2020].
14. Alkarim M., Yosi, BM., dan Saifullah. 2012. Formulasi *Hard Candy Lozenges bubuk Daun Legundi (Vitel trifolia L.)*. Majalah Obat Tradisional, Vol 17(1), 15–2.

15. Nutrima. 2019. Manfaat Penambahan Jintan Hitam (Habbatussauda) pada Madu [internet]. Tersedia pada : <https://nutrimasehatalami.com/manfaat-penambahan-jintan-hitam-habbatussauda-pada-madu/>. Diakses pada 20 Febuari 2021.
16. Hayulistya, D.P., Affandi, D.R. and Sari, A.M., 2016. Pengaruh Penambahan Bubuk Jintan Hitam (*Nigella sativa*) Terhadap Aktivitas Antioksidan Permen Jelly Herbal. *Jurnal Teknosains Pangan*, 1(1).
17. Engka D. L. 2016. Pengaruh Konsentrasi Sukrosa dan Sirup Glukosa Terhadap Sifat Kimia dan Sensoris Permen Keras Belimbing Wuluh. Jurusan Teknologi Pertanian Fakultas Pertanian Universitas. Ratulangi.
18. [BSN] Badan Standarisasi Nasional Indonesia. (2018). SNI-8664-2018: Madu. Jakarta: Badan Standarisasi Nasional Indonesia.

# FUNCTIONS OF VISUAL MESSAGES AS PRESENTATION AND PROMOTION MEANS IN CHANGING THE HOKKAN INDONESIA LOGO BY SOCIAL DISTANCING

Nia Rohmaniah<sup>1</sup>, Maria Fitriah<sup>2\*</sup>

<sup>1</sup>Employees of PT. Hokkan Indonesia, <sup>2</sup> Ps. Communication Science, Faculty of Social and Political Sciences, Djuanda University Bogor,

<sup>2</sup>Advisor 1 Study Program. Communication Science, Faculty of Social and Political Sciences, Djuanda University Bogor

Co Author: [rohmaniana317@gmail.com](mailto:rohmaniana317@gmail.com) ; [mariafitriah@unida.ac.id](mailto:mariafitriah@unida.ac.id)

---

## Abstract

Changing the logo within a company has several important aspects. A very significant aspect that must be designed by the company is the existence of a visual message related to the presentation and promotion of a company. The purpose of this study was to determine the visual message in the presentation and promotion of the Hokkan Indonesia logo by social distancing in the vitamin drink packaging of PT. Hokkan Indonesia. This type of research was conducted by using a qualitative descriptive method and in-depth interview techniques. In this case, the researcher will find the problem more clearly and openly by asking the opinion of the interviewer. The analysis used is the analysis of selecting the subject and object to be studied, selecting the subject and object of research that is the target of the analysis. The subjects in this study were PT. Hokkan Indonesia, while the object in this study was the Hokkan logo by social distancing on vitamin drink packaging. The results of this study explained that the visual message that was born from the change in the logo, namely " Meskipun ada jarak karena social distancing kita harus tetap bersatu dan solid". is a presentation of a new identity that has undergone changes with new procedures aimed at instilling awareness to keep a distance but remain solid when producing, and company promotion during the covid-19 pandemic that companies can produce vitamins needed during the covid-19 pandemic.

Keywords: Logo, Presentation, Promotion, Visual Message

---

## I. INTRODUCTION

Based on the interview on September 21, 2020 with the HRD-GA Manager at PT. Hokkan Indonesia Mawardi, PT. Hokkan Indonesia produces Vitamin Drink. Vitamin Drink packaging is deliberately made different because of the change in the logo of PT. Hokkan Indonesia which is in the package. The changing logo of PT. Hokkan Indonesia listed on the packaging, which was initiated by the president director of PT. Hokkan Indonesia Mr. Makoto Udagawa. The lotus flower logo has changed, which is where we are currently following the Government's recommendations regarding social distancing, but the lotus flower logo in the packaging is still attached in the box. The logo has the meaning "Meskipun ada jarak karena social distancing kita harus tetap bersatu dan solid".

According to Suryana (2016) Logo changes can be a problem for companies, the success or failure of logo changes that occur in the eyes of the public is determined by many things. A company must have a very strong identity in mind and be highly trusted by the Indonesian people. Intense business competition requires companies to improve services and enhance their corporate image. One of the imagery carried out by the company is to create a logo that is able to attract everyone who sees it.

According to Cenadi (in Fitriah 2017:26) visual communication has a basic function, one of them is as a meaning of presentation and promotion. To deliver the message and get the attention (attention) of the eye (visually) and make it memorable. The use of images and words required has a meaning and it is impressive. Generally, to achieve this goal, the images and words used are persuasive and attractive, because the end goal is to sell a product or service.

Through the background of the research problem, the focus of the researcher is "The Function of Visual Messages as a Presentation and Promotion Means on the Change of the Hokkan Indonesia Logo by Social Distancing".

## II. METHODOLOGY

The method used was descriptive qualitative by using in-depth interview techniques (Nazir, 2014:43).

### Unit of Analysis

The unit of analysis is a way of selecting subjects and objects to be studied, selecting subjects and objects of research that are the target of analysis (Rijali, 2018). The subjects in this study were PT. Hokkan Indonesia, while the object of this research is the meaning of the message of the Hokkan logo by social distancing on vitamin drink packaging.

### Informant

According to Moleong (2013), informants are people who will be used or filled into provide information about the situation and condition of the research setting.

The Key informant of this study was the interpreter President director of PT. Hokkan Indonesia, namely Bintari Hari Ayurindawati. The selection of key informants was Bintari, because it was directly involved in the preparation and recipient of the vitamin drink distribution report which was the first project given by the president director of PT. Hokkan Indonesia to the Research and Development (R&D) team during this pandemic.

Supporting informants from this research were:

#### a. Internal

The selection of internal supporting informant was the people who distribute vitamin drink PT. Hokkan Indonesia.

#### b. External

The selection of external supporting informants are the people who receive vitamin drink PT. Hokkan Indonesia.

### Data collection technique

#### a. Participation observation

According to Johnson & Christensen (2012) observation is carried out by researchers in natural settings with the aim of exploring or exploring a meaning.

#### b. Interview

According to Tohirin (2012) in qualitative research, in-depth interviews were conducted in an unstructured or irregular manner. Data collected through interviews are generally verbal data obtained through conversation or question and answer.

c. Documentation

According to Sugiyono (2015), documentation is a record of events that have passed. Documents can be in the form of writing, pictures, or monumental works of someone.

Data analysis technique

a. Data collection

According to Moleong (2013) data collection in the field is certainly related to data mining techniques, and it is also related to sources and types of data, at least the data sources in qualitative research are in the form of words and actions, the rest is additional data such as documents or written data sources, photos, and statistics. The words and actions of the people observed or interviewed are the main source of data.

b. Data reduction

According to Glasser and Strauss (in Rijali, 2018: 93) data reduction is the process of selecting, focusing on simplifying, abstracting and transforming rough data that emerges from written notes in the field.

c. Data presentation

According to Rijali (2018), data presentation is an activity when a set of information is compiled, thus giving the possibility of drawing conclusions and taking action.

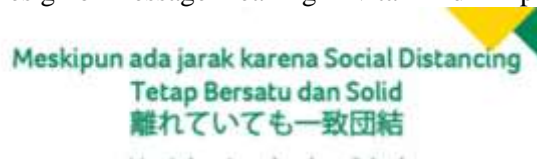
d. Drawing conclusions / verification

According to Rijali (2018), the researchers carried out continuous efforts to draw conclusions while in the field.

### III. RESULTS AND DISCUSSION

According to Cenadi (in Fitriah 2017:26) visual messages in visual communication have three basic functions, one of which is as a presentation and promotion function.

Figure 1. Design of message meaning in vitamin drink packaging



Bintari explained the motives of PT. Hokkan Indonesia in making the meaning of the message "*Meskipun ada jarak karena social distancing tetap Bersatu dan solid*" which is the result of the colors and logos that we gave above that made the message born.

From the results of observations and interviews, the following is a visualization message of the Indonesian Hokkan logo by social distancing in the vitamin drink packaging of PT. Hokkan Indonesia as a means of presentation and promotion.

I. As a presentation tool

Bintari explained the meaning of the message "*Meskipun ada jarak karena social distancing tetap Bersatu dan solid*" is a process of explaining and introducing a new identity that is deliberately placed on a new product, namely vitamin drink. This vitamin drink is a new product that is distributed free of charge to employees, relations, customers, and also government agencies. The purpose of this introduction is to introduce that PT. Hokkan Indonesia can produce vitamin drinks whose composition contains vitamins C, B2, B3, and B6 which are useful for maintaining the stamina needed during a pandemic like now served in a flavored drink.

Mawardi explained that the meaning of the message was made based on current conditions. During social distancing, the president director of PT. Hokkan Indonesia made several changes and even the total number of jobs underwent changes, but the president director deliberately reminded us that we must remain united, because after all, our current productivity must be prioritized. This is the president director of PT. Hokkan Indonesia was made with several considerations and is likely to occur after the overall shareholders' meeting.

Mawardi explained the motives of PT. Hokkan Indonesia in making the meaning of the message "*Meskipun ada jarak karena social distancing tetap Bersatu dan solid*" namely the motive is that the whole community, especially employees of PT. Hokkan Indonesia continues to maintain cohesiveness and unity in the face of this pandemic. Tahir mentioned the motive of PT.

Hokkan Indonesia in making the meaning of the message is that even though we are currently working far apart, we must jointly run the company as well as possible in order to create a solid company. Radhitia explained the motives of PT. Hokkan Indonesia in making the meaning of the message is to break the chain of the spread of the corona virus. Azzahra explained the motives of PT. Hokkan Indonesia in making the meaning of the message is that it must remain united and obedient to implement health protocols to get through the pandemic.

Mawardi explained the meaning of the message "*Meskipun ada jarak karena social distancing tetap Bersatu dan solid*" is to present the company at this time because as an example of reciprocity from the government agency Manpower, the current condition of the company following the government with the handling of social distancing is one of the things in handling implementation of K3 (Occupational Health and Safety) in the company. Bintari explained the meaning of the message was one of presentations to employees, customers, relations, and government agencies, with social distancing, we must be solid with social distancing changes that follow government rules, with social distancing we must also be solid to build and develop a better company. good.

Tahir explained that those who made the message conveyed through the Hokkan Indonesia packaging logo by social distancing in PT Hokkan Indonesia's vitamin drink packaging were noticed by consumers visually, namely the social distancing logo so that we still had to wear masks and wash our hands and keep our distance. Mawardi said the message was conveyed through the Hokkan Indonesia packaging logo by social distancing in PT Hokkan Indonesia's vitamin drink packaging which was noticed by consumers visually, namely with an easily visible location / position, attractive green and yellow colors, writing in 2 languages (Japanese). and Indonesia) which also attracts people to read the message. The image is large enough to be easily visible. Radhitia explained that what made the message conveyed through the Hokkan Indonesia packaging logo by social distancing in PT Hokkan Indonesia's vitamin drink packaging was noticed by consumers visually, namely understanding the importance of keeping distance and reducing crowds. Luffy said that the message conveyed through the packaging logo of Hokkan Indonesia by social distancing in the vitamin drink packaging of PT Hokkan Indonesia was noticed by consumers visually (visually) that something on a product labeled as food or drink would definitely read what was written to ensure the safety of the product to be shipped. consumption and with a logo embedded by the company will make a special suggestion that will be remembered and practiced in everyday life.

## II. As a means of promotion

Tahir explained the words that could influence consumers on what was displayed on the logo as a promotion, namely the company logo which was changed and added the words by social distancing and images of shield troops. Luffy explained that words that can influence consumers for what is displayed on the logo as a promotion is a message to always support social distancing from the government's recommendation, an image that shows the importance of 3M. Sari explained that words that will affect consumers are positive words that can imply and shape consumers' motivation, one of which is "*Meskipun ada jarak karena social distancing tetap Bersatu dan solid*".

Bintari said the meaning of the message was a promotion to customers that PT. Hokkan Indonesia can produce vitamin drinks whose composition is complete as in the packaging, which means the company is presenting new products during the pandemic with the meaning of social distancing. And as a result, there are some customers who want to produce vitamin drinks at PT. Hokkan Indonesia and the customer are already in the appendix process for production.

Azzahra explained that the meaning of the message really attracted the attention of customers, because it wasn't just a message from a vitamin drink, there were several customers who had asked for a quotation, there were even some customers who were already in the appendix process (the process of signing the MOU (memorandum of understanding) for trial and production) and also the taste of the delicious vitamin drink, also the meaning of the message that is suitable during this pandemic period, the customer really wants to produce the vitamin drink with the customer's brand produced at PT. Hokkan Indonesia. There are 3 (three) to 5 (five) new customers that are already in the process, and for existing customers there are about 3 (three). The

Marketing & Sales team is in the process of following up the appendix and preparing a production schedule for the customer's trial production.

#### Discussion

##### I. As a presentation tool

From the results of the research the meaning of the message "*Meskipun ada jarak karena social distancing tetap Bersatu dan solid*" is one of the presentations to employees, customers, relations, and government agencies, with social distancing, we must be solid with changes in social distancing that follow government rules, "With social distancing, we also have to be solid to build and develop a better company," said Bintari. Meanwhile, according to Mawardi says that the meaning of the message also represents the current company because as an example of reciprocity from the government agency Disnaker, the current condition of the company following the government with the handling of social distancing is one of the things in handling the existing K3 (Occupational Health and Safety) implementation. at the company.

The above is in line with the statement Cenadi (in Fitriah 2017:26) as a means of presentation by using the necessary words to have a meaning and impressive. Generally, to achieve this goal, the words used are persuasive and interesting, because the end goal is to introduce a product or service.

##### II. As a means of promotion

As for the results of interviews with Bintari, the meaning of this message was a promotion to customers that PT. Hokkan Indonesia can produce vitamin drinks whose composition is complete as in the packaging, which means the company was presenting new products during the pandemic with the meaning of social distancing. As a result, there were some customers who want to produce vitamin drinks at PT. Hokkan Indonesia and the customers were already in the appendix process for production.

The results of the interview were in line with the statement Cenadi (in Fitriah 2017:26) as a means of promotion to achieve this goal, the images and words used are persuasive and attractive, because the ultimate goal is to sell a product or service. Also in accordance with what Susetyarsi (2012) said, the words contained in the label have several functions, namely identifying products and brands, determining product classes and explaining products, promoting products.

### IV. CONCLUSIONS AND NEWNESS

Hokkan logo visual message by social distancing:

- As a means of presentation, the meaning of the message generated from the Hokkan logo by social distancing was a presentation from the company in explaining working conditions by following the government's recommendation to keep a distance in order to follow the health protocols that exist in the company during the covid-19 pandemic.
- As a means of promotion, the meaning of the resulting message was a promotion in increasing sales, because PT. Hokkan Indonesia introduced a new product, namely vitamins with many ingredients that can be produced by customers and were needed during a pandemic.

Newness

Theoretical Implications

Visual messages have a function, one of them which was as a presentation and promotion. The visual message itself was the result of the meaning of the logo in the packaging that was written and printed on the packaging.

Practical Implications

The results of this study were used as input to packaging companies, especially soft drink manufacturing companies such as PT. Hokkan Indonesia in order to prioritize promotions in production that can attract customers' attention, and have meaning in the application of making packaging designs such as messages generated from the meaning of logos in packaging that can be accepted by the public as consumers. And for students, this research can be a reference to find out related to visual communication, especially in marketing communications.

## V. REFERENCES

- Fitriah, Maria. (2017). *Komunikasi Pemasaran Melalui Desain Visual*. Yogyakarta: Penerbit Deepublish.
- Johnson, Burke., dan Christensen, Larry. (2012). *Educational Research: Quantitative, Qualitative, and Mixed Approaches* (4th ed.). California: SAGE publications, inc.
- Lukitasari, Evelyne. (2013). *Komunikasi Visual Pada Kemasan BeseK Makanan Oleh-Oleh Khas Banyumas*. Skripsi. Desain Komunikasi Visual. Universitas Sahid Surakarta, Surakarta.
- Moleong, Lexy J. 2013. *Metode Penelitian Kualitatif*. Edisi Revisi. Bandung : PT. Remaja Rosdakarya.
- Nazir, Moh. (2014). *Metode Penelitian*. Surabaya: Ghalia Indonesia.
- P Nuswantara, Jaka. (2014). *Pesan Sosial Dalam Foto Jurnalistik*. Jurnal. Ilmu Komunikasi. 18 (5-8) .Semarang
- Rijali, Ahmad. (2018). *Analisis Data Kualitatif*. Banjarmasin: UIN Antasari Banjarmasin
- Sugiyono. (2015). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Penerbit Alfabeta Bandung.
- Tohirin. 2012. *Metode Penelitian Kualitatif dalam Pendidikan dan Bimbingan Konseling*. Jakarta: PT Raja Grafindo Persada.



## **PENGARUH PENGGANTIAN TEPUNG IKAN OLEH TEPUNG MAGGOT DALAM RANSUM TERHADAP KARAKTERISTIK FISIK DAGING AYAM KUB**

### **The Effect Of Replacing Fish meal with Maggot Meal In The Ration On The Physical Charasteristics Of KUB Chicken**

**U.Bahrudin<sup>a</sup>, Anggraeni<sup>b</sup>, D.Wahyuni<sup>b</sup>**

<sup>a</sup>Mahasiswa S1 Program Studi Peternakan, Fakultas Pertanian, Universitas  
Djuanda Bogor.

<sup>b</sup>Staf Pengajar Program Studi Peternakan, Fakultas Pertanian, Universitas  
Djuanda Bogor.

Co Author: [Anggraeni@unida.ac.id](mailto:Anggraeni@unida.ac.id) . [dewiwahyuni4326@gmail.com](mailto:dewiwahyuni4326@gmail.com)

---

#### **Abstrak**

Chicken meat contains high and complete nutritions such as protein, vitamins, minerals, energy and water. In addition, most Indonesian people like chicken meat because it contains high of nutritions and has a good taste too. Both the quality or physical characteristics of meat is one part of consumer reference in choosing meat. Fish meal is feed ingredients source of protein found in almost all poultry ration formulas. The problem with fish meals is the quite high price and the limitation of availability in the market. The alternative feed that has almost the same quality as the fish meal is ulcerot. Because it contains maggot or larvae from BSF flies, namely : 40.2% crude protein, 28% crude fat, 2.36% calcium, and 0.88% phosphorus (Dengah et al. al, 2016). In addition, with high nutritions, BSF fly larvae are also a solution for handling organic waste. Because of the flexibility of the feed, it makes maggots an ideal insect for producing protein. This study was aimed to determine the replacement of fish meal by maggot flour on the physical characteristics of superior balitnak (KUB) chicken meat. The design used in this study was a Completely Randomized Design (CRD). It consisted of 5 treatments and 4 replications. The treatments given were: R0 = 0% maggot flour +10% fish meal in the ration. R1 = 2.5% maggot flour + 7.5% fish meal in the ration. R2 = 5% BSF larvae meal + 5% fish meal in the ration. R3 = 7.5% maggot flour + 2.5% fish meal in the ration, R4 = 10% maggot flour + 0% fish meal in the ration. Therefore, the results of this study showed that the provision of maggot flour as a substitute for fish meal in the ration was not significantly different ( $P>0.05$ ) on the value of pH, water binding capacity, tenderness, and cooking loss. Based on the results of the research, it can be concluded that the provision of maggot flour (*Hermetia Illicens*) as a replacement for fish meal in KUB chicken rations has not been able to improve the physical quality of superior balitnak (KUB) chicken meat.

*Keywords: KUB Chicken, Maggot, Physical Characteristics of Meat*

---

## I. PENDAHULUAN

Daging ayam memiliki kandungan gizi yang tinggi dan lengkap seperti protein, vitamin, mineral, energi dan air. Selain kandungan gizi yang tinggi daging ayam juga memiliki rasa yang enak maka dari itu sebagian besar masyarakat Indonesia menyukai daging ayam. Menurut angka Susenas (BPS) konsumsi daging ayam buras tahun 2020 sebesar 0,463 kg/kap/tahun dan tahun 2021 sebesar 0,445 kg/kap/thn. tahun 2020 dan 2021 masing-masing konsumsi nasional rumah tangga untuk ayam buras sebesar 125,63ribu ton dan 121,82 ribu ton. Ayam kampung unggul balitnak (KUB) adalah hasil seleksi ayam kampung asli Indonesia selama enam generasi yang lebih efisien dipelihara karena konsumsi pakan lebih sedikit, lebih tahan terhadap penyakit, tingkat mortalitas yang lebih rendah, pertumbuhan cepat serta produksi telur yang lebih tinggi dibanding ayam kampung lain.

Pakan merupakan salah satu faktor terpenting dalam beternak termasuk ayam lokal, karena biaya pakan mencapai 60-70% dari total biaya produksi. Ransum yang baik mengandung gizi yang berkualitas tinggi hal ini disebabkan pakan merupakan sumber gizi dan energi sehingga ternak dapat hidup, tumbuh dan bereproduksi dengan baik (Mahfudz *et al.*, 2004). Komposisi ransum harus seimbang antara tingkat energi dan kandungan protein dalam ransum, karena erat hubungannya dengan kecepatan pertumbuhan dan biaya produksi pemeliharaan. Perbedaan tingkat protein dalam ransum akan menyebabkan adanya perbedaan pertumbuhan (Urfa *et al.*, 2017).

Namun, pakan sebagai salah satu unsur penting dalam produksi sektor peternakan harganya semakin hari terus meningkat dan salah satu bahan pakan dengan harga yang cukup tinggi adalah bahan pakan sumber protein hewani yaitu tepung ikan. Tepung ikan merupakan bahan pakan sumber protein yang terdapat dalam hampir semua formula ransum unggas. Kenyataannya adalah harga tepung ikan terus meningkat, kualitas tidak menentu, dan ada kala ketersediaannya terbatas sehingga mempengaruhi harga dan kualitas ransum. Usaha untuk mengatasinya adalah dengan mencari bahan pakan alternatif yang kualitasnya hampir mirip dengan tepung ikan (Filawati 2008). Pakan alternatif yang memiliki kualitas yang hampir mirip dengan tepung ikan adalah maagot karena kandungan maggot atau larva dari lalat BSF yaitu: protein kasar 40,2%, lemak kasar 28%, kalsium 2,36%, dan fosfor 0,88% (Dengah *et al.*, 2016). Selain memiliki kandungan nutrisi yang tinggi larva lalat BSF merupakan solusi penanganan limbah organik karena fleksibilitas pakan menjadikan maggot sebagai serangga yang ideal untuk memproduksi protein. Oleh karena itu, maggot BSF merupakan solusi penanganan limbah organik sekaligus bahan pakan sumber protein yang dapat menggantikan tepung ikan (Yuwono dan Mentari 2018). Kualitas fisik daging merupakan bagian yang menjadi acuan konsumen dalam memilih daging. Kualitas daging dapat dilihat dari warna, keempukan, pH, daya mengikat air, dan susut masak Menurut Sofrianti (2001).

Berdasarkan pembahasan diatas, maka akan dilakukan penelitian untuk mengetahui kualitas fisik daging ayam kampung unggul balitnak yang diberi tepung larva BSF sebagai pengganti tepung ikan dalam ransum.

## II. METODOLOGI

### Waktu dan Tempat Penelitian

Penelitian dilaksanakan selama 75 hari di Kampung Nambo Cipeuntas, Desa Taman Sari, Kecamatan Nambo, Kabupaten Bogor Jawa Barat.

### Bahan dan Alat Penelitian

Ayam KUB sebanyak 100 ekor (*unsexing*) diperoleh dari PT Sumber Unggas Indonesia yang berlokasi di Parung Bogor. Ditempatkan pada 20 unit kandang yang diisi 5 ekor setiap unit kandang dan ukuran setiap 1 unit kandang yang diisi 5 ekor ayam adalah : panjang 50 cm × lebar 50 cm × tinggi 50 cm. Tempat ransum dan tempat minum, lampu pijar 25 watt oven, kompor gas, saringan, dan timbangan digital dengan ketelitian 0,1 gram.

Bahan pakan yang digunakan adalah jagung, dedak, tepung maggot, tepung roti, CGF, bungkil kedelai, tepung ikan, minyak sayur, premix, garam, dan mineral mix. Ransum penelitian disusun dengan metode feeding trial berdasarkan kebutuhan nutrisi. Formula ransum perlakuan serta kandungan nutrient pakan dapat dilihat pada (Tabel 1).

### Metode Penelitian

. Rancangan yang digunakan pada penelitian ini menggunakan Rancangan Acak Lengkap (RAL) terdiri atas 5 perlakuan 4 ulangan dengan 5 unit satuan percobaan setiap ulangan. Perlakuan yang diberikan yaitu:

R0 = 0% tepung maggot + 10% tepung ikan dalam ransum.

R1 = 2.5% tepung maggot + 7.5% tepung ikan dalam ransum.

R2 = 5% tepung maggot + 5% tepung ikan dalam ransum.

R3 = 7.5% tepung maggot + 2.5% tepung ikan dalam ransum.

R4 = 10% tepung maggot + 0% tepung ikan dalam ransum.

Dari hasil uji dianalisis dengan menggunakan Anova. Analisis selanjutnya digunakan uji Duncan apabila hasil perhitungan yang didapat berbeda nyata. Model matematika penelitian menurut Sastrosipadi (2000) sebagai berikut:

$$Y_{ij} = \mu + T_i + \epsilon_{ij}$$

Keterangan:

$Y_{ij}$  = Nilai pengamatan dari perlakuan ke- $i$  pada ulangan ke- $j$  (1,2,3,4).

$\mu$  = Nilai tengah umum.

$T_i$  = Pengaruh perlakuan pemberian ransum tepung larva BSF.

$\epsilon_{ij}$  = Galat pada perlakuan ke- $i$  dan ulangan ke- $j$ .

Analisis data yang diperoleh dianalisis ragam (ANOVA), jika berpengaruh nyata akan dilanjutkan dengan uji lanjut duncan.

### Peubah Yang Diamati

Peubah yang diamati dalam penelitian ini yaitu: Nilai pH, Daya Mengikat Air, Kempukan, dan Susut Masak.

## III. HASIL DAN PEMBAHASAN

Daging didefinisikan sebagai semua jaringan hewan dan semua produk hasil pengolahan jaringan-jaringana tersebut yang sesuai untuk dimakan serta tidak menimbulkan gangguan kesehatan bagi yang memakannya (Soeparno, 2015). Rataan hasil analisis kualitas fisik daging ayam KUB dengan pemberian tepung maggot (*Hermetia illucens*) sebagai pengganti tepung ikan dalam ransum pada masing-masing perlakuan ditunjukkan pada tabel 3.

### pH Daging

Hasil penelitian menunjukkan bahwa pH daging ayam KUB yang diberikan tepung maggot mendapatkan hasil tidak berbeda nyata ( $P > 0,05$ ). Data rata-rata nilai pH selama penelitian pada masing-masing perlakuan adalah R0 =  $5,91 \pm 0,03$ , R1 =  $5,83 \pm 0,08$ , R2 =  $5,86 \pm 0,05$ , R3 =  $5,84 \pm 0,08$ , R4 =  $5,83 \pm 0,08$ , dengan total rata-rata pH selama penelitian yaitu sebesar  $5,86 \pm 0,06$ . Nilai pH yang didapat pada penelitian ini tidak berbeda jauh dengan pH ayam kampung normal sekitar 5,91-5,93 (Dewi 2013) sedangkan hasil analisis (Hidayah *et al.* 2019) menunjukkan bahwa nilai pH daging berkisar antara 5,88-6,00. Hasil nilai pH yang didapat dari pemberian tepung maggot sebagai pengganti tepung ikan menunjukkan hasil lebih besar jika dibandingkan dengan hasil penelitian (Nasution *et al.* 2016) yang menyatakan bahwa pH daging ayam kampung yang diberi pengaruh substitusi pakan komersil dengan tepung ampas kelapa berkisar 5,27- 5,36.

Lawrie (2003) menyatakan bahwa pH ultimat daging adalah pH yang tercapai setelah glikogen otot menjadi habis. Hal ini mungkin disebabkan oleh kurangnya kandungan energi pada ransum yang diberikan, karena menurut Soeparno (2005) semakin rendahnya pH pada suatu produk maka akan meningkatkan daya simpan produk, karena bakteri akan sulit hidup dalam pH yang rendah, kecuali bakteri yang tahan pada pH yang rendah (*acidophilic*). Menurut (Hajrawati *et al.*, 2016) yang menyatakan bahwa Nilai pH terkait erat dengan keberadaan mikroba pada daging sehingga sangat menentukan tingkat keawetan dan kualitasnya. Maggot juga memiliki kandungan antijamur dan antimikroba sehingga apabila dikonsumsi akan tahan terhadap penyakit yang disebabkan oleh bakteri dan jamur (Indarmawan 2014).

### Daya Mengikat Air

Hasil dalam penelitian ini menunjukkan bahwa daya mengikat air daging ayam KUB yang diberi tepung maggot sebagai pengganti tepung ikan mendapatkan hasil tidak berbeda nyata ( $P>0,05$ ) data rata-rata daya mengikat air masing-masing perlakuan adalah  $R_0= 29,99\pm 3,51$ ,  $R_1= 34,19\pm 3,68$ ,  $R_2= 28,74\pm 2,19$ ,  $R_3= 30,67\pm 2,50$ ,  $R_4= 29,59\pm 1,05$  dengan total nilai rata-rata daya mengikat air selama penelitian yaitu  $30,63\pm 3,12$ . Hasil tersebut lebih rendah apabila dibandingkan dengan hasil penelitian (Winarso 2003) menyatakan bahwa nilai rata-rata daya mengikat air daging ayam kampung pada bagian dada adalah 38,29% dan pada bagian paha 37,60%. (Nasution *et al.* 2016) menyatakan bahwa ayam kampung yang diberi pengaruh substitusi pakan komersial dengan tepung ampas kelapa berkisar 28,93%.

Daya ikat air juga dipengaruhi oleh pH daging (Alvarado dan McKee, 2007), air yang tertahan di dalam otot meningkat sejalan dengan naiknya pH, walaupun kenaikannya kecil. Selain faktor pH, nilai daya mengikat air juga dapat dipengaruhi oleh perbedaan spesies, umur dan fungsi otot, pakan, transportasi sebelum pemotongan, kesehatan ternak, temperatur, jenis kelamin ternak, perlakuan sebelum pemotongan dan kandungan lemak intra muskuler (soeparno, 2015). Berdasarkan analisis Elwert *et al.*, (2010) perbandingan jenis asam amino tepung ikan dan maggot (relatif terhadap lisin) terlihat bahwa kandungan isoleusin, leusin, treonin, valin, fenilalanin dan arginin relatif lebih tinggi pada tepung BSF dibandingkan dengan tepung ikan. Perbedaan yang mencolok terlihat pada kandungan histidin. Adapun kandungan metionin pada tepung BSF relatif lebih rendah dibandingkan dengan tepung ikan (Amandanisa dan Suryadarma, 2020). Risnajati (2010) menyatakan daya mengikat air dapat dipengaruhi oleh laju dan besarnya nilai pH, semakin rendah pH maka semakin rendah pula daya mengikat air.

### 4.3 Keempukan

Data rata-rata nilai keempukan pada penelitian masing-masing perlakuan adalah  $R_0= 2,35\pm 0,05$  kg/cm<sup>2</sup>,  $R_1= 2,50\pm 0,16$  kg/cm<sup>2</sup>,  $R_2= 2,47\pm 0,27$  kg/cm<sup>2</sup>,  $R_3= 2,52\pm 0,12$  kg/cm<sup>2</sup>,  $R_4= 2,62\pm 0,18$  kg/cm<sup>2</sup>, dengan total rata-rata keempukan selama penelitian yaitu  $2,49\pm 0,20$  kg/cm<sup>2</sup>. Hasil tersebut lebih kecil jika dibandingkan dengan hasil analisis (Hidayah *et al.*, 2019) yang menunjukkan keempukan daging ayam KUB yaitu 3 dengan menggunakan alat penetrometer. Sedangkan menurut Hermaditya (2011) menyatakan bahwa keempukan daging ayam kampung berkisar antara 3,7 -3,9.

Suryati (2008) menyatakan besarnya kekuatan (kg/cm<sup>2</sup>) merupakan indikator tingkat keempukan daging yang diperlukan untuk memotong corong daging (sampel) yang ditunjukkan oleh jarum penunjuk alat pemotong daging *Warner Blatzer Shearforce Device*, yang bergerak diatas skala dengan kepekaan pengukuran 0.1 kg/cm<sup>2</sup> (Suryati *et al.* 2008). Berdasarkan hasil yang diperoleh pada penelitian ini keempukan daging termasuk dengan kisaran sangat empuk ( $\leq 3.3$  kg/cm<sup>2</sup>). Hal ini didukung oleh (Lawrie, 2003) bahwa nilai pH daging merupakan faktor yang mempengaruhi keempukan daging. Menurut (Komariah *et al.*, 2004) daging yang empuk adalah hal yang paling dicari konsumen.

Bila daging ditekan dengan jari, daging yang sehat akan memiliki konsistensi kenyal sampai padat (Sindu, 2016). Soeparno (2015) menyatakan bahwa kesan keempukan secara keseluruhan meliputi tekstur dan melibatkan tiga aspek yaitu kemudahan dalam penetrasi gigi, mudahnya daging dikunyah, dan jumlah residu yang tertinggal setelah proses pengunyahan. Menurut (Winarso, 2003)

menyatakan denaturasi protein merupakan pemecah protein menjadi unit lebih kecil. Proses perebusan daging adalah salah satu cara untuk mengempukan daging dengan pemasakan yang menyebabkan terjadinya denaturasi.

Keempukan daging dipengaruhi oleh beberapa faktor, yaitu faktor sebelum pemotongan (antemortem) meliputi genetik, manajemen, spesies, fisiologis ternak, dan umur. Faktor setelah pemotongan (postmortem) meliputi pelayuan, pembekuan, metode pengolahan, dan penambahan bahan pengempuk (Soeparno, 2009). Keempukan daging merupakan atribut mutu yang kompleks. Secara umum, struktur primer yang mempengaruhi keempukan daging adalah integritas myofibril (dikenal dengan efek aktomyosin) dan kontribusi jaringan ikat (kolagen dan elastin). Walaupun kecil, kandungan lemak di dalam daging (marbling) juga memberikan kontribusi pada keempukan daging (Antara, 2011). Menurut Dengah *et al* (2016) Tepung maggot (*Hermetia illucens*) mengandung protein kasar minimum 40,2%, lemak kasar 28%, kalsium 2,36%, dan fosfor 0,88%. Jadi keempukan bisa bervariasi diantara spesies, bangsa ternak dalam spesies yang sama, potongan karkas, diantara otot serta pada otot yang sama (Soeparno, 2015).

### Susut Masak

Hasil penelitian ini menunjukkan bahwa susut masak daging ayam KUB yang diberi tepung maggot sebagai pengganti tepung ikan menunjukkan hasil tidak berbeda nyata ( $P > 0,05$ ). Data rata-rata susut masak pada masing-masing perlakuan adalah  $R_0 = 67,00 \pm 2,53$ ,  $R_1 = 70,45 \pm 7,53$ ,  $R_2 = 72,17 \pm 4,10$ ,  $R_3 = 69,70 \pm 10,15$ ,  $R_4 = 70,47 \pm 2,06$  dengan total rata-rata susut masak selama penelitian yaitu  $69,96 \pm 5,70\%$ . Hasil tersebut lebih besar dibandingkan dengan hasil penelitian (Nasution *et al*, 2016) yang menyatakan bahwa susut masak ayam kampung yang diberi pengaruh substitusi tepung pakan komersial dengan tepung ampas kelapa berkisar 49,49%. Menurut soeparno (2005) menyatakan bahwa susut masak daging bervariasi dari 15% hingga sampai 54,5%.

Daging dengan susut masak yang rendah mempunyai kualitas yang relatif lebih baik daripada daging dengan persentase susut masak yang tinggi, hal ini karena kehilangan nutrisi selama proses pemasakan akan lebih sedikit (Komariah *et al.*, 2009). Menurut (Shanks *et al.* 2002) menyatakan bahwa besarnya susut masak dipengaruhi oleh banyaknya kerusakan membran seluler, banyaknya air yang keluar dari daging, umur simpan daging, degradasi protein dan kemampuan daging untuk mengikat air. Susut masak berhubungan dan berbanding terbalik dengan daya ikat air, nilai susut masak yang tinggi diikuti oleh daya mengikat air yang rendah (Sriyani *et al*, 2015).

Berdasarkan analisis Elwert *et al*, (2010) perbandingan jenis asam amino tepung ikan dan maggot (relatif terhadap lisin) terlihat bahwa kandungan isoleusin, leusin, treonin, valin, fenilalanin dan arginin relatif lebih tinggi pada tepung BSF dibandingkan dengan tepung ikan Perbedaan yang mencolok terlihat pada kandungan histidin. Menurut (Winarso, 2003) menyatakan denaturasi protein merupakan pemecah protein menjadi unit lebih kecil. Proses perebusan daging adalah salah satu cara untuk mengempukan daging dengan pemasakan yang menyebabkan terjadinya denaturasi.

Menurut (Soeparno 2015) menyatakan bahwa susut masak dapat dipengaruhi oleh pH, panjang sarkometer serabut otot, panjang potongan serabut otot, status kontak myofibril, ukuran dan berat sampel daging dan penampang lintang daging. Risnajati (2010) menyatakan daya mengikat air dapat dipengaruhi oleh laju dan besarnya nilai pH, semakin rendah pH maka semakin rendah pula daya mengikat air.

## IV. KESIMPULAN DAN KEBARUAN

Berdasarkan dari hasil penelitian yang telah dilakukan dapat disimpulkan bahwa pemberian tepung maggot (*Hermetia Illucens*) sebagai pengganti tepung ikan dalam ransum ayam KUB belum mampu meningkatkan kualitas fisik daging ayam kampung unggul balitnak (KUB).

Berdasarkan hasil penelitian disarankan perlu diadakan penelitian lebih lanjut pada umur > 10 minggu untuk melihat pengaruh terhadap kualitas fisik daging ayam kampung unggul balitnak.

## V. DAFTAR PUSTAKA

- Amandanisa A, Suryadarma P. 2020. Kajian Nutrisi dan Budi Daya Maggot (*Hermentia Illuciens L.*) Sebagai Alternatif Pakan Ikan di RT 02 Desa Purwasari, Kecamatan Dramaga, Kabupaten Bogor. *Jurnal Pusat Inovasi Masyarakat* 2(5): 796–804.
- Dengah SP, Umboh JF, Rahasia CA, Kowel YHS. 2016. Pengaruh Penggantian Tepung Ikan Dengan Tepung Maggot (*Hermetia Illucens*) Dalam Ransum Terhadap Performans Broiler. *Jurnal ZooteK*. 36(1):51-60.
- Elwert C, Knips I, Katz P. 2010. A novel protein source: Maggot meal of the Black Soldier Fly (*Hermetia illucens*) in broiler feed.: Tagung Schweine-und Gefugelnahrung. Halle (Germany): Institut fur Agrar-und Ernahrungswissenschafte. Universitat Halle-Wittenberg. ISBN: 978-3-86829-250-3.
- Hajrawati, H., Fadliah, M., Wahyuni, W., Arief, I. 2016. Kualitas Fisik, Mikrobiologis, dan Organoleptik Daging Ayam Broiler pada Pasar Tradisional. *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*. Vol. 04 No. 03; 386-389.
- Hidayah, R. Ambarsari, I. Subiharta. 2019. Kajian Sifat Fisik dan Sensori Ayam KUB di Jawa Tengah. *Jurnal Peternakan Indonesia*. 21 (2):93-101.
- Komariah, Rahayu S., Sarjito. 2009. *Pengaruh Transportasi terhadap Kualitas Fisik dan Kimia Daging*. Skripsi. Fakultas Peternakan Institut Pertanian Bogor. Bogor.
- Mahfudz, L.D., Sarengat, W., Prayitno, D.S., Atmomarsono U. 2004. *Ampas tahu yang difermentasi dengan laru oncom sebagaipakan ayam ras pedaging*. Abstrak Seminar Nasional Teknologi Peternakan dan Veteriner, Bogor.
- Nasution AF, Dihasih E, Anggraeni. 2016. Pengaruh Substitusi Pakan Komersil Dengan Tepung Ampas Kelapa Terhadap Sifat Fisik Dan Organoleptik Ayam Kampung. *Jurnal pertanian* 7(1):14-22.
- Natsir WNI, Rahayu RSP, Darusalam MA, Azhar M. 2020. Palatabilitas Maggot Sebagai Pakan Sumber Protein Untuk Ternak Unggas. *Jurnal Agrisistem*. 16(1):27-32.
- Rachmawati, Buchori D, Hidayat P, Hem S, Fahmi MR. 2010. Perkembangan dan Kandungan Nutrisi Larva *Hermetia illucens* (Linnaeus) (Diptera: Startiomyidae) pada Bungkil Kelapa Sawit. *J Entomol Indonesia*. 7(5):28- 41.
- Risnajati D. 2010. Pengaruh Lama Penyimpanan dalam Lemari Es terhadap pH, Daya Ikat Air, dan Susut Masak Karkas Broiler yang Dikemas Plastik Polyethylen. *Jurnal Ilmiah Ilmu-Ilmu Peternakan* 13(6).
- Shanks BC, Wolf DM, Maddock RJ. 2002. Technical note : The effect of freezing on Warner Bratzler shear force values of beef longissimuss steak across several postmortem aging periods. *J. Anim.Sci*. 80 :2122-2125.
- Soeparno. 2005. *Ilmu dan Teknologi Daging*. Cetakan keempat. Gajah Mada University Press, Yogyakarta.
- Soeparno. 2009. *Ilmu dan Teknologi Daging*. Cetakan Ke lima. Gajah Mada University Press, Yogyakarta.

- Soeparno. 2015. *Ilmu dan Teknologi Daging*. Edisi Kedua. Gadjah Mada University Press. Yogyakarta.
- Sofrianti Y. 2001. Pengaruh Pemberian Ampas Tahu Dalam Ransum Terhadap Kualitas Karkas Broiler. [Skripsi] Universitas Bengkulu.
- Suprijatna EU, Atmomarsono R, Kartosudjana. 2005. *Ilmu Dasar Ternak Unggas*. Penebar Swadaya. Jakarta.

**TABEL**

Tabel 1 Formulasi Ransum

Bahan	Perlakuan				
	R0	R1	R2	R3	R4
	Proporsi (%)				
Tepung Ikan	10	7.5	5	2.5	0
Tepung maggot	0	2.5	5	7.5	10
Bungkil Kedelai	10.5	11.5	14	15	16
Jagung	35	35	40	37	33
Dedak	12	7.5	6	6	5
Tepung Roti	14	14.5	10	11	13
CGF	16.5	19.5	18	19	21
Minyak Sayur	0.5	0.5	0.5	0.5	0.5
Mineral Mix	0.5	0.5	0.5	0.5	0.5
Garam	0.5	0.5	0.5	0.5	0.5
Premix	0.5	0.5	0.5	0.5	0.5
Total	100	100	100	100	100

Keterangan : CGF : Corn Gluten Feed

Tabel 1 Kandungan Nutrisi Ransum

Kandungan Nutrisi	Perlakuan				
	R0	R1	R2	R3	R4
EM (Kkal/Kg)	2806.5	2821.8	2829.2	2822.79	2818
Protein Kasar (%)	20.54	20.54	20.56	20.51	20.56
Serat Kasar (%)	4.41	4.37	4.478	4.376	4.95

Keterangan: EM: Energi Metabolis, Kkal/Kg: Kilo Kalori/ Kilogram

Tabel 2 Rataan hasil analisis nilai pH, Daya mengikat air, Keempukan dan Susut masak

Perlakuan	Peubah			
	pH	Daya Mengikat Air (%)	Keempukan (kg/cm <sup>2</sup> )	Susut Masak (%)
R0	5,91±0,03	29,99±3,51	2,35±0,25	67,00±2,53
R1	5,83±0,08	34,19±3,68	2,50±0,16	70,45±7,53
R2	5,86±0,05	28,74±2,19	2,47±0,27	72,17±4,10
R3	5,84±0,06	30,67±2,50	2,52±0,12	69,70±10,15
R4	5,83±0,08	29,59±1,05	2,62±0,18	70,47±2,06
Rata-Rata	5,85±0,06	30,63±3,12	2,49±0,20	69,96±5,70

Keterangan: R0= 0% tepung maggot + 10% tepung ikan, R1= 2.5% tepung maggot + 7.5% tepung ikan, R2= 5% tepung maggot + 5% tepung ikan, R3= 7.5% tepung maggot + 2.5% tepung ikan, R4= 10%teping maggot + 0% tepung ikan.



# ABSTRACT

5<sup>th</sup> Bogor International Conference  
For Applied Science 2021  
(5<sup>TH</sup> BICAS 2021)

## RESPONSE OF RED CHILI PLANTS at VARIOUS CONCENTRATIONS and TIME of ADMINISTRATION of LOCAL MICROORGANISMS of KEPOK BANANA WEEVIL

Yanyan Mulyaningsih<sup>1</sup>

<sup>1</sup>Universitas Djuanda, Universitas Djuanda, Indonesia ;

<sup>1</sup>yanyan.mulyaningsih@unida.ac.id;

---

### Abstract

**Background** - Red chili (*Capsicum annum* L.) is a vegetable commodity that has high economic value. The large demand for red chili both at home and abroad makes chili plants a nationally superior vegetable commodity. Chili is also used mostly for household consumption and can be marketed both fresh and processed. Red chili contains nutrients needed by humans such as vitamin A, vitamin C, carotene, iron, potassium, calcium, phosphorus and also contains alkaloids such as capsaicin, flavonoids, and essential oils.

**Purpose** - This study aims to determine the response of growth and the yield of red chili (*Capsicum annum* L.) at various concentrations and times of administration of local microorganisms of kapok banana weevil

**methodology** - This study used a factorial randomized block design consisting of two factors, namely the MOL treatment of kapok banana weevil tillers at the level of K0 (0%), K1 (15%), K2 (30%), K3 (45%), K4 (60%) and the time of administration consisted of five levels, namely are F1 (0 day after transplanting = 0 DAT), F2 (12 DAT), F3 (24 DAT), F4 (36 DAT), F5 (48 DAT)

**Findings** - The result of research showed that the MOL concentration of mature stadia kapok banana tubers in K4 treatment with concentration of 60% had plant height, crown width, number of leaves, number of branches, stem diameter, number of fruit, fruit diameter, fruit wet weight, fruit dry weight, root, and the crown was greater than the other treatments, but not significantly different at a concentration of 45% (K3)

**Originality** - The administration of the main solution of local microorganisms concentration of mature kapok banana weevil of growth and the yield of red chili because the result was done

Keywords: Varieties, chili of Mace, stadia of banana, time of application, growth regulator

---

## **GROWTH AND PRODUCTION OF water spinach ( Ipomea aquatica Forsk.) IN VARIOUS TYPES OF HYDROPONIC NUTRITION SYSTEM NFT (Nutrient Film Technique)**

**Nani Yulianti<sup>1</sup>**

<sup>1</sup>, Djuanda University, Indonesia ;  
1;

---

### **Abstract**

**Background** - Efforts to increase the production of kale with a hydroponic cultivation system, the addition of nutrients is absolutely necessary for both macro and micronutrients. In addition to using AB mix nutrients, the use of other alternative fertilizers in hydroponic cultivation needs to be a big concern so that it can suppress the use of inorganic fertilizers.

**Purpose** - The purpose of this study was to determine the effect of giving various types of nutrient compositions AB mix and cow urine on the growth and yield of water spinach plants with the Nutrient Film Technique (NFT) hydroponic system

**methodology** - The design used in this study was a single factor randomized block design (RAK) with 4 levels of treatment of various types of hydroponic nutrients consisting of N 1 (100% AB mix ), N 2 (75% AB mix + 25% Cow Urine), N 3 (50% AB mix + 50% Cow Urine), and N 4 (25% AB mix + 75% Cow Urine).

**Findings** - The results of this study showed that the provision of various nutritional compositions significantly affected the growth and productivity of kale except for the variable number of books. Plant kale given nutritional composition N 4 (25% AB mix + 75% of cow urine) showed a markedly lower in all the observed variables, while the growth and productivity of kale best shown in the nutritional composition of 100% AB mix but not significantly different the nutritional composition treatment was 75% AB mix + 25% cow urine and 50% AB mix + 50% cow urine. The results of this study also show that the use of cow urine has not been able to replace the use of AB mix nutrition.

**Originality** - -

Keywords: cow urine, lombok kale, AB mix , hydroponics, NFT

---

## A framework of Social-Ecological System for Measuring the Small Island and Coastal Community Perception Index

Yudi Wahyudin<sup>1</sup>, Mahipal<sup>2</sup>

<sup>1</sup>Akuakultur, Universitas Djuanda, Indonesia ;

<sup>2</sup>Ilmu Hukum, Universitas Pakuan, Indonesia ;

<sup>1</sup>yudi.wahyudin@unida.ac.id; <sup>2</sup>mahipal@unpak.ac.id;

---

### Abstract

**Background** - Sixty percent of the population is inhabited in coastal areas. They have the best sense of belonging for the success story of many empowerment and coastal management program. Therefore, their perception index should be included as the main consideration to run any related and planned program. A framework of the social-ecological system could be designed as an approach to develop this small island and coastal community perception index.

**Purpose** - The objective study is designing and developing a method to measure the perception index of coastal and small island communities based on a social-ecological system framework.

**methodology** - This study was conducted using normative-deductive based on an iterative survey on many kinds of literature and lesson learned-inductive based on the experiences of many other indexing methods developed. This study was conducted during May-June 2020. A framework of the social-ecological system is carried out using an indexation analysis approach to the components of (i) ecological component index, (ii) social-ecological component index, (iii) ecological-economic component index, and (iv) social-ecological institutions component index to measure the perception index community. Each of those four component indexes would be gathered based on the questionnaires of each classifications types of data and information on community perceptions, where each classification is assessed based on the level of need and the level of current benefit conditions with the highest point value of 10 and the lowest value of 1. Score 1 indicates the lowest level of need/benefit, while a score of 10 indicates the highest level of need/benefit.

**Findings** - Based on the analyses of the deductive-inductive approach based on kinds of literature and lesson learned of developed indexations, 25 questions related with each classification of four component indexes, which are 9 questions for ecological component index, 6 questions for social-ecological component index, 5 questions for ecological-economic component index, and 5 questions for social-ecological institutions component index. Data analysis would be approached using the community perception indexation (CPI) approach based on the modified formula from several indexation assessment references, such as Wahyudin et al (2013), Damar et al (2013), Wahyudin (2013; 2014), and Wahyudin et al (2018). The categories of community perception are then calculated based on the calculation model of score intervals and their classes, namely platinum perception (CPI>0.8000), gold perception (0.6000

**Originality** - The framework of the social-ecological system is still very rarely used to many indexations, especially for community perception. This approach is originally developed by the researcher and not yet published in any scientific journal but has been presented in several proposal projects, especially in the context of community empowerment and development program run by the oil and gas companies in Indonesia.

Keywords: Coastal community, community empowerment and development, social-ecological system, community perception index, qualitative analysis

---

## Heart Rate Detection of Stress Levels for Pregnant Women

Yuli Wahyuni<sup>1</sup>, Muhammad Abdulrohman Pany<sup>2</sup>

<sup>1</sup>, Pakuan University, Indonesia ;

<sup>2</sup>, Pakuan University, Indonesia ;

<sup>1</sup>; <sup>2</sup>;

---

### Abstract

**Background** - During pregnancy there are changes because the fetus begins to grow and develop in the stomach of the pregnant woman. During pregnancy these developments also affect the physiology due to hormonal and metabolic changes that affect the psychological prenatal stress of pregnant women.

**Purpose** - This study aims to determine the initial action to detect heart rate by looking at stress levels in pregnant women.

**methodology** - This study uses a hardware programming approach with the stages: Project Planning, Research, Component Testing, Mechanical System Design, Functional Test, Functional Test, Overall System Functional Test, System Optimization.

**Findings** - Detection of stress levels of pregnant women.

**Originality** - Monitoring the heart rate when stressed in real time and continuously as a system that operates and displays history in the telegram application in the form of pregnant women's heart rate data while the pulse sensor is a heart rate detection tool when stressed.

Keywords: Heart Rate, Pregnant Women, Stress, Detection, Sensor Pulse

---

## POTENSI DAN STRATEGI PENGEMBANGAN PARIWISATA DITENGAH KONDISI PANDEMIK COVID 19 DI KABUPATEN SUKABUMI

Dede Syahrudin<sup>1</sup>, Rita Rahmawati<sup>2</sup>

<sup>1</sup>, Djuanda Univesity, Indonesia ;

<sup>2</sup>, Djuanda University, Indonesia ;

<sup>1, 2</sup>;

---

### Abstract

**Background** - This research is motivated by looking at the condition of Sukabumi Regency's tourism potential which has the potential to develop more advanced, it's just that the Covid-19 pandemic has caused tourism potential to be less stretched as usual. So that in this Covid-19 Pandemic condition, the Sukabumi Regency Government must try to increase existing and new potential as well as the development and tourism strategy carried out by the Tourism Office so that Sukabumi Regency tourism is better prepared when tourism conditions return to normal.

**Purpose** - This study aims to describe the potential and strategies for tourism development in Sukabumi Regency in the midst of Covid-19.

**methodology** - This research was carried out using descriptive methods and a case study approach using SWOT analysis.

**Findings** - This research was conducted using descriptive methods and qualitative approaches with case studies. The results of the study show descriptive data that the tourism potential of Sukabumi Regency is increasing in variety and innovation due to the encouragement of the district government and the community who are moved by themselves to further develop their area as a tourist attraction when tourist visits are closed. Second, during the COVID-19 pandemic, the Sukabumi Regency Tourism Office carried out a strategy for developing and strengthening tourism potential, both infrastructure, human resources, promotion and regulations related to tourism. The recommendation from this research is that the Tourism Office should further optimize tourism potential by promoting tourism that is more aggressive, creative, and keeps up with the times. Strengthening cooperation with sustainable tourism partners and completing more comprehensive tourism regulations and improving existing facilities and infrastructure so that they become more comfortable, current and attractive.

**Originality** - This research was conducted using descriptive methods and qualitative approaches with case studies. The results of the study show descriptive data that the tourism potential of Sukabumi Regency is increasing in variety and innovation due to the encouragement of the district government and the community who are moved by themselves to further develop their area as a tourist attraction when tourist visits are closed. Second, during the COVID-19 pandemic, the Sukabumi Regency Tourism Office carried out a strategy for developing and strengthening tourism potential, both infrastructure, human resources, promotion and regulations related to tourism. The recommendation from this research is that the Tourism Office should further optimize tourism potential by promoting tourism that is more aggressive, creative, and keeps up with the times. Strengthening cooperation with sustainable tourism partners and completing more comprehensive tourism regulations and improving existing facilities and infrastructure so that they become more comfortable, current and attractive.

Keywords: Pandemi Covid-19, Potensi Pariwisata, Strategi Pengembangan Pariwisata

---

## POTENTIAL OF BANANA PEEL EXTRACT (*Musa paradisiaca*) AS GLUCOSIDASE INHIBITOR IN MOLECULAR DOCKING

Titi Rohmayanti<sup>1</sup>

<sup>1</sup>, Universitas Djuanda Bogor, Indonesia ;

<sup>1</sup>titirohmayanti1@unida.ac.id;

---

### Abstract

**Background** - Diabetes mellitus (DM) occurs due to an imbalance in the amount of sugar transport into cells, storage of sugar in the liver, and the release of sugar from the liver so that blood sugar increases and is carried out with the urine so that the urine contains a lot of sugar. Lowering blood sugar can be done by inhibiting the activity of the -glucosidase enzyme.

**Purpose** - To determine banana peel extract as glucose inhibitor by molecular docking

**methodology** - This research was designed to study the potential of banana peel extract as an inhibitor of the -glucosidase enzyme by molecular anchoring method based on the value of Gibbs free bond energy ( $\Delta G$ ), RMSD value, Lipinski rule, and the interaction of amino acid residues with the active site of the receptor in molecular docking

**Findings** - The results of the bonding of the banana peel extract compound had an RMSD (Root Mean Square Deviation) value of 2.5 with the best compound being 1,2-Benzenedicarboxylic acid mono (2-ethylhexylester) (0.051 ). In addition, the value of Gibbs free bond energy ( $\Delta G$ ) produces values between -3.1 kcal/mol to -6.4 kcal/mol which is lower than the validation ligand 7 (-2.4 kcal/mol). The results showed that the interaction of the banana peel extract ligand to the receptor having the best hydrogen bonding was 1,2-Benzenedicarboxylic acid mono (2-ethylhexylester) in the amino acid group LEU355, ARG608, TYR360 with the addition of TYR360 hydrophobic bonds.

**Originality** - banana peel extract has glucose inhibitor activity by molecular docking

Keywords: banana peel extract, diabetes mellitus, -glucosidase enzyme, molecular docking

---

## The Effectiveness of Subcutaneous and Intramuscular FSH Injections on the Superovulatory Response of Limousin Cow

Ganjar Eka Candra<sup>1</sup>, Ristika Handarini<sup>2</sup>, Weni Kurniawan<sup>3</sup>

<sup>1</sup>, Universitas Djuanda, Indonesia ;

<sup>2</sup>Animal Science, Universitas Djuanda, Indonesia ;

<sup>3</sup>Cipelang Livestock Embryo Centre, Cipelang Livestock Embryo Centre, Indonesia ;

<sup>1</sup>-; <sup>2</sup>ristika.handarini@unida.ac.id; <sup>3</sup>-;

---

### Abstract

**Background** - The conventional method (intramuscularly) were repeated injections of FSH takes a lot of time and caused stress that can have a negative impact on the cow donor. Hiraizumi (2015) and Junaedi (2016) were reported injections by the subcutaneous route utilize fat under the skin as a depot for FSH in order to release FSH in long period and stimulated follicles continuously for 4 - 5 days.

**Purpose** - The aim of this study was to test the effectiveness of the method of subcutaneous and intramuscular injection of FSH on the superovulatory response of limousin cows.

**methodology** - The research was conducted at the Cipelang Livestock Embryo Center during March – May 2021. The study used 8 limousine breed cows aged 3-6 years. The requirements for the donor cows used were: have genetic superiority, normal estrus cycle of 18-21 days and high fertility ability, 90 days postpartum, and free from veneris diseases, Body Condition Score of donor cows used is 2.8 – 3.2. Donor cows are kept in freestall cages. Feeding of cows used forage that has been chopped about 10% of body weight twice a day and 1% concentrate of body weight once a day. Other ingredients used: Progesterone preparation (Cue-Mate® - Vetoquinol Australia Pty Ltd), Follicle Stimulating Hormone (Follitrovin-V® Vetoquinol NA Inc), Prostaglandin F2? (Estrumate® - MSD Animal Health), povidone iodine, alcohol, cotton, tissue, Lactated Ringer's media with penicillin and streptomycin antibiotics added, Fetal Calf Serum and Lidocaine for anesthesia. Kit for flushing embryos, stereo microscope, pasteur pipette, embryo filter, micro pipette, balloon pipette, 90×15mm petri dish (searching dish) and 35×12 petri dish (storage dish). Superovulation response observed from donor cows will be given 2 treatments, each treatment consists of 4 donor cows. All of 8 donor cows were used in this research. The two treatments were: P1 = Intramuscular injection of FSH for 3 days starting on the 9, 10, 11 and 12 days with doses (morning, evening: 4.4 - 3.3 - 2.2 - 1.1), and P2 = FSH injection subcutaneously 1 time on day 9 with a dose of 400 mg with a mixture of liquid (Sterile Diluent) as much as 5 ml. The observed variables were the number of CL, the number of embryos eligible for transfer, recovery rate and the proportion of embryos eligible for transfer. Statistical analysis for superovulatory response data was analyzed by T-test to compare the responses of the two superovulatory treatments.

**Findings** - The results showed a significant difference (P

**Originality** - The conclusion of the study was that the best injection was by subcutaneous method with an average number of CL  $20.75 \pm 2.17$ , number of embryos  $19.5 \pm 2.29$ , embryo transferable  $12.75 \pm 4.26$ , embryo recovery rate 95.18%.

Keywords: FSH, subcutaneous, intramuscular, transferable embryos, embryo recovery rate.

---



## The Effectiveness of Fish Meal with Maggot (*Hermetia Illucens*) Substitution in Ration on the Percentage of Boneless Kampung Unggul Balitnak (KUB) Chicks

Rully Abdul Haq<sup>1</sup>, Ristika Handarini<sup>2</sup>, Abdullah Baharun<sup>3</sup>

<sup>1</sup>, Universitas Djuanda, Indonesia ;

<sup>2</sup>, Universitas Djuanda, Indonesia ;

<sup>3</sup>, Universitas Djuanda, Indonesia ;

<sup>1</sup>; <sup>2</sup>; <sup>3</sup>;

---

### Abstract

**Background** - Maggot is a larva or black soldier fly (BSF) which can decompose organic waste very quickly in large quantities into processed waste products that can be used as animal feed. Maggot can be used as a source of animal protein for livestock or as a substitute for other protein sources that have high economic value.

**Purpose** - This study was aimed to examine the effect of fish meal with BSF larvae meal (*Hermetia ilucent*) substitution on the growth of KUB chicks on boneless, bone, skin, and meat bone ratio.

**methodology** - This study was used 100 KUB chickss. Feed ingredients consist of: corn, bran, BSF larvae flour, bread flour, CGF, soybean meal, fish meal, vegetable oil, premix, salt, and mineral mix. The rations were prepared using the excel trial and error method based on nutritional needs of chicks. Equipment was used: 20 units of henhouse with a size equipped: litter, feeder, drinking container. Equipment were used to cut the carcass parts: scales, knife and cutting board. This study used a completely randomized design (CRD) with 5 treatments and 4 replications. The treatments consisted of: R0 = 10% fish meal + 0% BSF maggot flour, R1 = 7.5% fish meal + 2.5% BSF maggot flour, R2 = 5% fish meal + 5% BSF maggot flour, R3 = = 2.5% fish meal + 7.5% BSF maggot flour, R4 = 0% fish meal + 10% BSF maggot flour. The observed variables were the percentage of slaughter weight, the percentage of boneless, the percentage of bone, the percentage of skin, and the ratio of meat to bone. Data analysis used one-way ANOVA analysis and Duncan's analysis.

**Findings** - The results were fish meal with BSF larvae flour (*Hermetia ilucent*) substitution in the ration had a different significant effect ( $P < 0.05$ ) on the percentage of the breastbone, femur percentage, meat bone ratio of the chest and thighs but did not give a different significant effect ( $P > 0.05$ ) on the percentage of the breastbone, chest percentage, thigh percentage, chest boneless percentage, thigh boneless percentage, chest and thigh skin percentage.

**Originality** - The conclusion of the study was to get the best breast and thigh MBR by substituting 7.5% fish meal + 2.5% BSF maggot flour. [https://drive.google.com/file/d/1JTuaqTrMvZoVVvBH-riocy\\_1EXZ6qwr4/view?usp=sharing](https://drive.google.com/file/d/1JTuaqTrMvZoVVvBH-riocy_1EXZ6qwr4/view?usp=sharing)

**Keywords:** substitution, BSF maggot flour, fish meal, boneless, meat bone ratio, KUB chicks.

---

## Effects of Differences in Energy and Protein Levels in Rations based piper betle solution and organic chromium To The Internal Quality of Quail Eggs.

Deden Sudrajat<sup>1</sup>, Dewi Wahyuni, S.Pt.,M.Si<sup>2</sup>

<sup>1</sup>Peternakan Fakultas Pertanian, Universitas Djuanda, Indonesia ;

<sup>2</sup>Peternakan, Univeristas Djuanda, Indonesia ;

<sup>1</sup>deden.sudrajat@unida.ac.id; <sup>2</sup>dewi.wahyuni@unida.ac.id;

---

### Abstract

**Background** - People's nutritional needs must be fulfilled with animal proteins. Quail as a producer of meat and eggs that can meet the needs of animal protein for the community. Egg quality, specially internal quality, requires adequate nutrients such as energy and protein.

**Purpose** - The purpose of the research is to study the influence of differences in energy and protein levels on quail rations on the internal quality of quail eggs.

**methodology** - Feed ingredients formulated in this study as basic rations are yellow corn, fine bran, soybean meal, fish meal, premix, DCP, CaCO<sub>3</sub>, CPO, and Cr-O. The design used is a Complete Randomized Design (RAL) with 6 treatments and 4 replays with 6 quails per cage unit. The ration treatment was a balance of energy (Kcal/kg) and protein (%), ie R1 2900/18; R2 2900/20; R3 2900/20 with PB and OC; R4 2950/18 with PB and OC; R5 2800/17 with PB and OC; R6 3000/19 with PB and OC. The research data was analyzed with Analisis of variance (ANOVA) when the data showed real different results (P

**Findings** - The results of the study were no different ( $P > 0.05$ ) in egg white weight with an average of  $5.36 \pm 0.22$  g, egg yolk weight with an average of  $2.78 \pm 0.12$  g, percentage of egg white weight with an average of  $65.7 \pm 0.81$  %, the percentage of yolk weight with an average of  $34.2 \pm 0.83$  %, haugh units with an average of  $84.31 \pm 0.57$ . Based on the results of the research conducted can be concluded that with the difference in protein and energy levels in the ration has no effect on the internal quality of quail eggs. rations with low energy and protein can still maintain the internal quality of quail eggs

**Originality** - .

Keywords: metabolizable energy, crude protein, quail egg

---

## The Inclusion of Indigenous Vegetable-based Antioxidant in ration to improve duck egg palatability

Ristika Handarini<sup>1</sup>, Deden Sudrajat<sup>2</sup>

<sup>1</sup>, Universitas Djuanda, Indonesia ;

<sup>2</sup>, Universitas Djuanda, Indonesia ;

<sup>1, 2</sup>;

---

### Abstract

**Background** - Duck egg is known to have an unpleasant fishy odor which often becomes a factor reducing its acceptance in public. This odor is resulted from lipid oxidation which can be avoided by using an antioxidant. Lipid is the main component determining the flavor of duck meat and egg (Wu and Liou, 1992). Star gooseberry leaves contain chemical compounds including tannin (catechin), flavonoids, and saponin (Juana, 2008). Star gooseberry leaves were able to reduce meat fat, abdominal fat, and total cholesterol (Arifin, 2005). The inclusion of 10% star gooseberry leaf meal in ration increased feed intake and egg production in chicken (Ibrahim, 2004).

**Purpose** - This study was aimed at assessing the effects of the inclusion of star gooseberry (*Sauropus androgynus*) dried leaf extract in ration on egg organoleptic quality of local duck

**methodology** - -

**Findings** - -

**Originality** - -

Keywords: star gooseberry leaf extract, organoleptic test, egg, local duck

---

## Analisis Perkembangan Cabang Kelompok Kelas Baca Anaku Sayang selama Pandemi Covid-19

Stanty Aulia Rachmat<sup>1</sup>, Agus Sri Iswiyanti<sup>2</sup>

<sup>1</sup>Manajemen, Universitas Gunadarma, Indonesia ;

<sup>2</sup>Manajemen, Universitas Gunadarma, Indonesia ;

<sup>1</sup>stanty@staff.gunadarma.ac.id; <sup>2</sup>agus\_sri@staff.gunadarma.ac.id;

---

### Abstract

**Background** - Pada saat ini keterampilan membaca, menulis, dan berhitung harus dimiliki oleh anak sebelum mereka memasuki sekolah. Walau ada juga beberapa sekolah yang tetap menerima anak yang belum bisa membaca, namun di beberapa sekolah khususnya sekolah swasta mengharuskan anak didik yang diterima minimal sudah mengenal huruf. Oleh karena itu, banyak orang tua yang memasukkan anak mereka ke tempat bimbingan belajar membaca, menulis dan berhitung pada usia dini atau pra-sekolah. Hal ini menimbulkan makin banyaknya sekolah informal yang mengkhususkan untuk belajar membaca, menulis dan berhitung pada anak usia dini atau pra-sekolah salah satunya adalah kelas baca Anaku Sayang. Selama pandemi Covid 19 perkembangan kelas Baca Anaku Sayang mengalami banyak penyesuaian dan beradaptasi dengan semua perubahan. Disamping itu, kelas baca Anaku Sayang juga harus bersaing dengan para pesaing agar tetap aktif selama pandemi Covid 19.

**Purpose** - Tujuan dari penelitian ini adalah untuk melihat perkembangan yang terjadi pada kelas baca Anaku Sayang selama pandemi Covid 19. Bagaimana mempertahankan peserta didik dan juga mengatasi persaingan antara sesama kelas baca pada sekolah informal lain yang sejenis.

**methodology** - Dalam penelitian ini, analisis yang digunakan adalah analisis deskriptif kualitatif. Pengumpulan data dilakukan dengan cara observasi dan wawancara langsung kepada pemilik kelas baca Anaku Sayang mengenai semua fakta dan data yang ada pada kelas baca Anaku Sayang dengan tetap menggunakan protokol kesehatan. Penelitian ini berlangsung dalam kurun waktu enam bulan, dimulai dari bulan Maret 2021 sampai September 2021.

**Findings** - Berdasarkan hasil penelitian, perkembangan kelas Baca Anaku Sayang selama pandemi Covid 19 yang sudah berjalan kurang lebih dua tahun ini terus mengalami peningkatan yang cukup baik. Hal ini terjadi karena selama pandemi berlangsung, Kelas Baca semakin diminati dalam Pembelajaran daring selama ini dan membuat para orang tua merasa perlu memasukkan anak mereka ke Kelas Baca Anaku Sayang karena lebih efisien dibandingkan memasukkan anak mereka ke Taman Kanak-kanak.

**Originality** - diketahui perkembangan kelas baca Anaku Sayang pada saat ini

Keywords: perkembangan, kelas baca, pandemi covid 19

---



**THE 5<sup>th</sup> BOGOR  
INTERNATIONAL CONFERENCE  
FOR APPLIED SCIENCE**

UNIVERSITAS DIUNDA

ISBN 978-602-6585-89-9



9 786026 585899



Organized by:



Supported by:



Number: 010/BICAS/5TH/11/2021

# CERTIFICATE

this certificate is proudly presented to :

***Deden Sudrajat***

as **PRESENTER** of the paper entitled:

*"Effects Of Differences In Energy And Protein Levels In Rations Based Piper Betle Solution And Organic Chromium To The Internal Quality Of Quail Eggs."*  
(Deden Sudrajat, Dewi Wahyuni)

in The 5<sup>th</sup> Bogor International Conference for Applied Science 2021,  
"Embracing the Global Society to Face New Normal Era through  
Applied Science".  
Conducted Virtually on November 11<sup>th</sup>, 2021.

Chairman,

Mohd. Ali Fulazzaky, Ph. D

Rector of Universitas Djuanda,



Assoc. Prof. Dr. Ir. Dede Kardaya, M.Si