



The 1<sup>st</sup> International Undergraduate Conference  
on Agriculture & Life Science  
(Online Conference)

BOOK OF

ABSTRACTS &  
FULL PAPER

June 1<sup>st</sup> - 2<sup>nd</sup>, 2021



Universiti Malaysia  
KELANTAN

CO-ORGANIZER



The 1<sup>st</sup> International Undergraduate Conference  
on Agriculture & Life Science  
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1<sup>st</sup>-2<sup>nd</sup> June, 2021

คณะเกษตรศาสตร์  
FACULTY OF AGRICULTURE

Organizing Committee of the IUCA 2021  
Faculty of Agriculture  
Princess of Naradhiwas University

<http://agri.pnu.ac.th/agri/index.php/iuca2021>



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Book of Abstracts of The 1<sup>st</sup> International Undergraduate Conference on Agriculture & Life Science (IUCA2021)

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## PREFACE

Welcome to the 1<sup>st</sup> International Undergraduate Conference on Agriculture & Life Science (IUCA2021) organized by the Faculty of Agriculture, Princess of Naradhiwas University on 1-2 June, 2021 as an online conference. We would like to thank our co-organizers from Yala Rajabhat University, (Thailand), Prince of Songkla University, Pattani Campus, (Thailand), Universiti Malaysia Kelantan, Jeli campus (Malaysia), Universiti of Bengkulu University, (Indonesia), University of Garmian, (Iraq), Omar Al-Mukhtar University, (Libya) for making this online conference a paramount and valuable event.

IUCA2021 Organizing Committee





**Asst.Prof. Dr. Chongrak Palasai**

**President of the University Council**

On behalf of Princess of Naradhiwas University Council Committee, it is my pleasure to welcome all participants to 'The 1<sup>st</sup> International Undergraduate Conference on Agriculture & Life Science'

I noticed that many of attendees today are PNU original partnership that I have met and welcomed all of you at the university last year before the coronavirus (COVID-19) pandemic happening. Anyway, I am also delighted to see that there are many more new attendees have been added at this year event. Although today, we are meeting via an online virtual space platform, but at least we can take this opportunity to recognize each other and exchange together.

On this occasion, I would like to invite all participants to visit our university (Princess of Naradhiwas University) via video presentation afterward. Hopefully, in the near future, after the situation of coronavirus (COVID-19) pandemic, there will be an opportunity to welcome all of you with my great pleasure again.





**Assoc. Prof. Dr. Rotssukon Sangmanee**

**President**

Today, it is a great honor to preside over an opening ceremony of 'The 1<sup>st</sup> International Undergraduate Conference on Agriculture & Life Science'

As the coronavirus (COVID-19) pandemic becomes to be widespread concern, we have to lookout for the situation hopefully we can overcome the crisis together. Especially, when we are organizing the large event with a large number of participants, at the same time our mission and duty must still continue to reach our goal. Today, it can be said that we just only change our route to the same destination instead of the rough road to go. Or people always use the term of 'New Normal' to define it. Anyway, every obstacle is surmountable. Also, for academic achievement, there will be many options and solutions. We found the way that to organize webinars to avoid gathering of people. Although, this academic conference is far from distance, but it can be clearly seen that we are here together through an online virtual space platform that allows all students, lecturers, and participants to exchange and learn as usual.

I would like to take this opportunity to say thank you all university partners namely ... Yala Rajabhat University and Prince of Songkla University, Pattani Campus (Thailand), FIAT UMK (Malaysia), Bengkulu University (Indonesia), University of Garmian (Iraq) and Omar Al-Mukhtar University (Libya.) it is a great honor that you are a co-host in organizing this academic conference 'The 1<sup>st</sup> International Undergraduate Conference on Agriculture & Life Science' and making this event happen. Thank you, all academic experts for revise and improvement presenters' articles. That makes every article more valuable. Thank you, students' advisor, that has pushed, supported, encouraged and provided a great opportunity for students to the world of academics. I strongly believe that today's students will be our mainspring for our country development in the future.

Now, the time has come, I would like to officially open this academic conference 'The 1<sup>st</sup> International Undergraduate Conference on Agriculture & Life Science'.



## Asst.Prof. Dr. Jakkhaphan Pichayapipatkul

### Dean of Faculty of Agriculture

On behalf of Faculty of Agriculture and all participants, I would like to say thank you to the President for your honor to preside over the opening remarks of 'The 1st International Undergraduate Conference on Agriculture & Life Science'

The 1st International Undergraduate Conference on Agriculture & Life Science is an academic conference presenting international academic work in the field of agriculture and related field from undergraduate students and interested people within both in Thailand and abroad via Zoom online platform. This conference is mainly organized by Princess of Naradhiwas University cooperated with 2 other local universities which are Yala Rajabhat University and Prince of Songkla University, Pattani Campus including 4 foreign universities namely FIAT UMK, Malaysia, Bengkulu University, Indonesia, University of Garmian, Iraq and Omar Al-Mukhtar University, Libya. This academic conference has 2 main purposes; (1) to provide a forum for undergraduate students to discuss and exchange experiences and ideas on all aspects of agriculture and life science. And (2) to promote collaboration among international universities.

This conference was opened to register on April 19<sup>th</sup> to May 5<sup>th</sup>, 2021 without registration fees. Then every single submitted articles are reviewed and proved by the expert referees in particular field. There are the articles that have been considered to be presented at this conference for xx articles in total. Consequently, the conference has been scheduled for 2-day presentation which will be held on 1<sup>st</sup>- 2<sup>nd</sup> June , 2021. Each person is allowed to present their academic work in the format of Video Presentations for 10 minutes following by answering questions from participants for 5 minutes session. At all events, there will be the expert referees judging the presentation of the best 3 awards (1) Gold Award will be given 100 USD (2) Silver Award will be given 70 USD (3) Bronze Award will be given 30 USD. I really hope that this event will provide a new platform for research and collaboration. Thank you

## June 1<sup>st</sup> 2021 (Tuesday)

Time (GMT+7)	Event
08.00 – 08.30	Registration
08.30 - 08.35	Welcome and Introduction by MC
08.35-08.50	Welcome Speech Greeting by President of the University Council (Asst. Prof. Dr. Chongrak Palasai)
08.50 – 08.55	Chairman Committee Report – by Dean of Faculty of Agriculture (Asst. Prof. Dr. Jakkhaphan Pichayapipatkul)
08.55-09.00	Opening Ceremony by President (Assoc. Prof. Dr. Rotssukon Sangmanee)
09.00-09.05	Consul-General By Mr. Mongkol Sinsomboon
09.05-09.15	Greeting Attending
09.15- 09.45	keynote Speaker By: Dr. Nasha Ananchotikul “Agriculture and Life Sciences for a Sustainable Future”
09.45-10.05	Plenary speaker By: Dr. Raja Ili Airina “The potential of reproductive technology in changing the economic landscape of farming in Asian”
10.05-11.40	<b>Video Presentation of Animal Science</b>
10.10-10.20	IUCA-A-A014: The Study of nutritive value of legumes fodder for raising goat and beef cattle in Raman district, Yala Province

<sup>st</sup>  
**June 1 2021 (Tuesday)**

<b>Time (GMT+7)</b>	<b>Event</b>
10.20-10.30	IUCA-A-A015: Effect of Sericin Supplementation in Semen Extender on Frozen-Thawed Bull Semen Quality
10.30-10.40	IUCA-A-A008: The Yield and Nutrient Composition of Soilless Fodder at Different Kinds
10.40-10.50	IUCA-A-A009: Diversity of the Amphibian in Hala-Bala forest, Yala Province, Thailand <i>*Presenters have not submitted the final abstract correction.</i>
10.50-11.00	IUCA-A-A037 Effect of Grass Hay as an Alternative Bedding Material on Growth Performance of Broiler
11.00-11.10	IUCA-A-A042: Effect of Different Type of Eggshells on Growth Performance of Japanese Quails ( <i>Cortunix japonica</i> )
11.10-11.20	IUCA-A-A046: Effect of Different Levels of Sodium Bicarbonate on the Total Mixed Ration Pellet of Lactating Dairy Goats
11.20-11.30	IUCA-F-A055: Effect of Feeding Black Soldier Fly Larvae (BSFL) and Anchovy By-Product on Egg and Hatching Chick Weight in Japanese quail <i>*Presenters have not submitted the final abstract correction.</i>
11.30-11.40	IUCA-A-A061: The effect of antibacterial activity of the Black Soldier Fly Larvae ( <i>Hermetia illucens</i> ) extracted from the selected solvent against <i>Aeromonas hydrophila</i> <i>*Presenters have not submitted the final abstract correction.</i>
11.40-11.50	IUCA-F-A078: Effect of Pandanus amarylifolius Roxb Supplementation on Growth Performance and Egg quality of Japanese Quail.

**June 1<sup>st</sup> 2021 (Tuesday)**

<b>Time (GMT+7)</b>	<b>Event</b>
12.00-13.00	Lunch
13.00-13.35	Invited speaker By: Asst. Prof. Dr. ASAAD MAHMOOD “Sustaining agricultural development through action research”
13.35-16.00	Video Presentation of Plant Science
13.35-13.50	IUCA-A-P003: Synthetic Fertilizer Substitution Using Thitonia Compost For Sweet Corn Production In A Dryland Environment
13.50-14.00	IUCA-A-P013: $\alpha$ -Glucosidase Enzyme Inhibition Activity and Organoleptic Test from the Combination of Black Tea, Turmeric, and Ginger Extract by In Vitro
14.00-14.10	IUCA-A-P021: Ginger as an immune booster during a pandemic by utilizing the yard
14.10-14.20	IUCA-A-P022: Baferpott (Biofiberpott) As An Alternative Plant Container Utilization Of Coconut Fruit ( <i>Cocos nucifera</i> )
14.20-14.30	IUCA-A-P023: Effects of Organic Fertilizers Types and Dosages on Growth and Yield of Mustard Green ( <i>Brassica juncea</i> L.)
14.30-14.40	IUCA-A-P024: Effects of Sweet Corn variety and Dosages of Vermicompost of Growth and Yield of Sweet Corn
14.40-14.50	IUCA-A-P028: Charakterization Genetic Variability and Heritability of Thirteen Genotypes Vinca ( <i>Chataranthus roseus</i> )
14.50-15.00	IUCA-F-P035: Growth, Yield and Quality of Three Varieties of Melon in the Application of Some types of Local Microorganism (MOL)

June 1<sup>st</sup> 2021 (Tuesday)

Time (GMT+7)	Event
15.00-15.10	IUCA-A-P074: Pollen spectrum, Pollen diversity and pollen ingestion of Stingless bee at stingless bee center in Saiburi, Pattani province
15.10-15.20	IUCA-A-P077: "Screening of Microorganisms for Plant Growth Promoting Activity of Hom Gra Dang Ngah Rice"
15.20-15.30	IUCA-F-P079: Mode Of Actions and Pathogenecity od 11 Endophytic Fungi on <i>Fusarium oxysporum</i>
15.30-15.40	IUCA-A-P087 Chemical Sterilization of Culture Media used for Shoots Multiplication of Bamboo ( <i>Dendrocalamus sericeu</i> )
15.40-15.50	IUCA-A-P073: The Lettuce Growth Using Residue Mushroom as Substrates
15.50-16.00	IUCA-A-P090: Effect of Different Media Ratio for the Growth and the Yield of <i>Hericium erinaceus</i> <i>*Presenters have not submitted the final abstract correction.</i>

**June 2<sup>nd</sup> 2021 (Wednesday)**

Time (GMT+7)	Event
08.00 – 08.30	Registration
08.30 - 08.40	Welcome and Introduction by MC
08.40-09.00	Dr. Nurmeilia sari- Plinery Speaker - Animal Welfare
09.00-11.50	Video Presentation of Life Science
09.00-09.10	IUCA - A - O005: Effect of Dairy Cattle Waste Based Vermicompost on Reduction of Cadmium Concentration in Contaminated Inceptisols and Entisols
09.10-09.20	IUCA - A - O025: Activity Test of <i>Asplenium nidus</i> L. Leaves from Barumanis Village against Pathogenic Bacteria <i>*Presenters have not submitted the final abstract correction.</i>
09.20-09.30	IUCA - F - O027: Identification Process of “Japigo” Mushroom Chips Composition in Gondangmanis Mushroom Business Group <i>*Presenters have not submitted the final abstract correction.</i>
09.30-09.40	IUCA - A - O040: Stability Study of Sweet Potato ( <i>Ipomoea batatas</i> ) Cookies from Different variation of Sweet Potatoes <i>*Presenters have not submitted the final abstract correction.</i>
09.40-09.50	IUCA - A - O058: Physiochemical and Proximate Analysis of Powdered Rambutan Vinegar ( <i>Nephelium lappaceum</i> L.)
09.50-10.00	IUCA - A - O065: Gel Extracts Development from Acacia Leaves, Santol Leaves and Bamboo Leaves for Anti-Pathogenic Bacteria in Plant
10.00-10.10	IUCA - A - O071: Encapsulation of Bergamot Leaves Extract Development for Resistance of <i>Colletotrichum gloeosporioides</i> in Durian
10.10-10.20	IUCA - A - O080: Analysis of Consumer Behavior on Purchasing Decision of "Lapis Aren Linggau" Cake in Lubuklinggau City, South Sumatera Province, Indonesia

**June 2<sup>nd</sup> 2021 (Wednesday)**

<b>Time (GMT+7)</b>	<b>Event</b>
10.20-10.30	IUCA - A - 0081: Analysis of consumers attitude and behavior of two durian basic products (studi in syarah bakery bengkulu city) <i>*Presenters have not submitted the final abstract correction.</i>
10.30-10.40	IUCA - A - O082: The Correlation between Marketing Mix (Product, Price, Place and Promotion) With Purchase Decision of Kopi Janji Jiwa Bengkulu City
10.40-10.50	IUCA - A - O083: Analysis of Marketing Chain, Value Added & Efficiency of Marketing of Dried Fish in Bengkulu Province <i>*Presenters have not submitted the final abstract correction.</i>
10.50-11.00	IUCA - A - O084: The Level of Food Commodity Varieties Demand by Peddlers in Covid-19 Pandemic (A Case Study in Panorama Market of Bengkulu City Bengkulu Province – Indonesia) <i>*Presenters have not submitted the final abstract correction.</i>
11.00-11.10	IUCA - A - O050: Physicochemical Properties and Sensory Evaluation of Cracker Made from a Combination of Banana ( <i>Musa acuminata</i> ) and Chia Seeds ( <i>Salvia hispanica</i> L.) <i>*Presenters have not submitted the final abstract correction.</i>
11.10-11.20	IUCA - A - O088: Daycare Information System
11.20-11.30	IUCA - A - O089: A Smart System for Controlling the Mushroom Growing House
11.30-11.40	IUCA-A-O091 : Study of the Twin's Birth Rate in Al-Bayda City, Libya
11.40-13.00	Lunch
13.00-15.00	Video Presentation of Fisheries
13.05-13.15	IUCA-A-F001: A remarkable evidence of the erythrocyte and its nuclear morphological abnormality of the Doublespotted Queenfish <i>Scomberoides lysan</i> (Forsskål 1775) in the rearing pond
13.15-13.25	IUCA-A-F002: Oocyte structure and reproductive health of the sexually mature Hedgehog seahorse, <i>Hippocampus spinosissimus</i> (Weber, 1913) reared in captivity

**June 2<sup>nd</sup> 2021 (Wednesday)**

<b>Time (GMT+7)</b>	<b>Event</b>
13.25-13.35	IUCA-A-F032: Product development of fried fish bone crisp.
13.35-13.45	IUCA-A-F047: Effects of Differences in Physical Properties of The Earthworm and the Black Soldier Fly Larvae (BSFL) in Fish Feed With Commercial Feed as Control Towards Growth and Performance of Betta Fish ( <i>Betta splendens</i> )
13.45-13.55	IUCA-A-F048: Antibiogram of <i>Vibrio parahaemolyticus</i> isolated from diseased ornamental fish
13.55-14.05	IUCA-A-F075: Simulation of the impact of the Covid-19 pandemic on the household economy of Tilapia cultivators in Bengkulu: a simulation
14.05-14.15	IUCA-A-F051: Effects of black soldier larvae (BSFL) and earthworm feeding on the water quality of betta fish ( <i>Betta splendens</i> )
14.15-14.30	IUCA-A-F085: Eels, A Potential Dietary Protein In Rural Areas Of Bengkulu Province
14.30-15.00	Reward
15.00	Closing Ceremony



**ANIMAL SCIENCE  
(ABSTRACT & FULL PAPER)**

## The Study of nutritive value of legumes fodder for raising goat and beef cattle feed in Raman district, Yala Province

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### Abstract

The purpose of this research was to study a situation of farmer and nutritive value of legumes used to raised goat and beef cattle diet in Raman district, Yala Province, Thailand. The sample of study were farmers who raising goat and beef cattle. The research tool of this study was an interview. The statistic employed was frequency and percentage. The result showed that most of the farmers were male farmers (64%), and 41-60 years of age (32%). Farmers in Yala apply traditional livestock production which is mainly using grass-land based system. Goats and beef cattle are the popular in Yala. The most common legumes fed to the cattle and goats are Phasey bean (*Macroptilium lathyroides*) (22.68% DM, 6.93% of ash, 18.17% CP, 3.59% of fat, 50.55% of NDF, 35.33% of ADF, 8.25% of ADL), Desmanthus (*Desmanthus virgatus*) (36.74% DM, 8.73% of ash, 19.21% CP, 3.20% of fat, 52.93% of NDF, 22.33% of ADF, 14.08% of ADL), Centro (*Centrosema pubescens*) (52.04% DM, 5.87% of ash, 17.70% CP, 2.66% of fat, 51.59% of NDF, 39.74% of ADF, 8.68% of ADL), Leucaena (*Leucaena leucocephala*) (35.28% DM, 9.32% of ash, 18.99% CP, 3.19% of fat, 47.99% of NDF, 37.03% of ADF, 9.71% of ADL), Calopo (*Calopogonium mucunoides*) (33.98% DM, 8.94% of ash, 12.81% CP, 2.40% of fat, 54.09% of NDF, 33.52% of ADF, 8.99% of ADL), Alyce clover (*Alysicarpus vaginalis*) (26.21% DM, 7.27% of ash, 13.92% CP, 2.00% of fat, 53.30% of NDF, 37.30% of ADF, 8.40% of ADL), Manila Tamarind (*Pithecellobium dulce*) (51.35% DM, 6.56% of ash, 23.59% CP, 3.19% of fat, 33.92% of NDF, 30.54% of ADF, 15.56% of ADL) and Mata Raton (*Gliricidia sepium*) (21.51% DM, 11.61% of ash, 16.74% CP, 2.00% of fat, 44.0% of NDF, 42.21% of ADF, 9.74% of ADL). In conclusion, the chemical composition of legumes in Raman district is suitable for raising.

**Keywords:** nutritive value, goat, beef cattle, legumes

## Effect of Grass Hay as an Alternative Bedding Material on Growth Performance of Broiler

Jeanmas, A.<sup>1,\*</sup>, Ongsara, A.<sup>1</sup>, Longnapa, K.<sup>1</sup>, Ausengmake, A.<sup>1</sup> and Doco, M.<sup>1</sup>

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### Abstract

The experiment was conducted to investigate the effect of grass hay as an alternative bedding material on the growth performance of broilers. This study was conducted at the Faculty of Science and Technology, Prince of Songkla University, Pattani, Thailand. Chicks were raised from 1 to 35 days old, from December to January with temperatures from 22.5 to 29.2 °C. The used litter types were rice husk and grass hay. All sorts of litters were to a depth of approximately 5 cm. A total of two thousand broilers (CP707) one day old were randomly allocated to 2 treatments with 10 replicates of 100 chicks each (10 birds/m<sup>2</sup>). Feed and water were available ad libitum. Body weight, feed intake, weight gain and feed conversion ratio (FCR) were recorded weekly. The litter moisture was assessed weekly. Data analysis was performed using the t-test method. Results showed that litter moisture was not significantly different between rice husk and grass hay. Litter materials had no significant influence on weight at 35 days old, weight gain and FCR at 7 to 35 days of age ( $P > 0.05$ ). The broilers reared on rice husk had significantly lower feed intake than grass hay ( $P < 0.05$ ). In conclusion, this study has shown that grass hay may be suitable as an alternate bedding material for the broiler.

**Keywords:** grass hay, bedding, growth performance, broiler

## Effect of Sericin Supplementation in Semen Extender on Frozen-Thawed Bull Semen Quality

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### Abstract

Sericin from silkworm (*Bombyxmori*) was antioxidant and antimicrobial properties. Therefore, the objective of this study was aims to investigate the effect of sericin supplementation in Tris-Egg Yolk-Glycerol (TEY) extender on frozen-thawed bull semen quality. Three treatment groups were divided, consisting of supplemented of sericin in TEY extender with 0.0 % (Group 1: served as control group), 0.5% (Group 2) and 1.0% (Group 3), respectively. The mass motility of sperm (%), progressive motility of sperm (%), live sperm (%) and plasma membrane integrity of sperm (HOT-test) (%) in cooled (storage at 5 °C) and frozen-thawed sperm were examined. The present study was found that the mass motility of sperm (%), progressive motility of sperm (%), live sperm (%) and sperm plasma membrane integrity (HOT-test) (%) in cooled semen (storage at 5 °C) in the group of supplemented sericin in TEY extender with 1.0% (Group 3) was significant higher ( $P<0.05$ ) than the control group. However, the progressive motility of sperm (%) and live sperm (%) in frozen-thawed semen in the group of supplemented sericin in TEY extender with 0.5% and 1.0% (Group 2 and 3, respectively) was non-significant difference in compared with the control group. Vice versa, the sperm plasma membrane integrity (HOT-test) (%) in frozen-thawed semen in the group of supplemented sericin in TEY extender with 1.0% (w/v) (Group 3) were significant lower ( $P<0.05$ ) than the control group. In conclusion, this study can conclude that supplemented sericin in TEY extender with 1.0% (w/v) was improved fresh semen quality (storage at 5 °C), but it cannot improve frozen-thawed semen quality.

**Keywords:** Sericin, Antioxidants, Frozen, Semen, Cattle

## The Yield and Nutrient Composition of Soilless Fodder at Different Kinds

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### Abstract

The study was conducted with a view to establishment technology of production and analysis of yield and nutrient component of soilless fodders with three different kinds i.e. maize, and wheat and Thai local rice (Seribugantan). The experimental design was a completely randomized design with six replicates. The seeds were placed within the trays that size 30x60 cm. through spreading and water were given timely. Fresh soilless fodders were cultivated and harvested in 14 days. The yield production and nutrient contents of soilless fodder were measured. The nutrients contents were dry matter (DM), crude protein (CP), ash, ether extract (EE) and neutral detergent fiber (NDF) were analyzed. The results found that the fresh yield of maize sprout (4.50 kg/kg seed) was significantly ( $p<0.05$ ) higher than wheat (3.99 kg/kg seed) and local rice sprout (1.98 kg/kg seed). However, the dry yield of local rice sprout (0.83 kg/kg seed) was significantly ( $p<0.05$ ) higher than maize (0.74 kg/kg seed) and wheat sprout (0.56 kg/kg seed). The DM content of Thai native rice sprouts was significantly ( $p<0.05$ ) higher than maize and wheat sprouts. The CP of fodder was similar for all treatments ( $p>0.05$ ) (13.71, 11.60 and 14.11%, respectively). However, the EE in maize was significantly ( $p<0.05$ ) the highest than wheat and local rice sprout (5.69, 1.87 and 1.08% ( $p<0.05$ )) the highest than other (6.65, 6.70 and 4.88%, respectively). Moreover, the NDF content within the local rice sprout was significant the lowest than others. Hence, from this study can conclude that the yield and nutrient content of soilless maize fodder was found to be high and appropriate for feeding ruminant livestock. Further study long-term studies are required to achieve more insights regarding the effect of soilless fodder on ruminant performance.

**Keywords:** Soilless fodder, innovation, animal feeding, sprout, nutrient content

## Effect of Different Type of Eggshells in the Diet on Growth Performance of Japanese Quails (*Coturnix japonica*)

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### Abstract

Egg has been being highly demand and consumes among worldwide which being used widely in many meal and product. The eggshell is being threw away as waste that may cause pollution problem. As the eggshell contains rich in calcium, it can be recycle for use as a supplement of calcium in formulated feed. Calcium is a needed micromineral for the growth of the quail for bone formation and laying egg purpose. This research is carried out to determine the effect of different type of eggshell on Japanese quail growth performance with applying chicken and duck eggshell into specific formulated feed for the quail. Sample of 180 Japanese quail that age around 25 days old were being used and the experiment was done at Agrotechnopark, Universiti Malaysia Kelantan, Jeli Campus. There are three treatment groups of formulated diet, which are Treatment 1 (Control), contain 2% of limestone, Treatment 2 contains 2% of chicken eggshell and Treatment 3 contains 2% of duck eggshell. Each treatment contains 20 Japanese quails with three replicates. The feeding trial was being tested for 6 weeks and the body weight of each quail in each treatment was being recorded weekly. Treatment 2 with chicken eggshell recorded highest average body weight gain of  $2.64 \text{ g} \pm 0.32$  compare to Treatment 1 and Treatment 3 which is  $2.62 \text{ g} \pm 0.8$  and  $2.62 \text{ g} \pm 0.25$  respectively. However, there are no significant different between the average body weight among three treatments. This research study showed that chicken eggshell gave highest weight gain on Japanese quails and it also can be consider as a calcium source in feed because of easily obtain compare to limestone and duck eggshell.

**Keywords:** Chicken eggshell, Duck eggshell, Growth performance, Japanese quail (*Coturnix japonica*)

## Effect of Different Levels of Sodium Bicarbonate on the Total Mixed Ration Pellet of Lactating Dairy Goats

Rozainal, S. N.<sup>1</sup>, Rusli, N. D.<sup>1,\*</sup>, Mat, K.<sup>1</sup>, Rahman, M. M.<sup>1</sup>, Harun, H. C.<sup>1</sup>, Al-amsyar, S. M.<sup>1</sup> and Mahmud, M.<sup>1</sup>

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### Abstract

Total Mixed Ration (TMR) feeding ensures the animal receives a nutritionally balanced ration to meet the animal's energy and protein needs for optimum efficiency. However, the use of TMR needs to be monitored daily due to high moisture ingredients. In order to prevent the overheated and spoiled condition, TMR should be pelletised. Since there is no standard use of sodium bicarbonate as a pellet-binding agent in TMR pellet for lactating dairy goats, this study aims to evaluate the effect of different levels of sodium bicarbonate in TMR pellet on the physical and chemical characteristics. The TMR will be formulated using the local ingredients which consists of palm kernel cake (PKC), rice bran, copra meal, molasses, vitamin/mineral, salt, Napier grass and soya hull. Four different levels of sodium bicarbonate at 0.5%, 1.0%, 1.5% and 2.0% will be formulated in four different formulations of TMR pellets namely formulation 1 (F1), F2, F3 and F4, respectively. The formulated TMR pellets will be isocaloric and isonitrogenous. The TMR pellet will be tested for its particle size, mass, and volumetric density. The pellet durability index (PDI, %) of the TMR pellet will be calculated based on its moisture content, as well as the amount of pellet output based on the compression roller's rotation pace. The proximate and mineral analyses of TMR pellet will also be analysed. It is expected that there will be no significant difference of particle size, mass and volumetric density between the F1, F2, F3 and F4. However, the PDI (%) might be optimum in the F3 with 1.5% sodium bicarbonate as the moisture content is the lowest. For chemical analysis, there will be no difference between the four TMR pellets, however the sodium content will be higher in the F4 as it contains 2% sodium bicarbonate. The current finding may help in improving the quality of the pellets on shelf for a longer period and reduces the feed cost.

**Keywords:** Lactating, Dairy goat, Total Mixed Ration pellet, TMR pellet

## ***In vitro* Assessment of the Digestibility of Soilless Fodder at Different Kinds**

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### **Abstract**

This study aimed to analyze the effects of a different kind of soilless fodder on dry matter digestibility (DMD), crude protein digestibility (CPD) and protozoa number by *in vitro* gas production technique. Soilless fodders were wheat, native rice and maize sprout. The material was incubated with three goat fluids and also the experimental design was a completely randomized design with three replications. Cumulative gas production and dry matter digestibility were recorded at 0, 2, 4, 6, 8, 12, 15, 18, 24, 36 and 48 hours of incubation. Conventional *in vitro* DMD was determined after 48 hr. incubation in a 39 °C water bath. The results showed that the various sort of soilless fodder have affected gas volume at 6 to 36 hr. after incubation were significantly different ( $P < 0.05$ ) among treatments. Gas production at 6 to 36 hr. of native rice sprouts was significantly ( $P < 0.05$ ) higher than maize and wheat sprouts. Consideration of DMD found that wheat sprouts (83.81%) had significantly higher than Thai native rice (60.02%) and maize sprout (47.70%). However, CPD was not significantly ( $P > 0.05$ ) different for all treatments. Also, the amount of protozoa was not significantly ( $P > 0.05$ ) different for all of the treatments additionally. Therefore, based on *in vitro* study can conclude that soilless fodder could be of great interest for its usage as ruminant feeding.

**Keywords:** gas production, innovation, animal feeding, sprout, *in vitro*

## Effect of *Pandanus amarylifolius* Roxb. Supplementation on Growth Performance and Egg Quality of Japanese Quail

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### Abstract

Study of the Effect of *P. amarylifolius* supplementations on growth performance and egg quality of Japanese Quail. By use 60 female quails at 30 days. The experimental design was completely randomized (CRD) into 4 treatment groups, each group with three replications each replication with 5 birds were divided into four groups of 3, each of which was feed a control formula (T1), group 2 received *P. amarylifolius* powder supplements 2 percent (T2), group 3 received *P. amarylifolius* powder supplements 4 percent (T3), and group 4 received *P. amarylifolius* powder supplements by 6 percent (T4), of *P. amarylifolius*. The quails fed *P. amarylifolius* powder supplementation at different level show that initial weights final weights, weight gain, feed intake, growth rate per day and amount of feed conversion to eggs is not different in statistic ( $p>0.05$ ). For amount of feed conversion ratio, it shows that (9.40, 16.53, 27.28 and 11.79 respectively) are statistically different ( $p<0.05$ ). Feed conversion ratio, it shows that *P. amarylifolius* powder supplementation on productivity of Japanese quails at level, 2, 4 and 6 percent has a higher FCR than control group (9.40 g) significantly statistically ( $p<0.05$ ). For productivity and egg color of Japanese quails, it shows that percentage of egg productivity, feed conversion to a dozen of eggs, shell thickness, yolk height and yolk diameter are not statistically different ( $p>0.05$ ). For the rate of feed conversion to a dozen of eggs, it shows that *P. amarylifolius* powder Supplementation on productivity of Japanese quails at level 2 4 and 6 percent (390.08, 411.61 and 478.73 g respectively) gives a higher rate of feed conversion to a dozen eggs than the control group (347.52 g) significantly statistically ( $p<0.05$ ). For the value of egg color of Japanese quails, it shows that brightness value ( $L^*$ ) of quails fed *P. amarylifolius* powder Supplementation at level 2 4 and 6 percent are not statistically different ( $p<0.05$ ). Besides, for redness value ( $a^*$ ) (9.38, 9.24 and 10.37 respectively) and yellowness ( $b^*$ ) (51.41, 52.30 and 53.16 respectively) is likely to be higher than the control group (7.79 and 41.39 respectively) significantly statistically ( $p<0.05$ ).

**Keywords:** *Pandanus amarylifolius* Roxb., growth performance, egg quality, Japanese quail

### Introduction

Quails are considered an economical animal which is interesting because the space used to feed quails is less than live stocks, such as goats, sheep, and cows. There was not any obvious evidence about the first country that started to feed quails. However, in Asia, the very first country started to feed quails is Japan. In the beginning, people feed quails for its tweet like Thais feeding doves. Later, quails are developed and improved to layer quails (Muang-ngam, 2014).

Nowadays, the price of a quail is 25 Baht. Quails will give eggs at aged 30 days. When the quail is 10monthold, it will retire to lay eggs. At that time, the quails could be sold at 10 - 12 Baht. On average, a quail costs 10 Baht. Egg productivity is about 70% of all quails. For the average feed cost for a quail, it can be calculated to 0.50 Baht per quail per day because a quail eats feed around 25 g a times, two times a day. For the price of egg sale, eggs are able to be sold at 80-90 Baht. Quail caring take only 4 - 5 hours a day, and it can be periodically done, Quail caring, such as feeding, cleaning, egg collecting, packing, and selling at the market, is detailed works but somewhat easy. These works should be rotated in turn. In Thailand, there is only one species of quails that are fed for trade. That is Japanese quail which has black and white feathers or gold and white feathers, but they give similar eggs with dots on. This species of dove is easy to feed. It grows fast and gives eggs fast. Its eggs are plentiful, durable and resistant to disease. Even though there are more than 12 local species of quails, these species are not as good as Japanese quails on giving egg and meat productivity, so Thais prefer to raise Japanese quails extensively. Although feeding quails are not largely as wide as feeding ducks or chickens, it tends to become the main occupation for farmers because the feeding time is short, but giving return is faster than other animal feeding. Moreover, the amount of investment is small, and the market needs quail eggs (Anghong, 2017). Feed for a quail is very important because quails need high protein to lay eggs and to get a proper color of eggs. Synthetic pigments sold in the market are expensive, so it is important to find natural pigments to add color value of yolks and to reduce feed cost. *P. amarylifolius*, a local vegetation, gives many benefits like nourishing heart, reducing blood sugar, lowering blood pressure, curing measles, restraining scurvy- cold, hepatitis and dysentery. *P. amarylifolius* flowers can be used to relieve cough and sore throat help digestion and nourish power. Moreover, *P. amarylifolius* leaves give a sweet smell when it is used in sweets or desserts. Sirito (2009) explained that the nutrition of a *P. amarylifolius* contains protein (1.90%), carbohydrate (4.70%), fiber (5.20%), calcium (27.00%), and phosphorus (124.00%). Besides, there is beta-carotene in *P. amarylifolius*. It is the initial substance to vitamin A which plays an important role in maintaining health and boosting the immune system. It also acts as an antioxidant. The researchers, therefore, have the idea of using *P. amarylifolius* powder to replace the color source in eggs quail.

## Materials and Methods

### 1. Sampling Animal

Sixty female quails at 30 days are fed and divided quails into 4 treatment groups, each group with three replications each replication with 5 head.

### 2. Experimental Housing

The quails were in a 4-layer cage in open housing with a single gable. Each tier was divided into four replications. There were feed troughs, automatic water containers, quail cage mats and lighting in each tier.

### 3. Experimental Feed

Quails were fed with at least protein 22%.Feed is divided into 4 formulas, as following:

Treatment 1: feeding with layer quail feed (control group)

Treatment 2: feeding with control diet supplemented with 2%

Treatment 3: feeding with control diet supplemented with 4%  
 Treatment 4: feeding with control diet supplemented with 6%  
 by supplementing *P. amarylifolius* powder and using a horizontal mixer.

#### 4. Methods

From Raised layer quails aged 30 days, are fed and divided quails into 4 treatment groups, each group with three replications each replication with 5 head, randomly pick an egg from replication 5 each, total 36 eggs in week 7-10 to measure intensity of eggs, yolk height, yolk diameter, and thickness of eggshell throughout the experimental period, 45 days. The quails were fed with four formulas two times a day, at 8.00 a.m. and 4.00 p.m. The quails were fully fed with food and water.

#### 5. Data collection

Record feed intake, growth rate per day, weight gain, egg productivity rate, egg weight, eggshell weight, yolk height, yolk diameter, albumen height, albumen diameter, yolk weight, albumen weight, shell thickness, and measure egg color by measuring brightness value (L\*), redness value (a\*), yellowness value (b\*). Then, calculate collected data to find average value by using Microsoft Excel, and analyze statistical differences of each value by analysis of variance: Anova). In addition, if the influence of treatment was found, drawing the comparison of differences of average value will be conducted by Duncan's New Multiple Range Test: DMRT using a program (SAS).

#### - Formulas for Calculation

Feed intake	=	$\frac{\text{Weight of Given feed} - \text{Weight of remaining Feed}}{\text{The number of quails}}$
Feed Conversion Ratio	=	$\frac{\text{Feed Intake}}{\text{Weight Gain}}$
Average Daily Gain	=	$\frac{\text{Final Weight} - \text{Initial Weight}}{\text{The Number of Experimental}}$
Body Weight Gain	=	$\text{Final Weight} - \text{Initial Weight}$
Feed Conversion Ratio Egg	=	$\frac{\text{Feed Intake}}{\text{The Number of Egg} \times \text{Average Weight of Egg}}$
Hen-day production	=	$\frac{\text{Total Eggs to Day} \times 100}{\text{Total Quails to Day}}$
Feed dozen egg	=	$\frac{\text{Feed Intake} \times 12}{\text{Total eggs}}$

#### - Internal and external egg inspection

1. Measure yolk height by using venire caliper measuring from the bottom to the top.

2. Measure yolk diameter by using venire caliper measuring yolk diameter.
3. Measure shell thickness by using venire caliper measuring shell thickness at the center of the egg.

### Results and Discussion

From experiment in week 6-10, the quails fed *P. amarylifolius* supplementation at different level show that initial weights (149.53, 151.40, 151.33 and 148.73 g), final weights (177.13, 174.33, 173.93 and 173.40 g), weight gain (27.60, 22.93, 22.60 and 24.66 g) feed intake (168.74, 155.00, 163.68 and 169.61 g/treatment), growth rate per day (3.03, 2.00, 1.20 and 2.06 percent respectively) and feed conversion to eggs (11.35, 9.44, 7.60 and 7.09 g/head respectively) is not different in statistic ( $p>0.05$ ). Feed conversion ratio, it shows that (9.40, 16.53, 27.28 and 11.79 respectively) are statistically different ( $p<0.05$ ). For feed conversion ratio, it shows that *P. amarylifolius* powder supplementation on productivity of Japanese quails at level, 2, 4 and 6 percent has a higher FCR than control group (9.40 g) significantly statistically ( $p<0.05$ ). This is due to a result of short period of experiment and the young quails in the experiment which require a high diet, but rate of conversion ratio and rate of egg conversion are not fully ready. This conforms to the experiment of *P. amarylifolius* powder supplementation in quails' feed taken by Sanguanphan et.al. (2005). The result showed that it does not enhance the efficiency of productivity ( $p>0.05$ ).

**Table 1** Effects of *P. amarylifolius* supplementation on quails egg quality at different levels

Egg Productivity	<i>P. amarylifolius</i> powder levels				P-value	SEM
	0	2	4	6		
Initial Weight (g)	149.53	151.40	151.33	148.73	0.66	1.17
Final Weight (g)	177.13	174.33	173.93	173.40	0.67	1.5
Weight Gain (g)	27.60	22.93	22.60	24.66	0.49	1.61
Feed intake (g/treatment)	168.74	155.00	163.68	169.61	0.19	4.47
Growth Rate per Day	3.03	2.00	1.20	2.06	0.49	0.07
Feed Conversion Ratio (g)	9.40 <sup>b</sup>	16.53 <sup>a</sup>	27.28 <sup>a</sup>	11.79 <sup>a</sup>	0.03	0.63
Feed Conversion to eggs (g/head)	11.35	9.44	7.60	7.09	0.17	0.22

**Annotation:** (T1) feeding with control diet with supplemented 0%, (T2) feeding with control diet with supplemented 2%, (T3) feeding with control diet with supplemented 4%, (T4) feeding with control diet with supplemented 6%

For productivity and egg color of Japanese quails, it shows that percentage of egg productivity (9.03, 8.35, 10.58 and 9.3 percent respectively), rate of feed conversion to a dozen of eggs (347.52, 390.08, 411.61 and 478.73 g respectively), shell thickness (1.72, 1.70, 1.69 and 1.70 mm respectively), yolk height (2.22, 2.24, 2.27 and 2.17 mm) and yolk diameter (1.11, 1.12, 1.13 and 1.14 mm) are not statistically different ( $p>0.05$ ). For the rate of feed conversion to a dozen of eggs, it shows that *P. amarylifolius* powder

supplementation on productivity of Japanese quails at level 2 4 and 6 percent (390.08, 411.61 and 478.73 g respectively) gives a higher rate of feed conversion to a dozen eggs than the control group (347.52 g) significantly statistically ( $p < 0.05$ ). For the value of egg color of Japanese quails, it shows that brightness value ( $L^*$ ) of quails fed *P. amarylifolius* powder supplementation at level 2 4 and 6 percent (53.76, 52.35, 52.93 and 52.13 respectively) are not statistically different ( $p < 0.05$ ). Besides, for redness value ( $a^*$ ) (9.38, 9.24 and 10.37 respectively) and yellowness ( $b^*$ ) (51.41, 52.30 and 53.16 respectively) is likely to be higher than the control group (7.79 and 41.39 respectively) significantly statistically ( $p < 0.05$ ). This conforms to the experiment taken by Niyomdech (2012). The experiment was taken on supplementing pandanus powder into bird feed, and the result showed that *P. amarylifolius* enhanced the intensity of egg color. Besides, Kit (2002) reported that supplementing *P. amarylifolius* into quail feed at 6% enhances intensity of yolk because, probably, there are components of pigments, such chlorophyll, anthocyanin, beta-carotene which are substance that improve animal's health, and it helps quails to eat more feed, gain more benefits from feed, so the pigment in yolk increases.

**Table 2** Effects of *P. amarylifolius* supplementation on quails egg quality at different levels

Egg Quality	<i>P. amarylifolius</i> powder levels				P-value	SEM
	0	2	4	6		
Percentage of Egg Productivity (day)	9.03	8.35	10.58	9.3	0.56	1.09
Feed Conversion to a Dozen of Eggs(g)	347.52 <sup>b</sup>	390.08 <sup>a</sup>	411.61 <sup>a</sup>	478.73 <sup>a</sup>	0.058	0.06
Shell Thickness (mm)	1.72	1.7	1.69	1.7	0.75	0.01
Brightness Value ( $L^*$ )	53.76	52.35	52.93	52.13	0.44	2.19
Redness Value ( $a^*$ )	7.79 <sup>b</sup>	9.38 <sup>a</sup>	9.24 <sup>a</sup>	10.37 <sup>a</sup>	0.04	1.52
Yellowness Value ( $b^*$ )	41.39 <sup>b</sup>	51.41 <sup>a</sup>	52.30 <sup>a</sup>	53.16 <sup>a</sup>	0.007	3.71
Yolk Height (mm)	2.22	2.24	2.27	2.17	0.77	0.13
Yolk Diameter (mm)	1.11	1.12	1.13	1.14	0.76	0.06

**Annotation:** (T1) feeding with control diet with supplemented 0%, (T2) feeding with control diet with supplemented 2%, (T3) feeding with control diet with supplemented 4%, (T4) feeding with control diet with supplemented 6%. a, b: means within same column with different superscripts are significantly statistical different ( $p < 0.05$ )

### Conclusion

The study shows that *P. amarylifolius* powder supplementation on productivity of Japanese quails at level 2 4 and 6 percent tends to improve growth, amount of feed intake, growth rate per day, feed conversion to eggs, shell thickness, yolk diameter, color value of Japanese quail eggs, higher than control group.

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### Acknowledgements

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**PLANT SCIENCE**  
**(ABSTRACT & FULL PAPER)**

## Synthetic Fertilizer Substitution Using Tithonia Compost for Sweet Corn Production in a Dryland Environment

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### Abstract

Scarcity and high price of synthetic fertilizer leads to the awareness of using organic amendment for the substitution. Tithonia (*Tithonia diversifolia* L.) is a broadleaf weed abundantly available as a source of compost. The study was carried out to determine the substitution of synthetic fertilizer using Tithonia compost for sweet corn production in dryland environment. The experiment assigned a Completely Randomized Block Design (RCBD) with six treatments and three replications. The treatments included control (without fertilizer), recommended NPK synthetic fertilizer (600 kg/ha, RSF), the combination of 75% RSF + 3.75 ton/ha Tithonia compost (TC), 50% RSF + 7.5 ton/ha TC, 25% RSF + 11.25 ton/ha TC, and 15 ton/ha TC. Tithonia compost was homogeneously incorporated at the soil depth of 0-5 cm a week before planting, while a half of synthetic fertilizer was applied at the planting and the rest five weeks afterward. The growth and yield variables were measured at harvesting. The results indicated that the greatest shoot dry weight, root dry weight, ear length, ear diameter, and the weight husked and unhusked ears were observed at the combination of 50% RSF with 7.5 ton/ha TC. The combination increased husked and unhusked ears by 27.2% and 33.0%, respectively, compared to recommended fertilizer. Application of 50% NPK synthetic fertilizer combined with 7.5 ton/ha tithonia compost is the best combination for sweet corn production in a dryland environment.

**Keywords:** Thithonia, Sweet Corn, Compost

## **$\alpha$ -Glucosidase Enzyme Inhibition Activity and Organoleptic Test from the Combination of Black Tea, Turmeric, and Ginger Extract by *In Vitro***

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### **Abstract**

Black tea (*Camellia sinensi* L), turmeric (*Curcuma longa* L.), dan ginger (*Zingiber officinale*) are traditional medicinal plants that have the potential to inhibit the  $\alpha$ -glucosidase enzyme to maintain blood sugar levels in diabetes mellitus sufferers. However, the scientific basis regarding the use of a combination of black tea, turmeric, and ginger in  $\alpha$ -glucosidase enzyme inhibition is still limited. Therefore, this study aims to determine the optimum combination of black tea extract, turmeric, and ginger for inhibition of the  $\alpha$ -glucosidase enzyme as an antidiabetic and to perform an organoleptic test on the optimum combination of  $\alpha$ -glucosidase enzyme inhibition activity. The method of the research carried out included phytochemical analysis of the extracts, determining the IC<sub>50</sub> value against the  $\alpha$ -glucosidase enzyme inhibition of each extract, determining the inhibitory activity of the  $\alpha$ -glucosidase enzyme combination extract, and organoleptic tests.

Phytochemical screening showed that black tea and ginger extract contained alkaloids, flavonoids, tannins, saponins, terpenoids, quinones, glycosides, and phenolics, while turmeric extract contained alkaloids, flavonoids, tannins, terpenoids, quinones, glycosides, and phenolics compounds. Turmeric ethanol extract was the best extract with an IC<sub>50</sub> value of 9.48±0.05  $\mu$ g/mL. The highest inhibitory activity of  $\alpha$ -glucosidase enzyme in combination F7 consisting of black tea extract, turmeric, and ginger was 67.86±0.93 %. The organoleptic test of the combination F7 showed the highest level of preference by the P3 treatment which was not significantly different from the P2 treatment on the attributes of color, aroma, consistency, and aftertaste, while the level of preference for the highest taste attributes was in the P3 treatment. The conclusion of this study is the ability of the combination of black tea extract, turmeric, and ginger to inhibit the enzyme  $\alpha$ -glucosidase which shows a synergistic interaction.

**Keywords:** diabetes mellitus, black tea, turmeric, ginger,  $\alpha$ -glucosidase inhibition, organoleptic

## Ginger As An Immune Booster During A Pandemic By Utilizing The Yard

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### Abstract

The current state of the pandemic requires maintenance of immunity for humans. Immunity is done by consuming foods or drinks that boost the immune system. The higher the mobility of the community demands optimal health conditions. The health condition of the body, of course, cannot be separated from the consumption of healthy foods. Ginger is a plant that is rich in benefits that have many ingredients that are beneficial to human immunity and can be used as an immune booster in times of a pandemic like this time. The purpose of research is to take advantage of the yard in maintaining the availability of ginger as an immune booster during a pandemic. The research uses secondary data obtained from various sources. The research method used is descriptive analysis method. The results of this study indicate that in providing ginger, it is necessary to use the yard as a place to plant ginger. Utilization of this yard needs to be done considering that currently the availability of agricultural land in Indonesia is decreasing due to the conversion of land into housing. In addition, when the demand for ginger increases and the supply of ginger is insufficient, traders are required to find ginger supplies outside the region and this will cause the price of ginger offered in the market to increase. By planting ginger in the yard, the availability of this ginger plant can be maintained. In meeting these needs, there is no need to look for ginger stocks from outside the region when the ginger supply is insufficient to meet existing needs. Besides being able to be consumed alone, planting ginger plants by using the yard can also add to the economic value of the household.

**Keywords:** Ginger, Immune booster, Pandemic, Utilizing the yard

## **Baferpott (Biofiberpott) as an Alternative Plant Container Utilization of Coconut Fruit (*Cocos nucifera*)**

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### **Abstract**

Biopotting is a pot made of organic material that has a resistance to being made as a pot. One of the ingredients that can be used to make biopotting is coconut husk. Coir has resistance, elasticity and durability that are potentially biopotting. Coir coconuts are solid waste from the coconut oil industry, as well as from foods sourced from coconut that are consumed much by people in Indonesia. The study aims to know the effectiveness and production plans of baferpott in utilizing coir waste and knowing the stage of implementation and those that can help implement the idea. The method used in this study is a qualitative method with a descriptive approach. The realization of this idea will make an application solution to polybag reduction substitution and use coir wastes. This idea is effective in reducing polybag waste and optimizing coconut fiber by making a baferpott that is a biodegradable and conducive plant growth. Ideas can be implemented with the 4 stages of constructing a transition room and the development of vision, the development of transition cooperation and the transition agenda, the movement of those involved and carrying out the transition and final monitoring and evaluation projects. Baferpott's ideas are also appropriate because they support the ideals of the sustainable development goals.

**Keywords:** Biopotting, Baferpott, Coconut husk, Sustainable development goals.

## Effects of Organic Fertilizers Types and Dosages on Growth and Yield of Mustard Green (*Brassica juncea* L.)

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### Abstract

Organic vegetable of mustard green is increasingly popular due to increasing awareness and concerns on harmful effects of synthetic fertilizer inputs. There are many prospective organic fertilizers available in the production areas that can be used for mustard greens organic production. This study aimed to determine (1) the interaction effect of types and dosages of organic fertilizers, (2) the best type of organic fertilizer for green mustard plants (3) the best dosage of organic fertilizers for mustard greens. Experiment was conducted on the Integrated Agricultural Zone of Faculty of Agriculture, University of Bengkulu from December 2020 to January 2021 and was arranged in a factorial randomized complete design with three replicates. The first factor was the types of organic fertilizer ; (1) azolla compost, (2) vermicompost, and (3) cow manure, while the second factor was the dosages of fertilizers ; (1) 0 ton ha<sup>-1</sup>, (2) 3 ton ha<sup>-1</sup>, (3) 6 ton ha<sup>-1</sup>, and (4) 9 ton ha<sup>-1</sup>. Results showed that the interaction effect of 9 ton ha<sup>-1</sup> of azolla compost produced highest shoot fresh weight, followed by 9 ton ha<sup>-1</sup> of azolla compost. Mustard greens with no organic fertilizer (control) had the lowest shoot fresh weight. Mustard greens fertilized with azolla compost had higher shoot fresh weight, leaf fresh weight, root fresh weight, and total dry weight than those of fertilized with vermicompost and cow manure. However, root fresh weights of mustard greens had similar responses to organic fertilizers types. Mustard greens fertilized with organic fertilizers had higher root fresh weight, root dry weight, shoot fresh weight, leaf fresh weight, and total dry weight than those of control plots. In all organic fertilizer sources the use of 3 ton ha<sup>-1</sup> had similar effects compared to those of fertilized with 6 and 9 ton ha<sup>-1</sup> of organic fertilizers.

**Keywords:** Azolla Compost, Cow Manure, Fertilizer Dosages, Mustard Greens, Vermicompost.

## Effects of Sweet Corn Variety and Dosages of Vermicompost of Growth and Yield of Sweet Corn

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### Abstract

The efficient use of organic fertilizers in agricultural cultivation is still a challenge in agricultural activities, including in the production of sweet corn (*Zea mays saccharata* Sturt). Yields performances are determined by the variety used and types of fertilizers. The use of vermicompost as solid organic fertilizer is increasing practiced in sweet corn production. This study aimed to determine the optimum dosage of vermicompost for the growth and yield of three sweet corn varieties. The field experiment was conducted from January to March 2021 at Kandang Limun, Bengkulu City, Indonesia, and arranged in a factorial completely randomized block design with three replicates. The first factor was the sweet corn varieties; (1) Sweetboy, (2) Bonanza, and (3) Paragon, while the second factor was the dosages of vermicompost; (1) 0 ton ha<sup>-1</sup>, (2) 10 ton ha<sup>-1</sup>, (3) 20 ton ha<sup>-1</sup>, and (4) 30 ton ha<sup>-1</sup>. Results indicated that the interactions varieties and dosages of vermicompost significantly influenced ear weight, ear length and yield per plot, and showed a linear increase with increasing fertilizer dose. Results also concluded that Paragon variety had the highest yields among the tested varieties. On variables the length of the plant cob produced a quadratic curve with an optimum dose of 28.57 tons/ha producing a cob length of 19.18 cm.

**Keywords:** Fertilizer Dosages, Sweet Corn Variety, Vermicompost.

## Characterization, Genetic Variability and Heritability of Thirteen Genotypes Vinca Rose (*Catharanthus roseus*)

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### Abstract

Characterization of genetic variability and heritability of vinca rose (*Catharanthus roseus*) is crucial for breeders to carry out plant selection to increase the quality and quantity of vinca rose (*Catharanthus roseus*) as ornamental plants. The objective of this study was to characterize and assess the genetic variability and heritability values of 13 genotypes of *C. roseus*. The research was conducted from October 2020 to February 2021 in screen house located in Perumahan Rakyat, Sungai Serut District, Bengkulu City-Indonesia, with an altitude 10 m above sea level. The research was compiled in a completely randomized design (CRD), one factor, consisting of 13 genotypes of *C. roseus* with 3 replications. The results revealed that the qualitative characters showed on leaf shape (ovalis and oblongus); type of stem growth (hanging and upright); the main color of the corolla (pale pink, peach, white, pink fanta, apricot, pink taffy, lavender, magenta, rose pink, reddish-pink, pink, baby pink, orange); and the middle color of the corolla (pale pink, peach, white, fanta pink, red, french rose, baby pink, and orange). The value of quantitative characters on genetic variability in the genotypes of the plant is narrow; hence mutations are necessary to increase the diversity of the plant. Furthermore, the heritability of the plant is high on the number of branches (50%) only, but other parameters are moderate and low.

**Keywords:** *Catharanthus roseus*, heritability, variability genetic

## Growth, Yield and Quality of Three Varieties of Melon in the Application of Some types of Local Microorganism (MOL)

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### Abstract

High demand for melons is not matched by production. The purpose of this study was to determine the best varieties and types of local microorganisms (MOL) to provide growth, yield and quality of melons. The study used a factorial Completely Randomized Design (CRD) consisting of two factors. The first factor was melon varieties, namely melon varieties Gracia, Sonya, and Tavia. The second factor was the type of MOL which consisted of 3 types of MOL and one control, namely without MOL, banana weevil MOL, papaya MOL, and bamboo shoot MOL. From these two factors, 12 treatment combinations were obtained, which were repeated 3 times, in order to obtain 36 experimental units. Each experimental unit consisted of 2 plants, so that 72 plants were obtained. The results of this study indicate that there is an interaction effect between melon varieties and MOL types on fruit diameter, fruit sweetness level and fruit hardness level. The best fruit diameter was found in the Tavia variety by giving MOL papaya. The best fruit sweetness level was found in Sonya varieties with MOL papaya, and the best fruit hardness levels on Gracia varieties without MOL application. The Tavia variety gave the best response to the growth, yield and quality of melon plants including hermaphrodite flower appearance, harvesting age, fruit diameter, fruit sweetness level and fruit hardness level. Papaya MOL gave the best response to the quality of melon yields including fruit diameter and fruit sweetness level.

**Keywords:** Local Microorganisms, Melons, Varieties

### Introduction

Melon (*Cucumis melo* L.) is a horticultural commodity that is favored by the public as a fresh fruit that can be consumed directly or as a flavoring and the resulting product. Melon with a sweet taste is a source of vitamins and minerals and is very good for the health of the human body (Sobir and Siregar, 2010). The above advantages indicate that melon is a horticultural plant product that has high economic value.

Based on data from the Central Statistics Agency (BPS) in 2019, melon production in Indonesia from 2015 to 2019 has fluctuated. In 2015, Indonesia's melon production was 137,887 tons and decreased in 2016 to 117,341 tons. In 2017 melon production decreased significantly with a total production of 92,435 tons and increased to 118,722 tons in 2018. In 2019 melon production increased to 122,105 tons. These figures have not been able to meet the demand of the Indonesian people for melons. Based on fruit consumption data from the Directorate General of Horticulture, Indonesian consumption of melons in 2015 to 2019 is 124,032 tons, 128,184 tons, 132,300 tons, 133,888 tons and 137,544 tons

respectively. Therefore it is necessary to increase melon production in order to balance the demands and needs of the community for melons.

The increase in consumer demand for melons which is quite high has led to the need for an increase in the production of high quality and high yielding melons. Efforts to increase melon production are by using hybrid melon varieties. Hybrid melons can provide better yields, higher production with high uniformity and high yield quality, are resistant to pests and diseases, are stable in various environmental conditions, and grow faster.

Another effort that can be done is by increasing the absorption of nutrients through the addition of microorganisms to the soil. Local microorganisms (MOL) can be an alternative in supplying soil microorganisms. MOL is a microorganism that comes from certain materials / substrates and is reproduced with natural carbohydrates (sugar), protein, vitamins and minerals (Indonesian Soil Research Institute, 2015). Some natural ingredients that can be used as basic ingredients for making MOL are banana, papaya and bamboo shoots. Giving MOL of banana weevil can increase plant height growth, plant fresh vegetative weight and the number of shallot bulbs. Rahayu (2017) in her research reports that giving papaya MOL with a concentration of 5% can increase the number of primary branches, number of leaves, wet weight of fruit, and dry weight of cayenne pepper. Saputra et al., (2019) in their research reported that giving MOL bamboo shoots with a concentration of 20 ml / l was able to increase the dry weight of peanut pods per plant.

This study aims to determine the right melon varieties and types of MOL to provide the best growth, yield and quality for melon plants.

## Materials and methods

### Material

The materials used are the seeds of three melon varieties (*Cucumis melo* L.), namely the Gracia variety, the Sonya variety and the Tavia variety, banana weevil, papaya, bamboo shoots, remaining water from washing rice, brown sugar, dolomite, karbofuran, manure, NPK fertilizer, Urea, TSP and KCl fertilizers, fungicides, bactericides and insecticides. The tools used include hoes, waring, 10 x 15 cm polybags, 50 x 40 cm polybags, stakes, raffia ropes, buckets, stirrers, knives, hoses, jerry cans, scales, bottles and ovens.

### Method

#### 1. Making MOL

1. Each of the MOL ingredients, namely banana weevil, rotten papaya and bamboo shoots, cut into small pieces as much as 4 kg.

2. 300 grams of brown sugar is sliced and dissolved in 4 liters of rice washing water and placed in each jerry can.

3. After the sugar dissolves, each MOL ingredient is put into each jerry can and stirred until combined.

4. The jerry cans are tightly closed and given a plastic hose connected to a bottle filled with clean water to maintain pressure and prevent air from entering.

5. The MOL solution is fermented for 15 days until the smell of tape is smelled.

6. MOL is filtered using a cloth and placed in a closed bottle (Agricultural Training Agency, 2016).

## 2. Seeding

Melon seeds were soaked at 25– 30 ° C for 24 hours (Triadiati et al., 2019). Then the seeds are sown in small polybags measuring 10 x 15 cm which have been filled with a mixture of soil and manure with a ratio of 2: 1. When the seeds are 11 days or 3 days old before planting in the field, spraying with insecticides and fungicides is carried out. The pesticides used were Insecticide Decis 0.5 ml / liter and Previcur N fungicide 1.0 ml / liter. Keep the nursery moist, but not too wet. Seedlings are transferred to the beds after 14 days of age.

## 3. Soil Analysis

Soil analysis was carried out before planting which was carried out at the Soil Science Laboratory of the University of Bengkulu. Soil was taken at five different points using the zigzag method with a soil depth of  $\pm$  15 cm then combined and mixed in a composite then 500 g of soil was taken for analysis of C-organic, pH, total N content, available P, K-dd, AL- dd and land CEC.

## 4. Preparation of Planting Media

The media used was a mixture of ultisol soil taken from the Babatan Village which had never been used in practical or previous research activities mixed with cow manure with a ratio of 2: 1. Then the soil mixture is filtered using a soil filter. Soil that is ready to be put into a 10 kg polybag. After that, 90 grams of dolomite lime is added per polybag (equivalent to a dose of 2 tons / ha) and basic fertilizers of Urea, TSP and KCl using  $\frac{1}{2}$  the recommended dose, namely 187.5 kg / ha, 125 kg / ha, and 187. 5 kg / ha. Furthermore, the poly bag arrangement was carried out in the experimental field with a distance between plants of 40 cm x 30 cm.

## 5. Planting

Planting is done in the afternoon to avoid excessive respiration due to sunlight. Seeds are planted in the available holes. Seedlings are placed in the center of the planting hole with the amount of 1 seed per hole.

## 6. The MOL application

MOL solution was dissolved in water in a ratio of 1: 10 (equivalent to 111.1 ml / l). Then watered 200 ml on the soil around the plant evenly. The application of MOL is done once a week when the plants are 2 WAP to 8 WAP. MOL was given in the morning.

## 7. Maintenance

## 8. Harvest

Performed when the melon fruit shows the characteristics of the mesh fibers on the skin surface is clear and rough, the skin around the stalk looks cracked, the skin color is yellowish green and has a fragrant aroma. Picking is done by cutting the fruit stalks with a knife or scissors. The stalk is cut like the letter T, so that the part that is cut is the one that leads to the leaves, not the fruit. Harvesting is done in the morning around 8-11 and is done gradually.

### *Experimental Design*

This study used a factorial Completely Randomized Design (CRD) with two treatment factors:

#### 1. Factor I: Melon varieties (V), namely:

V1 = Gracia variety

V2 = Sonya variety

V3 = Tavian variety

2. Factor II: Type of MOL (M), namely:

M0 = without being given MOL (Control)

M1 = MOL banana weevil

M2 = MOL of papaya

M3 = MOL of bamboo shoots

Thus obtained 12 combinations, using 3 replications, then obtained 36 experimental units. Each experimental unit used 2 plants to obtain 72 experimental units.

#### *Variable observed*

Variable observed were the length of the plant, number of leaves, number of stems, age of flowering male, age of hermaphrodite flowering, leaf area, greenness of leaves, dry weight of the stems, weight of fruit, harvesting age, fruit diameter, thickness of fruit flesh, sweetness level of fruit and fruit hardness level

#### *Data Analysis*

Data were analyzed with analysis of variance if there were significant differences among the treatment analyzed continued using Duncan's Multiple Range Test ( $P < 0.05$ )

#### **Results and Discussion**

Based on analysis of variance showed the significant interaction between local microorganisms and three varieties of melon on a variable diameter of fruit, fruit sweetness level and the level of fruit hardness level.

**Table 1.** Effect of interactions of local microorganisms (MOL) and melon varieties on fruit diameter

Varieties	Without MOL	Banana Weevil MOL	Papaya MOL	Bamboo Shoots MOL
Gracia	13.5 a A	11.7 b A	11.8 b B	13a A
Sonya	13.3 a A	12.7 a A	13.3 a A	13.2 a A
Tavia	13.2 ab A	12.7 c A	14.2 a A	13.4 ab A

**Note:** numbers followed by the same letter have no significant effect on DMRT 5% rate. Notations with uppercase letters are read vertically, while notations with lowercase is read horizontally.

Gracia variety produced the highest fruit diameter in the MOL treatment of bamboo shoots and without MOL, which was significantly different from the MOL treatment of banana weevil and MOL of papaya. Sonya varieties in various types of MOL and without MOL produced fruit diameters that were not significantly different. Tavia varieties produce fruit diameter is greatest in MOL treatment papaya, which is significantly different from a treatment bamboo shoots MOL, MOL banana weevil and without being given MOL. Control treatment on various melon varieties resulted in fruit diameters that were not significantly different. Likewise, giving banana weevils MOL resulted in fruit meters that were not significantly different. Papaya MOL produced the largest fruit diameter in the

Tavia and Sonya varieties, which was significantly different in the Gracia varieties. MOL of bamboo shoots in all varieties produced fruit diameters that were not significantly different.

**Table 2.** The effect of the interaction of local microorganisms (MOL) and melon varieties on the level of sweetness of the fruit

Varieties	Without MOL	Banana Weevil MOL	Papaya MOL	Bamboo Shoots MOL
Gracia	7.3a B	6.6a B	7.5a B	7.5a A
Sonya	9.5 ab A	7.7 b AB	10.9 a A	8.3 b A
Tavia	9.8 a A	9.5 a A	8.6 ab B	7 b A

**Note:** numbers followed by the same letter have no significant effect on DMRT 5% rate. Notations with uppercase letters are read vertically, while notations with lowercase is read horizontally.

Gracia varieties in each type of MOL and without being given MOL produced fruit sweetness levels that were not significantly different. In the Sonya variety, the MOL papaya treatment produced the highest fruit sweetness level, not significantly different in the treatment without MOL and significantly different in the MOL treatment of bamboo shoots and banana weevil MOL. The Tavia variety produced the highest fruit sweetness level in the MOL treatment of banana weevil and without MOL, it was not significantly different in the MOL treatment of papaya and was significantly different in the MOL treatment of bamboo shoots.

The control treatment produced the highest fruit sweetness level in the Tavia and Sonya varieties, significantly different for the Gracia varieties. MOL banana weevil produced the highest fruit sweetness level in the Tavia variety, not significantly different in the Sonya variety and significantly different for the Gracia variety. Papaya MOL produced the highest fruit sweetness level in the Sonya variety, and was significantly different in the Tavia and Gracia varieties. MOL of bamboo shoots in various varieties produced fruit sweetness levels that were not significantly different.

This study had an average fruit sweetness level ranging from 6.6 brix - 10.9 brix. When compared with the sweetness level of the fruit in the variety description, this result is still below the variety description value. This is thought to be due to the high rainfall at the time of the study. High rainfall causes the volume of water on the stems and fruit to be high so that the sweetness of the fruit decreases. This is in line with the research of Suhandy *et al.*, (2015) which states that increasing the volume of water can reduce the capacity of solid solution (KPT) and will be followed by a decreased level of fruit sweetness.

Based on the laboratory test results of the Bengkulu Agricultural Technology Research Institute (BPTP), it was shown that the MOL phosphate content of papaya (1.19%) was higher than the phosphate nutrient content in MOL bamboo shoots (0.99%) and banana weevil MOL (0.84%). A higher phosphate content can support the sweetness of the fruit. This is in line with Alfikri (2020) which states that the P element affects the stimulation of flowering and fruit formation. Results p enelitian Wi dj a j ani *et al.*, (2007)

proved that the quality of the melon is strongly influenced by the content of Phosphate, Potassium and Magnesium in the soil, especially sugar melon.

The results of the analysis in Basir's (2011) study showed that papaya MOL contained *Actinomyces*, cellulolytic bacteria and cellulolytic fungi. These microorganisms break down the organic matter, releasing inorganic nutrients that the plants need. These microorganisms play an important role because the organic waste that has died is broken down into elements which are returned to the soil (N, P, K, Ca, Mg, etc.) and the atmosphere (CH<sub>4</sub> or CO<sub>2</sub>) as nutrients that can be reused by plant. If microorganisms are not present, organic matter will accumulate so that nutrients are not available. (Basir, 2011). Nutrients that can be absorbed by plants, including potassium, play an important role in supporting the sweetness of the fruit. Uliyah *et al.*, (2017) also stated that potassium in plants functions in the process of forming sugars and starches, sugar translocation, activating enzymes and influencing the movement of stomata.

**Table 3.** The effect of the interaction of local microorganisms (MOL) and melon varieties on the level of fruit hardness

Varieties	Without MOL	Banana Weevil MOL	Papaya MOL	Bamboo Shoots MOL
Gracia	3.2a	2.3b	2.9ab	3.1a
	A	B	A	A
Sonya	2.2a	1.7 a	1.7 a	2a
	B	B	B	B
Tavia	3a	3a	2.5ab	2b
	A	A	A	B

**Note:** numbers followed by the same letter have no significant effect on DMRT 5% rate. Notations with uppercase letters are read vertically, while notations with lowercase is read horizontally.

Gracia variety produced the highest level of fruit hardness in the MOL of bamboo shoots and without MOL, it was not significantly different in the MOL of papaya and was significantly different in the MOL of banana weevil. Sonya varieties in each variety produced fruit hardness levels that were not significantly different. The Tavia variety in the banana weevil MOL and without MOL produced the highest fruit hardness level, not significantly different in the MOL of papaya and significantly different in the MOL of bamboo shoots.

The control treatment resulted in the highest fruit hardness level in Gracia and Tavia varieties, significantly different in Sonya varieties. MOL of banana weevil produced the highest level of fruit hardness in the Tavia variety, significantly different for the Gracia and Sonya varieties. Papaya MOL produced the highest level of fruit hardness in Gracia and Tavia varieties and was significantly different in Sonya varieties. Giving MOL of bamboo shoots to Gracia variety resulted in the highest level of fruit hardness, significantly different in Sonya and Tavia varieties.

Based on the results of the study, it was seen that the MOL administration affected the level of fruit hardness. The level of fruit hardness due to MOL was lower than without MOL. Agusta (2016) in his research stated that one of the important parameters in determining fruit maturity is the level of hardness of the fruit flesh. The texture of the pulp will get softer as the fruit ages, especially after the fruit is harvested. Softening is the main

indicator of the fruit ripening process because pectin and hemicellulose, which are components forming the cell wall structure, are degraded into water-soluble components so that the total pectin substance that affects fruit hardness decreases (Khairi *et al.*, 2017). MOL accelerated fruit maturity compared to control. The negative impact is that the soft flesh of the fruit will go into the fruit rot faster so that the fruit does not last long.

#### Effect of Varieties on the Growth of Melon Plants

The variables of the number of stem segments, male flowers appeared, hermaphrodite flowers appeared leaf area, greenish level of leaves and dry weight of the stalks showed that the variety treatment had a significant effect (Table 4).

**Table 4.** Recapitulation of the results of observations of the variable number of stem segments, male flowers appearing, hermaphrodite flowers, leaf area, leaf greenness and dry weight of stalks

Varieties	Number of sections (segments)	Male Flower Appears (hst)	Appears Flower Hermaphrodite (HST)	Leaf Area (cm <sup>2</sup> )	Leaf Green Level (unit)	Dry Weight (g)
Gracia	30a	17.29a	24.5a	240.28a	46.1b	30.52a
Sonya	27b	15.5b	22.08b	203.89b	47.96a	21.1b
Tavia	30a	15.71b	20.58c	187.73b	44.7b	29.87a

**Note:** numbers followed by the same letter have no significant effect on DMRT 5% rate. Notations with uppercase letters are read vertically, while notations with lowercase is read horizontally.

Further test results DMRT influence factors single varieties to the number of stem segments showed that the varieties Gracia and Tavia significantly different with Sonya varieties. P there was a variable number of stem segments that produced the highest average value for Gracia and Tavia varieties with a value of 30 internodes and the lowest average value for the Sonya variety with a value of 27 segments (Table 5). The large and small number of internodes followed by the same length of the plant will produce different lengths of segments. A large number of segments will produce a small segment length, while a small number of segments will result in a large segment length. The longer the segments produced by the melon plant, the greater the chance of getting quality melon fruit, because in 1 melon plant there is only 1 best candidate for fruit. According to Faruqi (2011), the Gherkin cucumber plant which has longer segments will have more space to grow fruit so that fruit development is better.

The age at which male flowers appeared on the Sonya variety was not significantly different from the Tavia variety, but significantly different from the Gracia variety. The average age for male flower appearance was the fastest in Sonya variety and the longest age for male flowers to appear in Gracia variety. The Tavia variety produced the fastest hermaphrodite flower appearance age when compared to other varieties. Melon plants that have a fast flower emergence time are closely related to the harvest age, the faster the flower appears, the faster the harvest time. According to Jannah *et al.* (2018), the character of the flowering age has a positive correlation with the harvest age of the plant, where

plants that have a short flowering age will have a short harvest life so that the character of the flowering age can be used as an indicator of determining the early age of a plant.

The same thing happened to leaf area, Gracia varieties had the highest leaf area, significantly different from Sonya and Tavia varieties. Leaf area is closely related to the ability of plants to produce assimilates which in turn have an effect on plant growth. Amiroh and Rohmad (2017) assume that the larger the leaf area, the higher the photosynthate produced, so the higher the translocated photosynthate. The photosynthate is used for plant growth and development, including plant height, the formation of new branches and leaves. The difference in leaf area in each variety is thought to be caused by genetic factors from each different variety. In this study, the sunlight obtained by each plant is the same so that different results are caused by differences in varieties.

The Sonya variety had the highest level of leaf greenness, namely 47.96 units, significantly different from the Tavia variety and the Gracia variety which had leaf greenness of 46.1 units and 44.7 units, respectively. The level of greenness of the leaves is caused by the chlorophyll content of the leaves. Chlorophyll is one of the factors to determine N leaf status. The results of chlorophyll measurement can be categorized into three criteria, namely low, medium and high. According to Prabowo *et al.*, (2018) based on the Nitrogen category in SPAD, the greenness of the leaves can be classified into three categories, namely leaf greenness <50 (low), 50-53 (moderate), and > 53 (high). When compared with the observed leaf greenness data, it can be seen that the level of leaf greenness in each variety is low. This is due to the influence of weather during the study. The rainy season and the weather that is often cloudy make sunlight energy cannot be fully absorbed by the leaves. In melons (C3 plants) the compound form that accumulates from photosynthesis is sucrose stored in the fruit (Fahmi *et al.* 2010). The level of greenness of the leaves will have a positive correlation with the quality of the fruit produced, such as the level of sweetness of the fruit. This is in line with Ari's research (2018) that there is a positive correlation between the greenness of the leaves and the sweetness of the fruit, meaning that the higher the greenness of the leaves, the higher the sweetness of the fruit.

Gracia variety gave the highest plant dry weight, not significantly different from the Tavia variety but significantly different from the Sonya variety. According to Isnaini (2009) the higher the nutrition provided, the higher the dry weight of the plant. Plant dry weight reflects the accumulation of organic compounds successfully synthesized by plants from inorganic compounds, especially water and carbon dioxide. The nutrients that have been absorbed by the roots contribute to the increase in dry weight of all parts of the plant. In addition, according to Utami (2016), the main source of sufficient nutrient availability plays an important role as a source of energy for plants so that it affects the biomass of a plant. In addition, the stover dry weight factor is influenced by good plant growth, this is supported by the statement of Ervina *et al.*, (2016) that during a good plant growth period, it will tend to affect the increase in plant dry weight.

### **Effect of Varieties on Melon Plant Yield**

The DMRT result of the effect of the single factor of melon varieties on harvesting age showed that the Tavia variety produced the fastest harvesting age, significantly different from the Sonya and Gracia varieties. The harvest age variable produced the highest average value for the Gracia variety which showed the longest harvesting age with

an average value of 81.04 DAS and the lowest average value on the Tavia variety which showed the fastest harvesting age with an average value of 64.79 DAS (Table 3). The harvest age for the Sonya variety is in accordance with the variety description, which is approximately 70 DAS, as well as the Tavia variety which has a harvest age suitability in the variety description, namely 60 DAS-65 DAS, but the Gracia varieties tend to be longer when compared to the varietal description, namely 65 DAS. according to the description of the variety.

**Table 5.** Recapitulation of the results of the observation of the harvest age variable

Varieties	Harvest Age (DAS)
Gracia	81.04a
Sonya	70.58b
Tavia	64.79c

**Note:** the numbers in the same column followed by the same letters are not significantly different at the DMRT level of 5%

#### Effect of Local Microorganisms (MOL) on the Quality of Results Melon

The DMRT result of the effect of the single factor MOL on the thickness of the pulp showed that the MOL of bamboo shoots and MOL of papaya produced the highest fruit flesh thickness, not significantly different in the treatment without MOL and significantly different in the banana weevil MOL treatment. The thickness of the fruit flesh variable produced the highest average value, namely the MOL of bamboo shoots with a value of 3.76 cm and the lowest average value of the MOL of banana weevil with a value of 3.25 cm (Table 6).

**Table 6.** Recapitulation of the results of observations of the thickness variable of fruit flesh

MOL	Fruit Thickness (cm)
Control	3.51ab
Banana Weevil	3.25b
Papaya	3.72a
Bamboo Shoots	3.76a

**Note:** the numbers in the same column followed by the same letters are not significantly different at the DMRT level of 5%

The thickness of the pulp formed in the melon is influenced by the nutrients absorbed by the plant. The level of nutrient absorption is thought to be from the effect of the addition of microorganisms in the soil. Based on the results of the microbial density test, the total microbe in papaya MOL was  $3.69 \times 10^6$  CFU / mL, the highest compared to the MOL of bamboo shoots ( $1.1 \times 10^6$  CFU / mL) and banana weevils ( $1.63 \times 10^4$  CFU / mL). The number and the minimum number of microbes contained in MOL is thought to be the cause of differences in the thickness of the fruit flesh. Microbes contained in the soil are able to increase the breakdown of organic matter in the soil, so that nutrients become available for melon plants. The more microbes contained in the soil, the better the nutrient absorption process will be (Simanungkalit, 2006).

Papaya MOL contains many microorganisms, one of which is *Actinomycetes*. Alfikri (2020) in his research reports that *Actinomycetes* can produce enzymes and release organic acids which help the process of supplying phosphate in the soil that is not readily available. Phosphate elements play a role in energy metabolism, because of their presence in ATP and ADP, so that an increase in energy in the form of ATP and ADP can increase the translocation of photosynthate to the fruit. So it can be assumed that the increase in photosynthesis results will also increase the thickness of the pulp. This is also supported by Wijaya's (2008) research which states that optimal nutrient supply with a good balance of all nutrients is a guarantee for the quantity and quality of the harvest. Fruit quality, such as sugar content, aroma, taste, fruit weight, pulp thickness and fruit volume of a plant are determined by the plant nutrition absorbed by the plant which is ultimately carried by the harvest.

MOL bamboo shoots contain microorganisms that are very important to help plant growth, namely *Azotobacter* and *Azospirillum* (Saraswati and Sumarno, 2008). Zakharova *et al.*, (1999) in their research reported that *Azotobacter* and *Azospirillum* are growth-promoting bacteria that directly produce growth-inducing phytohormones. MOL of bamboo shoots has high gibberellin content so that it can stimulate plant growth, namely the growth of shoots, leaves, roots and stems on plants before entering the flowering period.

### Conclusion

There is an interaction effect between melon varieties and MOL types on fruit diameter, fruit sweetness level and fruit hardness level. The best fruit diameter was found in the Tavia variety by giving MOL papaya. The best fruit sweetness level was found in the Sonya variety with MOL papaya, and the best fruit hardness level on the Gracia variety without MOL application.

The Tavia variety gave the best response to the growth, yield and quality of melon plants including hermaphrodite flower appearance, harvesting age, fruit diameter, fruit sweetness level and fruit hardness level.

Papaya MOL gave the best response to melon yield quality including fruit diameter and fruit sweetness level.

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## Pollen Spectrum, Pollen Diversity and Pollen Ingestion of Stingless Bee at Stingless Bee Center in Saiburi, Pattani province

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### Abstract

Stingless bee is a small insect that has the behavior to collect pollen and nectar from flowers to keep in the nest and used as food. Pollen of plant has different morphology. The characteristics of different pollen grains and can identify plants. Describe plant diversity and know the plant spectrum that is the food of the protagonist. This research is to study the spectra of the diversity of pollen accumulation of the stingless bees. And to be able to identify the types of plants that are food crops of the precinct at stingless bee center in Saiburi, Pattani province. It will collect pollen of plants and pollen in the pollen pot was studied. The pollen will be collected in July – October 2020 to compare the characteristics of the pollen found in flower and the pollen pot. The study found that plant pollen spectra found throughout the 4 months were 25 species. The most common plant pollen species were *Chrysopogon aciculatus*, therefore it is sufficient for the cultured stage. Plants are diverse and can be found in a total of 40 species, 25 species of pollen in pollen pot and unknown has 16 types, while the pollen in the pollen pot can be identified 16 species and Unknown has 8. *Chrysopogon aciculatus* is the most pollen has a spheroidal shape because it is valuable Polar axis and Equatorial axis Most of them are between 0.75-1.33 microns with isopolar polarity. The apertures distal and proximal have the same number of apertures have apertures tricolporate, inaperturate, and diporate and will have a psilate, scabrate and echinate pattern. This is first report in the palynology that can management stingless beekeeping in the future.

**Keywords:** Stingless bee, Pollen spectrum, Diversity, Pollen ingestion

## Screening of Microorganisms for Plant Growth Promoting Activity of Hom Gra Dang Ngah Rice

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### Abstract

Hawm Gra Dang Ngah rice is a local rice species of Narathiwat province that has economic significance because it is high in nutritional value and has a fragrance similar as ylang-ylang flowers making it popular among consumers of healthy rice. The objective of this research was to select microorganisms that promoting the growth of Hawm Gra Dang Ngah rice by separating from the soil at the root of rice and vetiver grass in Phatthalung, Songkhla and Pattani provinces. It appears that there are 289 isolates of isolates that can be isolated from the soil when analyzed to find the phosphate solubilization ability and the nitrogen fixation ability. It was found that the strains of NN311 and NT7 have outstanding properties in the transformation of the phosphate solubilization ability and the nitrogen fixation ability respectively. In which NN311 is able to convert phosphate into soluble form, which is 334 g / mL, while NT7 can fix nitrogen 747 µg / L. In addition, the results of the testing of both types of isolate did not find antagonism to each other. Therefore, isolate NN311 and NT7 can be used together to promote plant growth. The combination of isolates was found to be able to promote Hawm Gra Dang Ngah rice plants to grow better than the control treatment and using only one type of isolate.

**Keywords:** Hawm Gra Dang Ngah rice, Plant Growth Promoting bacteria, nitrogen fixation, Phosphate Solubilization

## Mode of Actions and Pathogenicity of 11 Endophytic Fungi on *Fusarium oxysporum*

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### Abstract

*Fusarium oxysporum* is the pathogenic cause of the disease on chili plant that is able to reduce production in the cultivation process that needs to be done to control an environmentally friendly manner using endophytic fungi. This study aims to test the inhibition, the mechanism of antagonism, and pathogenicity eleven endophytic fungi origin of pepper plants Bengkulu province against the pathogen *Fusarium oxysporum* in *vitro*. Research conducted in the Laboratory of Plant Protection, Faculty of Agriculture, University of Bengkulu from December 2020 to February 2021. The study consists of: the rejuvenation of the fungi isolates of endophytic and fungi pathogens *Fusarium oxysporum*, dual culture test, the mechanism of antagonism test, as well as pathogenesis's endophytic fungi test. Endophytic fungi isolates obtained from the collection of the laboratory of Plant Protection, University of Bengkulu. The results of the research show from eleven endophytic fungi only 1 endophytic fungi which has a percentage of inhibition of 50% of the isolates of *Rhizoctonia* sp.2. The mechanism of antagonism which occurs consisting of the competition between the space of nutrients and oxygen, hyperparasitism, and antibiosis. Pathogenicity test show only isolates of *Rhizoctonia* sp.2 that does not produce spot on the chili seeds.

**Keywords:** Endophytic fungi, pathogenicity, mechanism of antagonism

### Introduction

*Fusarium oxysporum* is a fungi pathogens that cause fusarium wilt. Fusarium will be one of the obstacles in the process of cultivation in agriculture, especially in chili plants. In the process of cultivation, the plant is often impaired due to various diseases of plants causing the decrease of production results even death of the plant (Soesanto, 2019). However, at this time a lot technology has developed to control of pests and plant diseases. Control efforts are performed with a variety of environmentally friendly technologies. One of them is the use of microorganisms endophytic as agents antagonistic to biologically control.

Endophytic fungi are fungi that residing or living in the recesses of the plant that can give a positive response to the plant so that the plant to be healthy and protected from the pathogen. According to Harman (2011), endophytic fungi able to help plants avoid the attack of pathogens, stress abiotic because of endophytic within the plant, colonize plant tissues and help the plant in the process of growth to be better.

In the process of inhibition against pathogens, endophytic fungi has a mechanism of inhibition. Hallmann and Berg (2006) mentions mechanism inhibition of Endophytic fungi on pathogens are distinguished into two types, namely the mechanism of the direct and the mechanism is not direct. Mechanism directly from fungi endophytic i.e.,

antibiosis, competition and lysis. While mechanisms not immediate is to induce plant resistance and increase growth for the plant. Bengkulu is an area with rich biodiversity. Previously, exploration and identification of endophytic fungi on chili plants has been done in Pekik Nyaring, Bengkulu. However it is not known how the traffic endophytic fungi isolate against the pathogen *Fusarium oxysporum*. Therefore it is necessary to do further testing of the inhibition, the mechanism of antagonism and pathogenesis as each isolate. Therefore study aims to test the inhibition, the mechanism of antagonism, and the pathogenicity of origin of chili plants Bengkulu province against the pathogen *Fusarium oxysporum* *in vitro*.

### Materials and methods

Research conducted in the Laboratory of Plant Protection, Faculty of Agriculture, University of Bengkulu from December 2020 to February 2021. As for the stages of the research carried out beginning with the rejuvenation of 11 fungi endophytic collection of the laboratory of Plant Protection, University of Bengkulu on the media Potato Dextrose Agar (PDA). Endophytic fungi is the result of the exploration of the berof origin of chili plant in the village of Pekik Nyaring, Kelurahan Pondok Kelapa, Kabupaten Bengkulu Tengah.

Further test the culture of a dual culture test on the media PDA. Endophytic fungi isolates and pathogenic *Fusarium oxysporum* taken using a cork borer of diameter 7 mm, and then inoculated into petri dishes containing media PDA is dealing with a distance of 30 mm. After that the whole petri dish was incubated at room temperature. The observed variable is the inhibiting zone (%) calculated on the 8th day after incubation with the formula:

$$\text{Inhibiting zone (\%)} = \frac{R1 - R2}{R1} \times 100\%$$

Description : R1 = radius of the colony of the pathogen away from the colonies of Endophytic fungi

R2 = radius of the colony of the pathogen approaching a colony of Endophytic fungi

Further testing of the mechanism of antagonism based on the results of the dual culture test the mechanism of antagonism each Endophytic fungi. The mechanism of antagonism was identified by Farida (1992), which includes: competition between the space of nutrients and oxygen, antibiosis, lysis and parasitism.

The last pathogenicity test eleven fungi isolates of endophytic on seedlings of chili plants by the method of Bioassay. Patogenensitas test carried out on the seeds of chili peppers at the age of 7 days after planting (HST). The test is done with the use of 3 seedlings of chili plants healthy in a petri dish diameter 14 cm which has been given the filter paper moist before. Then the stem of the plant chili wounded using a sterile needle and given the Endophytic fungi taken using a cork borer from the culture medium. Do the same thing on the entire endophytic fungi and also the pathogen *Fusarium oxysporum*. Hereinafter all of the petri dish is incubated at a temperature of 30°C for 7 days. The variables observed that the symptoms of which appear in the form of long patches on the trunk and observed after 1 week.

## Results and Discussion

### Antagonism Test of Endophytic Fungi and Pathogenic *Fusarium oxysporum*

#### The Inhibition Percentage

The results of inhibition that occurs in eleven endophytic fungi against the pathogen *Fusarium oxysporum* varied. The following data is the results of inhibition percentage eleven endophytic fungi isolates.

**Table 1.** The inhibition percentage of the eleven isolates of endophytic fungi against the growth of *F. oxysporum* at 7 days of incubation

The origin of the Isolates/Location of the Garden	Isolate	the Inhibition
Pekik Nyaring 1	<i>Fusarium</i> sp.	0,31%
Pekik Nyaring 1	CE2	23,75%
Pekik Nyaring 1	CE3	5,13%
Pekik Nyaring 1	CE4	31,25%
Pekik Nyaring 1	<i>Rhizoctonia</i> sp.	42,58%
Pekik Nyaring 1	CE6	35,81%
Pekik Nyaring 1	<i>Rhizoctonia</i> sp.	50%
Pekik Nyaring 2	CE8	14,65%
Pekik Nyaring 2	<i>Curvularia</i> sp.	39,44%
Pekik Nyaring 2	<i>Curvularia</i> sp.	47,15%
Pekik Nyaring 2	<i>Curvularia</i> sp.	32,12%
Average		29.29%

Based on the results of the inhibition percentage at 7 days of incubation only CE7 (*Rhizoctonia* sp.) which the inhibition reached 50%. Then there are the CE10 (*Curvularia* sp.) reaching the percentage of inhibition of 47%, followed by the CE5 (*Rhizoctonia* sp.) which has inhibition by 42,58%. Then there Endophytic fungithat represents the percentage above 30% i.e. CE9, CE6, CE11, and the last CE4, and Endophytic fungithe remaining percentage of inhibition of below 30%.

High low percentage of barriers that occur can be affected by environmental conditions and other factors that may affect the Endophytic fungi such. According to Nurfatimah (2020), the inhibition of Endophytic fungi against the pathogen *Pyricularia oryzae* is influenced by environmental conditions that vary across all isolates. Environment origin endophytic fungi in the field with laboratory environment have differences. So that affects the inhibition of each isolate. Furthermore, other factors that cause differences in the rate of inhibition of the eleventh isolates namely differences in the ability to grow each isolate tested. This is in accordance with the statement Liswarni *et al.* (2018) , namely the difference in the rate of growth of each isolate and its ability to compete to get the nutrients from the growing medium affects the ability of the endophytic fungi in inhibiting fungi pathogens. The last factor because of the biological compound that is produced each fungi isolates of endophytic different. Endophytic fungi able to produce a variety of biological compounds, especially antibiotics that are able to suppress the growth of pathogens. However, high-low compound that is produced by would also affect the effectiveness of inhibition of the endophytic fungi against pathogens. Manurung (2014) explained that the

antibiotic compounds produced by endophytic fungi less effective in inhibiting the growth of pathogens so that the diameter of the fungi pathogens is greater than the Endophytic fungi, and the percentage of endophytic fungi lower.

### The Mechanism of Antagonism

The mechanism of antagonism which occurs in eleven endophytic fungi isolates varied, from the competition between the space of nutrients, and oxygen, antibiosis and parasitism. The observation of the mechanism of antagonism is done on day 7 after incubation and the results obtained as in the table.

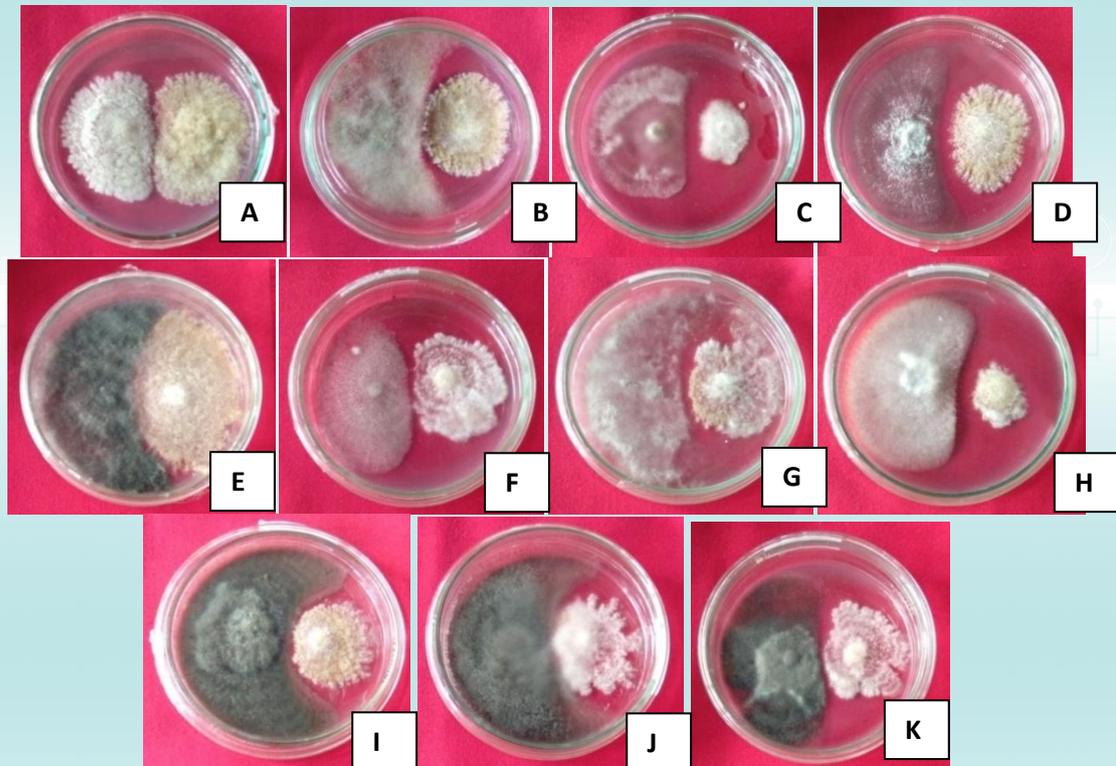
**Table 2.** The mechanism of the antagonism endophytic fungi

The origin of the Isolates/ Location of the Garden Pepper Plants	Isolate	the Competition space nutrients, and oxygen	Antibiosis	Lysis and Parasitism
Pekik Nyaring 1	<i>Fusarium</i> sp.	+	-	+
Pekik Nyaring 1	CE2	+	-	+
Pekik Nyaring 1	CE3	+	+	-
Pekik Nyaring 1	CE4	+	+	-
Pekik Nyaring 1	<i>Rhizoctonia</i> sp.	+	-	+
Pekik Nyaring 1	CE6	+	+	-
Pekik Nyaring 1	<i>Rhizoctonia</i> sp.	+	+	-
Pekik Nyaring 2	CE8	+	+	-
Pekik Nyaring 2	<i>Curvularia</i> sp.	+	+	+
Pekik Nyaring 2	<i>Curvularia</i> sp.	+	+	+
Pekik Nyaring 2	<i>Curvularia</i> sp.	+	+	-

**Description:** (+) occurs the mechanism of antagonism, (-) does not occur the mechanism of antagonism

Type of mechanism of competition between space, nutrients and oxygen occurs in the whole endophytic fungi against the pathogen *Fusarium oxysporum*. The nature of the antagonist will appear when fungi live side by side so that raises competition. On each of the isolates showed the ability to compete are different. It is influenced by the ability of each endophyte fungi in growing. Endophytic fungi able to urgent *Fusarium oxysporum* fungi causing *Fusarium oxysporum* is increasingly out of room to grow. Mukarlina (2010) explained the need for space of nutrients and oxygen endophytic fungi different cause competition against fungi pathogens.

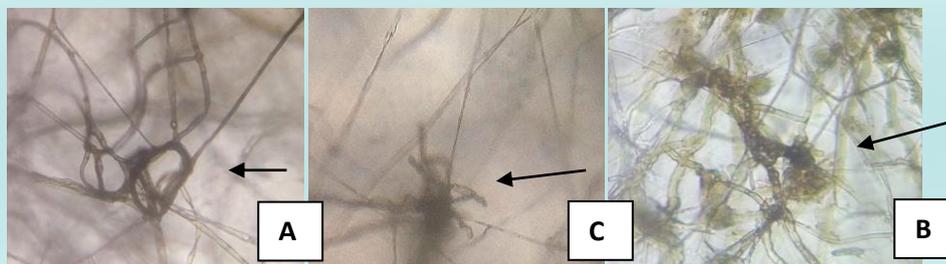
The mechanism of antagonism another place that antibiosis. There are eight endophytic fungi with mechanism antibiosis namely *Rhizoctonia* sp. (CE7), *Curvularia* sp. (CE9, CE10, CE11), CE3, CE4, CE6, CE8. Antibiosis is the inhibition of growth is characterized by the presence of zone of inhibition (Mejia *et al.* 2008). This is in accordance with antibiosis occurs is indicated by the presence of clear zone on the media between endophytic fungi with the *F. oxysporum* fungi. Clear zone occurs due to Endophytic fungi that produce antifungal compounds so it is able to inhibit fungi pathogens.



**Figure 1.** Dual culture test endophytic fungi vs. *Fusarium oxysporum*.

Description : (A) *Fusarium* vs CE1, (B) *Fusarium* vs CE2, (C) *Fusarium* vs CE3, (D) *Fusarium* vs CE4, (E) *Fusarium* vs CE5, (F) *Fusarium* vs CE6, (G) *Fusarium* vs CE7, (H) *Fusarium* vs CE8, (I) *Fusarium* vs CE9, (J) *Fusarium* vs CE10, (K) *Fusarium* vs CE11.

The mechanism of the latter is the hyperparasitism mechanism. There are 3 fungi, namely CE1, CE2 and *Rhizoctonia sp.* (CE5). However, in this study nothing endophytic fungi with lysis mechanisms. Sari (2020) explained, that the endophytic fungi able to crochet with the form loops on the hyphae of the fungi pathogen so that the hyphae of the pathogen becomes entangled.



**Figure 2.** Hyperparasitism endophytic fungi against *Fusarium oxysporum*.

Description : (A) CE5 ensnare *Fusarium oxysporum*, (B) CE2 ensnare *Fusarium oxysporum*, (C) CE10 ensnare *Fusarium*.

### Pathogenicity Test of Endophytic Fungi

Pathogenicity test conducted to evaluate the potential of endophytic fungi as fungi pathogens with a long look of spotting that occurs on the chili seeds.

Treatment	Length blots (mm)	Pathogenicity
Fusarium	31,6 a	+
<i>Fusarium</i> sp.	33,3 a	+
CE2	a 13.3 bcd	+
CE3	10bc	+
CE4 +	30a	+
<i>Rhizoctonia</i> sp.	20abc	+
CE6	3,3 d	+
<i>Rhizoctonia</i> sp.	0d	-
CE8	26,6 ab	+
<i>Curvularia</i> sp.	3,3 d	+
<i>Curvularia</i> sp.	The 13.3 bcd	+
<i>Curvularia</i> sp.	23,3 abc	+

On the observation 7 days of incubation (HSI) conducted, visible variations in the length of the spot produced by each Endophytic fungi. Spotting with the average value of the lowest is isolate CE7, then CE6 and CE9. Isolates CE7 is the isolates with the ability to inhibit the best on the dual culture test the previous. This suggests that the isolates CE7 has potential as endophytic fungi the best of all isolates. The difference in the length of the spotting that occurs because the compounds of metabolites or compounds of antibiotics produced by endophytic fungi very low so that it is not able to suppress the long spotting that occurs. The content of the compounds of secondary metabolites produced by fungi endophytic less effective in the suppression of spotting. Kasujtaningati (2004) explained, this is caused by the low concentration of antibiotics produced by endophytic fungi and breakdown of these antibiotics by microorganisms other so that it becomes less effective.

### Conclusion

The results of in vitro study showed that of eleven endophytic fungi only 1 endophytic fungi which has a percentage of inhibition of 50% of the isolates of *Rhizoctonia* sp.2. The mechanism of antagonism which occurs in endophytic fungi test consists of competition between the space of nutrients and oxygen, hyperparasitism, and antibiosis. Pathogenicity test show only isolates of *Rhizoctonia* sp.2 that does not produce spot on the chili seeds.

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## Chemical Sterilization of Culture Media used for Shoots Multiplication of Bamboo (*Dendrocalamus sericeu*)

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### Abstract

Controlling contamination in micropropagation leads to the success of the process. Autoclaving is conventionally applied but the price and maintenance of such autoclave instrument is pricy. This study aims to identify the efficiency and ideal concentration of sodium hypochlorite and providone-iodine for sterilization of culture media used during germinating of bamboo axillary bud. In the experiment, treatment consisted of culture media which were autoclaved and added 1 and 2 ml/l of bleach and 1 and 2 ml/l of antiseptic. Result showed that total control of contaminant was observed on culture media added all concentration of bleach and antiseptic. There were no significant differences of shoot number and shoot length between plants cultured on media which were autoclaved and added 1 and 2 ml/l of bleach and 1 and 2 ml/l of antiseptic. Thus, sodium hypochlorite and providone-iodine can be used instead of autoclave sterilization of nutrition media for in vitro germination of bamboo axillary bud.

**Keywords:** Chemical Sterilization, sodium hypochlorite, providone-iodine, bamboo axillary bud

## The Lettuce Growth Using Residue Mushroom as Substrates

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### Abstract

This study aimed to determine the residue mushroom as the substrate for cultivating the lettuce (*Lactuca sativa*). This experimental design was a completely randomized design with five treatments and ten replicates included residue mushroom, residue mushroom fermented, 0.5:0.5 of residue mushroom fermented and coco-coir dust, 0.5:0.5 of residue mushroom fermented and rice husk ash, 0.5:0.5 of residue mushroom fermented and rice husk. The yield and vegetative growth as leaf number, leaf width, leaf length, and plant canopy were measured. The results found that growth medium exhibited significant effects on the total number of leave, plant canopy, leave length, leave width, but the fresh yield and dry weight of stem and root was similarly for all treatments ( $p < 0.05$ ) (2.36, 2.14, 4.06, and 2.98 g/plant, respectively). In conclusion, 0.5:0.5 of residue mushroom fermented and coco-coir dust was suitable for growing the lettuce which provided the plant growth.

**Keywords:** Residue mushroom, *Lactuca sativa*, growing media



**LIFE SCIENCE**  
**(ABSTRACT & FULL PAPER)**

## Effect of Dairy Cattle Waste Based Vermicompost on Reduction of Cadmium Concentration in Contaminated Inceptisols and Entisols Soils

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### Abstract

Long-term applications of synthetic fertilizer and pesticides lead to contamination of agricultural soil with heavy metals. Excessive and prolonged use of phosphate fertilizer contributes to the accumulation of cadmium (Cd) in the soil. This laboratory experiment was undertaken to determine the reduction of Cd concentration in contaminated Inceptisols and Entisols soils under the vermicompost treatments. The experiment was arranged in a Completely Randomized Design (CRD) with two factors and three replications. The first factor was vermicompost rates, consisting of 0, 10, 20, and 30 ton/ha, and the second was soil samples, i.e., Inceptisols and Entisols. The Soil samples were pretreated with 100 ppm Cd before the application of vermicompost and incubated for eight weeks. Soil pH and temperature were monitored during the incubation. The result revealed that soil pH drastically lowered after pretreatment of Cd and continuously decreased until sixth week, and slightly raised to the end of the incubation. The addition of vermicompost consistently increased the soil pH during the period. At the end of the Incubation, Cd concentration in the soil linearly decreased as vermicompost rates increased ( $r^2 = 0.9988$ ;  $p < 0.008$ ). However, there was no significant difference between the two soil samples in Cd concentration. Vermicompost application in the soil eventually could neutralize Cd contamination in Inceptisols and Entisols.

**Key words:** Cadmium, Vermicompost, Contaminated Soils, Inceptisols and Entisols

## Physicochemical and Proximate Analysis of Powdered Rambutan Vinegar by Method of Oven Drying

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### Abstract

Vinegar has been globally used as an essential ingredient, most applicable in the food industry as seasoning due to its sharp and versatile taste. A wide variety of food products such as potato chips, tortilla chips and snack nuts are seasoned using vinegar in order to enhance the flavour. However, the use of vinegar in liquid form may affect the condition of the food in terms of its texture, consistency and overall appeal. Currently, there are a few available powdered vinegars sold in the market such as apple cider, red wine, malt and balsamic, however rambutan (*Nephelium lappaceum* L.) based powdered vinegar has not yet been produced. This project was proposed to make rambutan vinegar in powder form. Two types of fruit vinegar used are rambutan vinegar (RV) and apple cider vinegar (ACV), the latter used as the control. Each vinegar were mixed with different percentages of maltodextrin (0.00%, 12.50%, 25.00%, 50.00 and 75.00%) resulting in 5 samples respectively from RV and ACV. Following samples were then oven dried at 100°C. Physicochemical and proximate analysis was performed to determine the effects of using different percentages of maltodextrin. Findings showed that the use of different percentages of maltodextrin to make powdered vinegar has shown significant changes to the physicochemical properties in terms of increasing the acetic acid content (AAC), pH and Total Soluble Solid (TSS). The higher use of maltodextrin to produce the powdered vinegar has also increased the lightness (L\*), redness (a\*) and yellowness (b\*) of the powdered vinegar, but also decreased the rate of solubility (g/sec/ml). The proximate analysis conducted which was the moisture content has also shown significant changes by lowering the percentage of moisture content in powdered rambutan vinegar to as low as 5.60% as compared to its liquid form (99.62%). Further studies may be done to gain input on the sensory evaluation and nutritional value of the powdered vinegars.

**Keywords:** drying, maltodextrin, powder, rambutan, vinegar

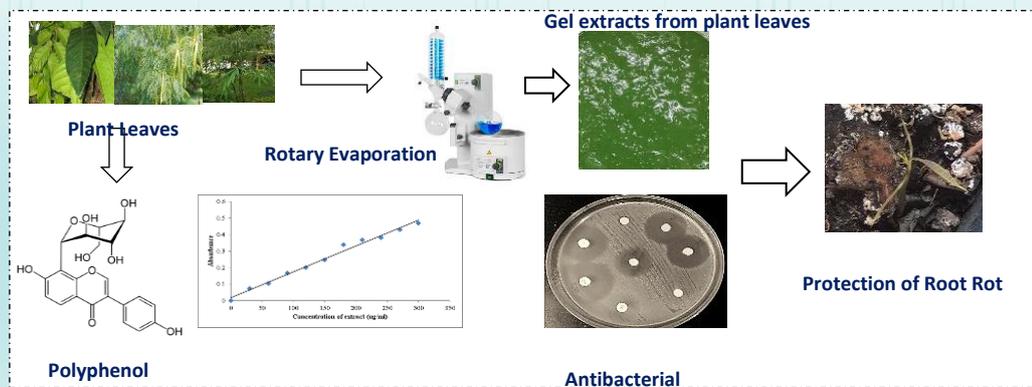
## Gel Extracts Development from Acacia Leaves, Santol Leaves and Bamboo Leaves for Anti-Pathogenic Bacteria in Plant

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### Abstract

The aim of this research was to study the efficacy of extraction of total polyphenols from acacia leaves, santol leaves and bamboo leaves, extracted by 95% ethanol and water, which had by highest total polyphenol content and antibacterial ability. We found that ethanol extracts had a significantly higher ( $p \leq 0.05$ ) yield than water extract. The ethanol extract of acacia leaves had the maximum yield of  $18.28 \pm 0.35$  percentage, with the highest total phenolic compound  $875.39 \pm 45.53$  mg gallic acid equivalents/g dried of plant leaves extract and the highest total flavonoid compound  $265.12 \pm 24.92$  mg catech in equivalents/g dry of plant leaves extract. In this research, the development of innovative gel mixed acacia leaves extract for testing with agar diffusion technique in *Bacillus subtilis* TISTR 1528 and *Erwinia carotovora* subsp. *carotovora*. The result showed that the activity against in both types of pathogenic bacteria were 23.2 and 16.5 mm, MIC of 0.39 and 3.13 mg/ml, and MBC of 0.78 and 12.5 mg/ml, respectively.

**Keywords:** Pathogenic Bacteria, Acacia Leaves, Santol Leaves, Bamboo Leaves, Anti-Bacteria

## Encapsulation of Bergamot Leaves Extract Development for Resistance of *Colletotrichum gloeosporioides* in Durian

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### Abstract

The objective of this research was to select bergamot leaf extracts by using ethanol and water, which had the select condition of the highest polyphenol content and antifungal in *Colletotrichum gloeosporioides*. The result showed that ethanol of bergamot leaves extraction had a significantly yield ( $p \leq 0.05$ ) higher than water extraction. The bergamot leaves extracts with Association of Official Analytical Chemists method had the maximum yield of  $18.55 \pm 0.75$  %. The highest total phenolic compound with folin-ciocalteu colorimetric method analytical method had  $1,058.45 \pm 75.13$  mg gallic acid equivalents/g fresh bergamot leaves extract, and the highest total flavonoid compound with colorimetric assay had  $350.13 \pm 12.52$  mg catechin equivalents/g fresh bergamot leaves extract. Then innovation was to develop the bergamot leaves extract encapsulation at 500,000 ppm. It can confirm that the best condition was antifungal of *C. gloeosporioides* by filter paper disk agar diffusion technique as a clear zone  $27.12 \pm 1.52$  mm.

**Keywords:** bergamot leaves, *Colletotrichum gloeosporioides*, antifungal, filter paper disk agar diffusion technique.

## Analysis of Consumer Behavior on Purchasing Decision of "Lapis Aren Linggau" Cake in Lubuklinggau City, South Sumatera Province, Indonesia

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### Abstract

Lapis Aren Linggau is a cake product produced by Aren Pastries. The pastry business competition is higher that Aren Pastries need to pay attention to consumers in order to maintain the company and compete for market share. This study aims to analyze 1) the process of purchasing decisions of Lapis Aren Linggau by consumers and 2) the correlation between consumer's characteristics and product attributes of the Lapis Aren Linggau purchase decision process. The method to determine the number of respondents in this study is the accidental sampling method. The process of making purchasing decisions (identifying needs, information seeking behavior, evaluation of alternatives, purchasing decisions, and post-purchase evaluation) is analyzed by descriptive analysis. The correlation between consumer characteristics and product attributes of the Lapis Aren Linggau purchase decision process is analyzed by the Spearman Rank correlation using SPSS version 21. The process of making a purchase decision for Lapis Aren Linggau at the stage of identifying needs, evaluation of alternatives and purchasing decisions is sufficient for consumers, while the stage of information seeking behavior and post-purchase evaluation needs to be carried out by consumers. Overall, the consumers need to decide the making process for purchasing Lapis Aren Linggau. There is a very weak significant correlation and a negative direction between the variable distance from residence to the location of the purchasing decision process, while age, education and income are not related to the purchasing decision process. Furthermore, there is a significant correlation and a positive direction between all product attribute variables of the purchase decision process.

**Keywords:** Lapis Aren Linggau, Consumer Behavior, Purchasing Decision Making Process.

## The Correlation between Marketing Mix (Product, Price, Place and Promotion) With Purchase Decision of Kopi Janji Jiwa Bengkulu City

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### Abstract

Kopi Janji Jiwa which has 3 shops located in Bengkulu City. With these 3 locations, Kopi Janji Jiwa must have the right marketing strategy in order to increase purchasing decisions. The objective of this study was aim to: 1) to determine and analyze the marketing mix (product, price, place and promotion) at Kopi Janji Jiwa Bengkulu City, 2) to determine and analyze purchasing decisions at Kopi Janji Jiwa Bengkulu City and 3) to determine and analyze the correlation between marketing mix (product, price, place, and promotion) with the purchase decision of the Kopi Janji Jiwa Bengkulu City. This research was conducted at the Kopi Janji Jiwa Coffee Shop located in Bengkulu City and was conducted on January 27- February 27 2021. Determination of the respondents used in this study using the Accidental Sampling technique with 96 respondents. The data analysis method used to analyze the marketing mix (product, price, place and promotion) and purchase decisions at Kopi Janji Jiwa Bengkulu City using descriptive analysis, correlation analysis between marketing mix (product, price, place and promotion) with the purchase decision Kopi Janji Jiwa Bengkulu City used rank spearman analysis with the SPSS application and to test the significant correlation between variables using the T test. Based on the result and discussion, it can be concluded that it shows the final results of the marketing mix with product, price, place and promotion variables. The final result is in the good and very good category. The correlation between product, price, place and promotion with the purchase decision of Kopi Janji Jiwa has a very significant correlation with a moderate correlation with the purchase decision of Kopi Janji Jiwa Bengkulu City. Meanwhile, the marketing mix simultaneously has a very significant correlation with a strong correlation with the purchasing decision of Kopi Janji Jiwa Bengkulu City.

**Keywords:** Marketing Mix, Purchasing Decisions, Kopi Janji Jiwa

## Daycare Information System

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### Abstract

As Thailand now enters to aging society era, centres for taking care of elders are increasingly required. This project aims to analyses, design, and develop a day-care information system for such centres to deliver those elders a good daily service. The system can be divided into three sections: the administrator, staff, and user section. The key features of the system are, for example, package arrangement, which includes a variety of activities, and online package booking. We used the Bootstrap framework to develop the system and MySQL as the system's database. The system was evaluated by stakeholders, including software development experts; the elderly care centre staff, and users. The result in terms of performance evaluated by experts is in excellent level with  $x = 3.62$  and  $S.D. = 0.00$ . The result in terms of convenience evaluated by administrators and staff is in good level with  $x = 3.32$  and  $S.D. = 0.57$ . The result in terms of friendly usage from the users' perspective is in good level with  $x = 3.28$  and  $S.D. = 0.67$ .

### Keywords:

## A Smart System for Controlling the Mushroom Growing House

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### Abstract

This project is a production control system of a mushroom growing house. It consists of a control system installed in the mushroom growing house and a reporting system, including temperature, humidity. This system will focus on adequately controlling water by monitoring humidity and temperature levels in the house. The temperature and humidity levels suitable for growing mushrooms are 28° C - 30° C and 70 % - 80 %, respectively. The controlling and reporting can perform through an android smartphone. Therefore, farmers can control water precisely no matter how climate changed, and they can predict yield accurately because of the stable ambient inside the mushroom house. This system was evaluated by experts and users. All evaluated results are at a good level.

**Keywords:** Mushroom nursery, Sensor, Relay



**FISHERIES**  
**(ABSTRACT & FULL PAPER)**

## **A remarkable evidence of the erythrocyte and its nuclear morphological abnormality of the Doublespotted Queenfish *Scomberoides lysan* (Forsskål 1775) in the rearing pond**

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### **Abstract**

Hematological alteration has been widely used as an accurate biomarker for fish assessment, but such information is not reported in the Doublespotted queenfish *Scomberoides lysan* (Forsskål 1775), an aquaculture candidate marine fish in Thailand. The current study aimed to observe the morphological characteristics of erythrocytes and their nuclear morphological abnormality in *S. lysan*. All fish (n = 10 individual fish with  $67.5 \pm 0.89$  cm in total length) were cultured in earthen pond and then the blood was collected for blood smear observation by Wright-Giemsa stain method. The blood smear test showed that the erythrocyte was the most abundant cell type in the blood. Mature erythrocytes had an ellipse-shape. The nucleus of erythrocytes was an oval to round shape and was surrounded by a faint pink cytoplasm. Some erythrocytes had nuclear morphological abnormality such as the kidney-shaped, polymorphic and/or segmented nuclei. The percentage of such nuclei was, however, approximately 2%. Our results added new morphological information to the hematology of *S. lysan* and also demonstrated that this fish is considered to be living under a good culture condition.

**Keywords:** Blood smear test, Doublespotted Queenfish, Health, Red blood cell, Thailand

**Oocyte structure and reproductive health of the sexually mature  
Longnose seahorse, *Hippocampus trimaculatus* (Leach, 1814)  
reared in captivity**

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**Abstract**

Fish reproductive health plays an important role in its aquaculture development, but this knowledge is limited in seahorses. The objective of this study is to investigate the ovarian structure and reproductive health of the Longnose Seahorse, *Hippocampus trimaculatus* (Leach, 1814) reared in captivity. The seahorse (n = 3 individual fish with  $17.50 \pm 1.95$  cm in total length) was reared in the recirculating aquaculture system, and then the ovaries were collected and histologically observed. The paired ovary of this seahorse contained oocytes of different stages, indicating an asynchronous development. The oocytes were categorized into two phases according to the nuclear and ooplasmic characteristics: primary growth (PG) and secondary growth (SG) phases. The PG phase had the previtellogenic and oil and cortical alveoli stages, whereas the SG phase was divided into two sub-stages (vitellogenic and mature oocytes). The atresia was the only histopathological sign found in this study for both PG and SG phases of the ovary. The atresia in the PG phase was mainly characterized by an abnormal shape and cytoplasmic degeneration. The degeneration of yolk granules and follicular cell layer occurred in the atresia of the SG phase. A higher degree of oocyte atresia was found in the SG phase compared to the PG phase. It warrants further observation of the occurrence of atresia associated with the reduced reproductive health of *H. trimaculatus* reared in captivity. These results also suggest that the aquaculture of *H. trimaculatus* require few improvements for their maintenance as well as to increase their reproductive success.

**Keywords:** Atresia, Captivity, Histology, Longnose seahorse, Thailand

## Product Development of Fried Fish Bone (*Decapterus russelli*) Crisp.

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### Abstract

Waste or by-product from the frozen seafood manufacturing processes often unused or sold for animal feed production. This research aims to produce “crispy fried fish bone”, from the by-product of the frozen Indian Scads (*Decapterus russelli*) battered fish production. Overall study processes include 1) recipe development, 2) packaging and shelf-life extension, and 3) investment feasibility study. Initially, prepared fish bone, yield of  $33.69 \pm 0.97\%$ , was softened by soaking in 1.5% X substance solution for 1 hour. Thereafter, fried and developed 4 different recipes (original, larb, nori seaweed, and hot and spicy). The hot and spicy showed the highest significant acceptable score ( $p < 0.05$ ) of  $6.23 \pm 0.93$ . Shelf-life extension test among 3 different packaging (Ziplock PPE, Vacuum PE bag, and oil expelling & Vacuum PE bag) was done during a period of 45 days. The oil expelling hot and spicy fried fish stored in vacuum PE bag showed the highest sensory test scores ( $p < 0.05$ ) of 5.47. Water activity and the color values varied according to the storage period. In brief, the developed products can be stored for 45 days although the consumer’s preferences scores were slightly decreased during the last two weeks. The microbial growth in the product was no significant difference ( $p > 0.05$ ) during therefore mentioned period. The feasibility study of a 5-years project investment for both factory and household levels was investigated. The initial investment costs of those levels were 69,007.71 and 5,623.08USD, respectively. Annual operating costs were 394,773.05 and 41,648.72USD, respectively. NPV, BCR, IRR and payback period of the factory level were 1,353,727.61USD, 1.97, 965%, and 0.21 year while those of the household level were 145,636.61USD, 1.98, 1155%, and 0.08 year, respectively. In summary, the crispy fried fish bone product is technically and financially feasible for both household and factory levels.

**Keywords:** Fish bone, Indian scad, Food processing, By-product, Waste utilization

## Effects of Differences in Physical Properties of the Earthworm and the Black Soldier Fly Larvae (BSFL) in Fish Feed with Commercial Feed as Control towards Growth and Performance of Betta Fish (*Betta splendens*)

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### Abstract

Aquaculture industry had been affected by the skyrocketing prices of fish meal that eventually leads to high prices of commercial fish feed. Formulating and manufacturing good fish feeds requires high quality fish meal for efficient and fast growth. The increasing price of fish meal and commercial feeds has led to farmers experiencing difficulties in maintaining their farm and survival in the industry. Therefore, black soldier fly larvae (BSFL) and earthworm meal has been suggested as an alternative feed source in replacing the fish meal. BSFL and earthworm meal were chosen because of their good protein source, which is the most valuable component of fish feed. Proteins are made of 20 common linkage of amino acids. Methionine, arginine, therein, tryptophan, histidine, Isoleucine, lysine, leucine, Valine and phenylalanine are among the essential amino acids that required in fish diet. Both BSFL and earthworm meal were manually formulated according to the diet formulation and fed to the betta fish, *Betta splendens*. The growth rate and tendency of eating the feed were measured.

**Keywords:** Black soldier fly larvae, earthworm meal, fish meal.

## Antibiogram of *Vibrio parahaemolyticus* isolated from diseased ornamental fish

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### Abstract

In the present study, *Vibrio parahaemolyticus* will be isolated and identified from diseased ornamental fish in aquarium shop will be carried out. The ornamental fish industry has contributed to billions of dollars market value in the world. However, *V. parahaemolyticus* is posed a threat to the industry where it might cause a severe economic loss. There is some infection case study of *V. parahaemolyticus* in clownfish *Amphiprion sebae*. However, there is scarce information available related to the *V. parahaemolyticus* infection in ornamental fish. This project was aim to isolate and identify *V. parahaemolyticus* from ornamental fish and identify antibiogram of isolated *V. parahaemolyticus*. Thiosulphate-citrate-bile salts-sucrose (TCBS) agar was used to isolate *V. parahaemolyticus* and BBL Crystal kit was used for identification. The present bacteria were subjected to a total of 17 antimicrobial susceptibility test discs impregnated with tetracycline, streptomycin, penicillin, meropenem, ampicillin, ampicillin sulbactam, amikacin, amoxicillin/clavulanic acid, ceftazidime, cefotaxime, cephalothin, levofloxacin, imipenem, gentamicin, doxycycline, ciprofloxacin and chloramphenicol. Based on the antimicrobial susceptibility result, multiple antibiotic resistances (MAR) index value was calculated. It is expected that the assessment of antimicrobial susceptibility profile of *V. parahaemolyticus* was highly susceptible to ampicillin sulbactam, meropenem, ceftazidime and imipenem, but resistant to penicillin G and ampicillin, referring to the previous study. The current finding can lead to a better understanding of *V. parahaemolyticus* and their resistance to antibiogram pattern. Furthermore, prevalence data attained can be further used in managing ornamental fish health.

**Key words:** Ornamental fish, *Vibrio parahaemolyticus*, antibiogram

## Simulation of the impact of the Covid-19 pandemic on the household economy of Tilapia cultivators in Bengkulu: a simulation

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### Abstract

The Covid-19 pandemic has an impact not only on the global economic sector but also at the micro level of community households. This study aims to estimate the impact of the Covid-19 pandemic on the household economy of Tilapia cultivators in Bengkulu. The research location was located in Padang Jaya District and involved 144 Tilapia cultivators who live in that place. This simulated estimation model refers to a simultaneous equation involving 8 endogenous variables or main variables. These variables are tilapia production, pond area, savings, health expenditures, food expenses, clothing expenses, education expenses and housing expenses. This simulation is designed to predict two scenarios in the future, namely the optimistic and pessimistic scenarios. Future simulation, if conditions return to pre-pandemic, the household economic variables such as: health consumption, clothing consumption, food consumption, education consumption, household consumption, tilapia fish production, pond area and savings); will increase. If another scenario is pessimistic, this scenario will happened, the household economic variables will be worse.

**Keywords:** Estimation, Covid-19, Household Economics, Tilapia Cultivators

## Effects of black soldier larvae (BSFL) and earthworm feeding on the water quality of betta fish (*Betta splendens*)

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### Abstract

This study aims to identify the effect of different fish feed on the water quality of ornamental fish (*Betta splendens*). The feed cost can rise by more than 70% of production because of the costly soybean and fish meal. Both BSFL and earthworm contain the nutrient composition that meets the requirement of fish feed. This experiment was done to find an alternative for fish meals. The feed that contains more protein is better for the fish. Unfortunately, there are a lot of factors that can affect the development of the *Betta splendens*, such as water quality. The observed water quality parameter were pH level, water temperature, dissolved oxygen level, ammonia level, and organoleptic test. Three types of feeding trial, fish meal (control), BSFL and earthworm used to determine the better water quality for the fish. It is expected that the earthworm will have a higher amount of ammonia due to the higher amount of protein. The replacement of Black Soldier Fly Larvae (BSFL) and earthworm in feed ingredients can cut off the feed cost and at the same it can be an alternative to the fish meal. For the water quality, feed that consists of earthworm is the worse due to the ammonia level that was excreted by the fish. A few research had done using earthworm and Black Soldier Fly Larvae (BSFL) as an alternative for the fish meal. It is said that the acceptability level of earthworm meal in fish diet ranges between 25 and 30%. It is stated that different species of earthworm contain about 50–60% of crude protein while black soldier fly larvae contain about 40 to 50% crude protein. This can be said that the higher the level of protein, the higher the ammonia level that was excreted by the fish.

**Keywords:** Black soldier larvae, fish meal, earthworm, feed, water quality

## Eels, a potential dietary protein in rural areas of Bengkulu Province

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### Abstract

Stunting refers to chronic malnutrition that occurs during the earliest period of a child's growth and development. A prevalence of stunting in Indonesia was recorded at 27.67 percent which is higher than the number set by WHO. A balanced nutritional intake of carbohydrate, fat and protein is required to support growth and development in young children. Dietary protein has been a dominant factor to induce stunting prevalence in rural areas in Indonesia where animal proteins are sold weekly in a traditional market. Asian swamp eel known as *Monopterus albus* Zuiew is a potential source of protein to address animal protein problem that induced stunting. This review article aimed to highlight the potential of eel as dietary protein to support animal protein security in rural areas. This article reviewed the distribution and abundance of Asian swamp eel (*Monopterus albus* Zuiew). This article explained the nutritional contents of eels and their benefits to support growth and development of children. Eels can be classified as super food or functional food for less sugar. Eels has small amount of sodium; in contrast, it has high concentration of phosphor. Eel's consumption is attributable in omega-3 fatty acids and protein supply to minimize cardiovascular diseases and strong skeleton, avoid hypertension and maintaining normal cholesterol. These review articles also provide insight on eel's habitat and eel aquaculture. Indonesian people in general; particularly local community in Bengkulu Province, are familiar with eel as a food. Eels are also widely cooked in many Indonesian cuisines. This article discusses some popular cuisine and potential processed food using eels. Eels can be processed to make nuggets, meat balls and many popular dishes for all ages.

**Keywords:** Eels, nutrition, habitat, aquaculture, cuisine



## Appendix



คำสั่งคณะกรรมการศาสตร์  
มหาวิทยาลัยราชภัฏสุรินทร์  
ที่ ๐๗๖ /๒๕๖๔

เรื่อง แต่งตั้งคณะกรรมการการประชุมวิชาการนำเสนอผลงานวิจัยระดับนานาชาติด้านการเกษตร  
และวิทยาศาสตร์ชีวภาพ ระดับปริญญาตรี ครั้งที่ ๑ (รูปแบบออนไลน์)

ด้วยคณะกรรมการศาสตร์ มหาวิทยาลัยราชภัฏสุรินทร์ ได้ดำเนินการจัดการประชุม  
วิชาการนำเสนอผลงานวิจัยระดับนานาชาติด้านการเกษตร และวิทยาศาสตร์ชีวภาพ ระดับปริญญาตรี ครั้งที่ ๑  
(รูปแบบออนไลน์) เพื่อดำเนินการ และเตรียมความพร้อมในการจัดประชุมวิชาการ ทั้งนี้อาศัยอำนาจตาม  
คำสั่ง มหาวิทยาลัยราชภัฏสุรินทร์ ที่ ๒๑๔๐/๒๕๕๘ ลงวันที่ ๒๗ ตุลาคม ๒๕๕๘ เรื่อง มอบหมาย  
หน้าที่และความรับผิดชอบในการปฏิบัติราชการให้คณบดี/ผู้อำนวยการ/ผู้อำนวยการสถาบัน สังกัด  
มหาวิทยาลัยราชภัฏสุรินทร์ ปฏิบัติราชการแทนอธิการบดีมหาวิทยาลัยราชภัฏสุรินทร์ จึงขอ  
แต่งตั้งคณะกรรมการทำหน้าที่ ดังนี้

๑. คณะกรรมการอำนวยการ มีหน้าที่ ให้คำปรึกษาและแนวทางในการดำเนินงานให้แก่คณะกรรมการ  
ฝ่ายต่าง ๆ เพื่อให้การจัดประชุมวิชาการครั้งนี้ดำเนินไปตามวัตถุประสงค์ ทั้งกำหนดรูปแบบและกิจกรรมในการจัด  
ประชุมทางวิชาการ และให้คำปรึกษาแนะนำในการจัดประชุมแก่คณะกรรมการฝ่ายต่าง ๆ รวมทั้งอำนวยการให้การ  
จัดประชุมเป็นไปตามวัตถุประสงค์และเป้าหมายในการจัดประชุม ประกอบด้วย

๑.๑ รองศาสตราจารย์ ดร.รสสุคนธ์	แสงมณี	ที่ปรึกษา
๑.๒ ผู้ช่วยศาสตราจารย์ทวี	บุญภิรมย์	ที่ปรึกษา
๑.๓ ผู้ช่วยศาสตราจารย์มนทนา	รุจิระศักดิ์	ที่ปรึกษา
๑.๔ ผู้ช่วยศาสตราจารย์ ดร.สายทอง	แก้วฉาย	ที่ปรึกษา
๑.๕ ผู้ช่วยศาสตราจารย์ ดร.จักรพันธ์	พิชญพิพัฒน์กุล	ประธานกรรมการ
๑.๖ ผู้ช่วยศาสตราจารย์ ดร.ชารีนา	สีอเม	กรรมการ
๑.๗ ผู้ช่วยศาสตราจารย์นิรันดร	หนักแดง	กรรมการ
๑.๘ อาจารย์ ดร.กนก	เชาวภาชี	กรรมการ
๑.๙ นางสาวปราณี	ทองเกิด	กรรมการ
๑.๑๐ อาจารย์ ดร.ราฮีม่า	วาแม่ดีชา	กรรมการและเลขานุการ

๒. คณะกรรมการฝ่ายประสานงาน และติดต่อผู้ทรงคุณวุฒิ มีหน้าที่ ติดต่อประสานงานเพื่อ  
เรียนเชิญวิทยากรในพิธีเปิด/ วิทยากรบรรยายพิเศษ/ วิทยากรแสดงปาฐกถาพิเศษ/ผู้ทรงคุณวุฒิในการ  
พิจารณาบทความวิชาการ ออกหนังสือเชิญกลุ่มเป้าหมายเข้าร่วมนำเสนอ ตลอดจนตอบข้อซักถามทั่วไป  
ประชุมวางแผน กำหนดรูปแบบวิธีการจัดงานระหว่างมหาวิทยาลัยราชภัฏสุรินทร์ และหน่วยงานภาคี  
ตลอดจนการเชิญคณะกรรมการจัดงานประชุมเพื่อสรุปความก้าวหน้าการดำเนินงานตลอดช่วงการจัด  
เตรียมการประชุมวิชาการ ประกอบด้วย

/ ๒.๑ ผู้ช่วยศาสตราจารย์ ดร.สายทอง...

๒.๑ ผู้ช่วยศาสตราจารย์ ดร.สายทอง	แก้วฉาย	ประธานกรรมการ
๒.๒ อาจารย์ ดร.สุไลมาน	เจ๊ะอาบู	กรรมการ
๒.๓ อาจารย์ดาวฟีก	หะยีหมัด	กรรมการ
๒.๔ อาจารย์ภณิดา	เกาประดิษฐ์	กรรมการ
๒.๕ นางสาวสุรัตนา	เทพแข	กรรมการ
๒.๖ อาจารย์อัมภรณ์พรรณ	พลาศัย	กรรมการ
๒.๗ อาจารย์ ดร.ราฮีม่า	วาเมตีซา	กรรมการและเลขานุการ

**๓. คณะกรรมการฝ่ายลงทะเบียน (อิเล็กทรอนิกส์)** มีหน้าที่ จัดทำแบบฟอร์มลงทะเบียนอิเล็กทรอนิกส์ รับลงทะเบียนผู้นำเสนอผลงานและผู้ร่วมงานประชุมวิชาการ ประกอบด้วย

๓.๑ อาจารย์ ดร.ราฮีม่า	วาเมตีซา	ประธานกรรมการ
๓.๒ ผู้ช่วยศาสตราจารย์ ดร.ภัทราวดี	ศรีมีเทียน	กรรมการ
๓.๓ อาจารย์ ดร.โรสลาวดี	โตะแอ	กรรมการ
๓.๔ นางสาวประกายวรรณ	วิเชียรรัตน์	กรรมการ
๓.๕ นางสาวรุสมา	ดอเลาะ	กรรมการ
๓.๖ นางจินตนา	ทองน้อย	กรรมการ
๓.๗ นางสาวธีรกานต์	ผิวแก้ว	กรรมการและเลขานุการ

**๔ คณะกรรมการผลิตสื่อและประชาสัมพันธ์** มีหน้าที่ จัดทำแผนประชาสัมพันธ์ ผลิตสื่อเพื่อเผยแพร่การประชุมวิชาการ ตัดต่อภาพให้เหมาะสมและนำเสนอบนสื่อออนไลน์ (call for paper) ประกอบด้วย

๔.๑ ผู้ช่วยศาสตราจารย์นิรันดร	หนักแดง	ประธานกรรมการ
๔.๒ นางสาวธีรกานต์	ผิวแก้ว	กรรมการ
๔.๓ นายมุฮัมมัดอารีเฟ็ญู	มัยเซ่ง	กรรมการ
๔.๔ นางสาวดวงฤทัย	ชายสวัสดิ์	กรรมการและเลขานุการ

**๕. คณะกรรมการประสานและติดต่อกับผู้นำเสนอผลงาน (บทคัดย่อ)** มีหน้าที่ กำหนดรูปแบบบทคัดย่อ (Template abstract) รวบรวมข้อมูลบทคัดย่อจากการลงทะเบียนผ่านเว็บไซต์ ตรวจสอบความถูกต้อง ติดต่อกับคณะกรรมการผู้ทรงคุณวุฒิเพื่อตรวจสอบคุณภาพของบทคัดย่อที่ได้รับจากผู้เข้าร่วมประชุม แจกผลการพิจารณาแก่ผู้เข้าร่วมประชุม และประสานงานกับฝ่ายที่เกี่ยวข้องให้เป็นไปด้วยความเรียบร้อย ประกอบด้วย

๕.๑ อาจารย์ ดร.กนก	เซาวภาชี	ประธานกรรมการ
๕.๒ อาจารย์ ดร.ธนเสฏฐ์	ทองใสเกลี้ยง	กรรมการ
๕.๓ อาจารย์ น.สพ.เอลฮัม	แวฮามะ	กรรมการ
๕.๔ อาจารย์ ดร.สุไลมาน	เจ๊ะอาบู	กรรมการ
๕.๕ อาจารย์ดาวฟีก	หะยีหมัด	กรรมการ
๕.๖ นางสาวพิมพ์รัตน์	หาญสกุลวัฒน์	กรรมการและเลขานุการ

**๖. คณะกรรมการประสานและติดต่อกับผู้นำเสนอผลงาน (วิดีโอ)** มีหน้าที่ กำหนดรูปแบบวิดีโอ ดำเนินการตอบรับและตรวจสอบความถูกต้องของวิดีโอที่ใช้ในการนำเสนอ ดำเนินการส่งไฟล์วิดีโอแก่ฝ่ายพิธีการ และประสานงานกับฝ่ายที่เกี่ยวข้องให้เป็นไปด้วยความเรียบร้อย ประกอบด้วย

๖.๑ ผู้ช่วยศาสตราจารย์ ดร.ซารีน่า	สื่อแม่	ประธานกรรมการ
๖.๒ อาจารย์ ดร.นิพัรีชา	เจ๊ะเลาะ	กรรมการ
๖.๓ นางสาวอติตา	จันทราช	กรรมการ
๖.๔ นายมุฮัมมัดอารีเฟ็ญ	มัยเซ่ง	กรรมการ
๖.๕ อาจารย์นุร์ซานิซา	เจดาโอะ	กรรมการและเลขานุการ

**๗. ฝ่ายพิธีการ** มีหน้าที่กำหนดรูปแบบภาพรวม จัดทำลำดับขั้นตอนการดำเนินงาน ติดต่อบุคลากร และเตรียมความพร้อมนักศึกษาเพื่อนำเสนอผลงาน ประกอบด้วย

๗.๑ ผู้ช่วยศาสตราจารย์มนทนา	รุจีระศักดิ์	ประธานกรรมการ
๗.๒ ผู้ช่วยศาสตราจารย์ ดร.สายทอง	แก้วฉาย	กรรมการ
๗.๓ ผู้ช่วยศาสตราจารย์ ดร.ซารีน่า	สื่อแม่	กรรมการ
๗.๔ ผู้ช่วยศาสตราจารย์นิรันดร	หนักแดง	กรรมการ
๗.๕ อาจารย์ ดร.กนก	เซาวภาชี	กรรมการ
๗.๖ ผู้ช่วยศาสตราจารย์เจษฎา	แก้วฉาย	กรรมการ
๗.๗ อาจารย์จักรพงษ์	จิระแพทย์	กรรมการ
๗.๘ อาจารย์นุร์ซานิซา	เจดาโอะ	กรรมการ
๗.๙ อาจารย์ ดร.ณัฐพัชรากานต์	แก้วพลอย	กรรมการ
๗.๑๐ อาจารย์เปลื้อง	บุญแก้ว	กรรมการ
๗.๑๑ อาจารย์ ดร.นราธิษณ์	หวมกรอง	กรรมการ
๗.๑๒ ผู้ช่วยศาสตราจารย์ ดร.ภัทราวดี	ศรีมีเทียน	กรรมการ
๗.๑๓ อาจารย์ ดร.ธนเสถียร	ทองใสเกลี้ยง	กรรมการ
๗.๑๔ อาจารย์ ดร.นิพัรีชา	เจ๊ะเลาะ	กรรมการ
๗.๑๕ อาจารย์อัมภรณ์พรรณ	พลาศัย	กรรมการ
๗.๑๖ อาจารย์ น.สพ.เอลฮัม	แวฮามะ	กรรมการ
๗.๑๗ อาจารย์ ดร.สุไลมาน	เจ๊ะอาบู	กรรมการ
๗.๑๘ อาจารย์ดาวฟีก	หะยีหมัด	กรรมการ
๗.๑๙ อาจารย์ ดร.โรสลาวาตี	โตะแอ	กรรมการ
๗.๒๐ อาจารย์ภณิดา	เกาประดิษฐ์	กรรมการ
๗.๒๑ อาจารย์ ดร.ราฮีม่า	วาแมดีซา	กรรมการและเลขานุการ

**๘. คณะกรรมการฝ่ายประเมินผล** มีหน้าที่จัดเตรียมรางวัล เกียรติบัตร พร้อมทั้งสรุปและประเมินผลการจัดประชุมวิชาการ วิเคราะห์ปัญหา อุปสรรคเพื่อนำมาพัฒนาและปรับปรุง ในการวางแผนการทำงานในครั้งต่อไป และประสานงานกับผู้เกี่ยวข้องให้เป็นไปด้วยความเรียบร้อย ประกอบด้วย

๘.๑ อาจารย์ ดร.ราฮีม่า	วาแมดีซา	ประธานกรรมการ
๘.๒ ผู้ช่วยศาสตราจารย์ ดร.ภัทราวดี	ศรีมีเทียน	กรรมการ
๘.๓ อาจารย์ภณิดา	เกาประดิษฐ์	กรรมการ
๘.๔ นางสาวพิมพ์รัตน์	หาญสกุลวัฒน์	กรรมการ
๘.๕ นางสาวธีรกานต์	ผิวแก้ว	กรรมการ
๘.๖ นางสาวสุรัตนา	เทพแข	กรรมการ
๘.๗ นางสาวรุสมา	ดอเลาะ	กรรมการ

**๙. คณะกรรมการฝ่ายการเงิน และพัสดุ** มีหน้าที่รับค่าลงทะเบียนและออกใบเสร็จ ค่าลงทะเบียน ควบคุมกำกับ จัดซื้อจัดจ้างวัสดุ อุปกรณ์ประกอบการจัดประชุม การเตรียมเอกสารเพื่อเบิกจ่าย ตามหลักฐานการเบิกจ่ายทั้งระหว่างดำเนินงาน ภายหลังเสร็จสิ้นการดำเนินงาน ตลอดจนการจัดเตรียม เอกสารหลักฐานต่าง ๆ ที่เกี่ยวข้องทางด้านการเงินและพัสดุให้เป็นไปตามหลักเกณฑ์และระเบียบที่กำหนด ประกอบด้วย

๙.๑ นางสาวปราณี	ทองเกิด	ประธานกรรมการ
๙.๒ อาจารย์ ดร.นิพัรีชา	เจ๊ะเลาะ	กรรมการ
๙.๓ นางสาวธีรกานต์	ผิวแก้ว	กรรมการ
๙.๔ นางสาวอังคณา	ศรีรักษ์	กรรมการ
๙.๕ นางสาวสุรัตนา	เทพแข	กรรมการ
๙.๖ นางสาวอรุณี	ศรีชัย	กรรมการและเลขานุการ

**๑๐. คณะกรรมการฝ่ายสถานที่** มีหน้าที่ในการวางแผน การประสานงานด้านการจัดเตรียม ความพร้อมด้านสถานที่จัดการประชุมตามความเหมาะสม (ห้องประชุม conference ชั้น ๑ อาคารคณะศิลปศาสตร์) ประกอบด้วย

๑๐.๑ อาจารย์ น.สพ.เอลฮัม	แวฮามะ	ประธานกรรมการ
๑๐.๒ อาจารย์เปลื้อง	บุญแก้ว	กรรมการ
๑๐.๓ อาจารย์ ดร.สุไลมาน	เจ๊ะอาบู	กรรมการ
๑๐.๔ นางสาวเกษร	เขี้ยวคง	กรรมการ
๑๐.๕ นางสาวดวงฤทัย	ชายสวัสดิ์	กรรมการและเลขานุการ

ทั้งนี้ ขอให้ผู้ที่ได้รับมอบหมายได้ปฏิบัติหน้าที่ด้วยความรับผิดชอบ เพื่อให้การดำเนินการ สำเร็จลุล่วงไปด้วยดี ขอให้ประธานแต่ละฝ่ายปรึกษาหารือและประสานการปฏิบัติงานที่ได้รับมอบหมายให้ เรียบร้อย หากมีอุปสรรคให้แจ้งคณะกรรมการอำนวยการเพื่อแก้ไขปัญหาต่อไป

สั่ง ณ วันที่ ๑๖ มีนาคม พ.ศ. ๒๕๖๔

(ผู้ช่วยศาสตราจารย์ ดร.จักรพันธ์ พิชญพิพัฒน์กุล)

คณบดีคณะเกษตรศาสตร์

มหาวิทยาลัยนราธิวาสราชนครินทร์



คำสั่งคณะกรรมการศาสตร์  
มหาวิทยาลัยราชภัฏสุรินทร์  
ที่ ๑๑๒ /๒๕๖๔

เรื่อง แต่งตั้งคณะกรรมการการประชุมวิชาการนำเสนอผลงานวิจัยระดับนานาชาติด้านการเกษตร  
และวิทยาศาสตร์ชีวภาพ ระดับปริญญาตรี ครั้งที่ ๑ (รูปแบบออนไลน์) เพิ่มเติม

ด้วยคณะกรรมการศาสตร์ มหาวิทยาลัยราชภัฏสุรินทร์ ได้ดำเนินการจัดการประชุม  
วิชาการนำเสนอผลงานวิจัยระดับนานาชาติด้านการเกษตร และวิทยาศาสตร์ชีวภาพ ระดับปริญญาตรี ครั้งที่ ๑  
(รูปแบบออนไลน์) เพื่อดำเนินการ และเตรียมความพร้อมในการจัดประชุมวิชาการ ทั้งนี้อาศัยอำนาจตาม  
คำสั่ง มหาวิทยาลัยราชภัฏสุรินทร์ ที่ ๒๑๔๐/๒๕๕๘ ลงวันที่ ๒๗ ตุลาคม ๒๕๕๘ เรื่อง มอบหมาย  
หน้าที่และความรับผิดชอบในการปฏิบัติราชการให้คณบดี/ผู้อำนวยการ/ผู้อำนวยการสถาบัน สังกัด  
มหาวิทยาลัยราชภัฏสุรินทร์ ปฏิบัติราชการแทนอธิการบดีมหาวิทยาลัยราชภัฏสุรินทร์ จึงขอ  
แต่งตั้งคณะกรรมการฝ่ายจัดทำรูปเล่ม ดังนี้

๑๑. คณะกรรมการฝ่ายจัดทำรูปเล่ม มีหน้าที่ ออกแบบหน้าปก รวบรวมบทคัดย่อ (Abstract)  
และบทความวิจัยฉบับเต็ม (Full Paper) พร้อมทั้งจัดทำรูปเล่มตามแบบฟอร์มที่กำหนดให้เรียบร้อยสมบูรณ์  
และประสานงานกับฝ่ายที่เกี่ยวข้องให้เป็นไปด้วยความเรียบร้อย ประกอบด้วย

๑๑.๑ อาจารย์จักรพงษ์	จิระแพทย์	ประธานกรรมการ
๑๑.๒ อาจารย์นุรชานีชา	เจดาโอ๊ะ	กรรมการ
๑๑.๓ อาจารย์ดาวพิก	หะยีหมัด	กรรมการ
๑๑.๔ นายมุฮัมมัดอารีเฟีย	มัยเซ่ง	กรรมการ
๑๑.๕ นางจินตนา	ทองน้อย	กรรมการ
๑๑.๖ นางสาวสุรตนา	เทพแข	กรรมการ
๑๑.๗ นางสาวธีรกานต์	ผิวแก้ว	กรรมการ และเลขานุการ

ทั้งนี้ ขอให้ผู้ที่ได้รับมอบหมายได้ปฏิบัติหน้าที่ด้วยความรับผิดชอบ เพื่อให้การดำเนินการสำเร็จ  
ลุล่วงไปด้วยดี ขอให้ประธานแต่ละฝ่ายปรึกษาหารือและประสานการปฏิบัติงานที่ได้รับมอบหมายให้เรียบร้อย  
หากมีอุปสรรคให้แจ้งคณะกรรมการอำนวยการเพื่อแก้ไขปัญหาดังกล่าวต่อไป

สั่ง ณ วันที่ ๒๘ เมษายน พ.ศ. ๒๕๖๔

(ผู้ช่วยศาสตราจารย์ ดร.จักรพันธ์ พิชญพิพัฒน์กุล)  
คณบดีคณะกรรมการศาสตร์  
มหาวิทยาลัยราชภัฏสุรินทร์

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