Certificate
of Recognition

No. 16283/UN22/PM.03/2019

Awarded to

Eni Setyowati

as

Oral Presenter

During the KOBI 2nd International Conference 2019
"MANAGEMENT OF TROPICAL BIODIVERSITY FOR HUMAN WELFARE: FROM ECOSYSTEM TO MOLECULAR"

September 6-8, 2019
Conference Building, Universitas Tanjungpura Pontianak
Indonesia

Rector of Universitas Tanjungpura

Prof. Dr. Garuda Wiko, S. H., M. Si
NIP. 19650128 199002 1 001

Chairman of Indonesia Biology Consortium (KOBI)

Prof. Dr. Budi Setiadi Daryono, M.Arg.Sc
NIP. 19700326 199512 1 001

Abstracts book

KOBI_ICON 2019

Management of Tropical Biodiversity for Human Welfare: from ecosystem to molecular

Pontianak,
September 6-8, 2019

KOBI_ICON2019

A COLLABORATION OF:

SUPPORTED BY:

PREFACE

On behalf of the Organizing Committee of the 2nd KOBI International Conference, it's a great honor for me to extend to you all a very warm welcome. This conference will cover a wide range of interesting topics related to biodiversity and basic research to support human welfare with three main different activities, which are the seminars, special training and workshop.

I am very pleased to inform you that 70 participants are joining the conference. They include participants representing universities, non-government organizations, private and government agencies from Indonesia and other countries.

I would like to take this opportunity to express our gratitude to all honorable keynote speakers Prof. Jatna Supriatna, Assoc. Prof. Antonia Monteiro, dan Prof. Joseph Holtum to be with us today. I would also like to give appreciation to all honorable invited speakers, scientists and experts who will address the conference and participants who will share their experience, The Ministry of Research, Technology, and Higher Education for the funding of this international conference, Conference Steering and Scientific Committee of KOBI and Untan for their support. Special thanks for all sponsors and contributors. This conference could not have been made possible without your support and great efforts. I would like to express my special thanks to all student volunteers for hard work from early to this day.

Finally, I wish you all fruitful days of interesting and beneficial discussion and a very pleasant stay in The City of Equator, Pontianak.

Thank you,

Kustiati
KOBI 2nd ICON Chairperson

ROOM DISTRIBUTION

Friday, September 6th, 2019

Room Theater 1

KEYNOTE SPEECH

08.45 – 09.45	Keynote Speech 1 (Prof. Jatna Supriatna, PhD)
09.45 – 10.30	Keynote Speech 2 (Antonia Monteiro, PhD)
10.30 – 11.20	Keynote Speech 3 (Prof. Joseph A. M. Holtum, PhD)

Conference Room 1

INVITED SPEECH + PARTICIPANTS

13.30 – 13.50	Prof. Latiffah Zakaria The genus *Fusarium*: Species concept and phylogeny
13.50 – 15.15	Presenting Participants
15.15 - 15.30	Coffee Break
15.30 - 17.00	Presenting Participants

Conference Room 2

INVITED SPEECH + PARTICIPANTS

13.30 – 13.50	Prof. Yohanes Purwanto, DEA. Applying Ethnobiology in Sustainable Management and Utilization of Biological Resources in Indonesia
13.50 – 14.10	Agung Nugroho, S.Si., M.A. Biodiversity Conservation of Bukit Baka Bukit Raya National Park: Strengthening the Scientific-Based Management System
14.10 – 15.15	Presenting Participants
15.15 - 15.30	Coffee Break
15.30 - 17.00	Presenting Participants

Conference Room 3

INVITED SPEECH + PARTICIPANTS

13.30 – 13.50	Dr. Junardi, M.Si. The Giant Nypa Palm Worm *Namalycastis rhodochorde* (Polychaeta: Nereididae) in West Kalimantan: Reproduction and Aquaculture Studies
13.50 – 14.10	Sadtata Noor Adirahmanta, S.Hut., M.T. Management Strategies of Conservation Region in Keeping the Biodiversity and Genetic Resources in West Kalimantan
14.10 – 15.15	Presenting Participants
15.15 - 15.30	Coffee Break
15.30 - 17.00	Presenting Participants

Conference Room 4

INVITED SPEECH + PARTICIPANTS

13.30 – 13.50	Tori Dawn Bakley Feeding and Behavior of Mother-offspring Pairs of Bornean Orangutans
13.50 – 14.10	Natalie Robinson Intestinal Parasite Infection among Bornean Orangutans (*Pongo pygmaeus wurmbii*) in Gunung Palung National Park
14.10 – 15.15	Presenting Participants
15.15 - 15.30	Coffee Break
15.30 - 17.00	Presenting Participants

Conference Room 1

Submission #	Author(s)	Title
1	Lara Klarisya and Entin Daningsih	Differences of Transpiration Rate amongst Six Dicotyledons Plant
5	Dwiria Wahyuni, Martial Balland, Irène Wang and Antoine Delon	Quantitative Microscopy for Biological Systems
8	Ruqiah Ganda Putri Panjaitan, Titin and Yohanes Gatot Sutapa Yuliana	The Feasibility of Text Book in Learning the Structure and Function of Cells in The Reproductive System
9	Medania Purwaningrum, Aris Haryanto, Irhamna Putri, Berta Alviyanto and Herjuno Ari Nugroho	Rapid Molecular Bird Sexing at Gembira Loka Zoo and Wildlife Rescue Center Yogya
14	Krisna Noli Andrian and Aris Haryanto	Expression of Recombinant Fusion Protein of NDV from Escherichia coli BL-21 Clone C-1b by using AccurapidTM Cell-Free Protein Expression System
16	Nur Nadhirah Izzaty Selamat, Mohamad Fizl Sidq Ramji, Mohd Azlan Jayasilan and Mukhlis Muaaz	Lek-site Selection of the Great Argus Pheasant (Aves Galliformes) in Totally Protected Forests of Western Sarawak
17	Anisa Fajar Kumala Wardani and Eni Setyowati	The Morphological Character of Cacao (Theobroma cacao L.) Lindak F1 Hybrids in Educational Tourism of Kampung Coklat
24	Aswandi and Annawaty	Diversity of Freshwater Shrimps (Palaemonidae and Atyidae) along Talau–Maraja River, Toli Toli, Sulawesi
31	Song Ai Nio, Ratna Siahaan, and Daniel Peter Mantilen Ludong	Leaf chlorophyll concentration in rice (*Oryza sativa* L.) cultivated in North Sulawesi under partial-submergence at the vegetative phase
33	Nawawi, Mustika Sari, and Henny Sulistiany	Design and Development of Interactive Multimedia Invertebrate Learning for Biology Teacher Candidates
35	Muhammad Akhsan Akib, Andi Nuddin, Retno	Exploration of Endomicorrhizal Fungus in Areas Contaminated with Heavy Metal

	Prayudyaningsih, and Syatrawati	
42	Siti Ardiyanti, Mahwar Qurbaniah, and Nuri Dewi Mudayanti	Joyful Learning Model: Improving Higher Order Thinking Skill and Students' Learning Motivation in Senior High School
47	Ira Erdiandini, Leo Monti and Fathin Hamida	Effectiveness of Growth Media *Metharizium anisopliae* as a Bioinsecticide against *Oryctes rhinoceros* larvae
51	Siti Sunariyati and Andi Riang Purnama	Ethnobotany of Plants Utilization by Dayak Ngaju Tribes in the Gold Mining Region of Sei Riang Village
52	Isma Kurniatanty and Esti Wahyu Widowati	Enzymatic Activity of Protease Producing Bacteria from Tofu Waste
56	Safrida, Cut Nurmaliah and Depita Karidiati	Potential of Medicinal Plants from Combination Ginger, Tamarind and Honey to Manage of Dysmenorrheal Pain Intensity at Adolescent Women in Aceh Besar
69	Adityo Raynaldo, Erizal Mukhtar, and Wilson Novarino	Mapping Mangrove Vegetation and Change Using Landsat Satellite Imagery in Mandeh Bay, West Sumatra
72	Dingse Pandiangan, Wenny Tilaar and Nelson Naingolan	The Harvest Time, Optimal Growth and Catharanthine Content of *Catharanthus roseus* Cell Aggregates Treated with Tryptophan in Erlenmeyer Flash

Conference Room 2

Submission #	Author(s)	Title
2	Sunarseh dan Entin Daningsih	Analysis of Stomatal Number and Size in Six Species of Monocotiledons Plants
10	Ruhyat Partasasmita, Nadya Timuriacahyani and Johan Iskandar	Local Knowledge of The Community in Cintaratu Village, Pangandaran Indonesia Regarding Traditional Landscapes for Sustainable Land Management

57	Yunita Magrima Anzani, Majariana Krisanti and Yusli Wardiatno	Habitat Assessment of Cisadane's River Headwater Inside and Outside Mount Halimun Salak National Park Area, West Java-Indonesia
59	Dwi Putri, Violita Violita and Iffa Haq	Stability of Andalas Endophytic Bacteria (*Morus macroura* Miq.) In producing Antimicrobial Active Compounds
60	Priyanti, Ardian Khairiah, Muhamad Hilal, Ade Maulana Putra, Nur Arifin Andryansyah, Ameylinda Dwi Fransiska, Roscha Amellia, Maulana Malik Assyaidin, and Rachma Fauziah	The Cotton Fabric Coloring with *Leucaena leucocephala* Peel at Room Temperature
66	Titta Novianti, Febriana Dwi Wahyuni, It Jamilah and Syafruddin Ilyas	The Comparison of tissue regeneration ability in mice (Mus musculus) limbs and house gecko (Hemidactylus platyurus) tails
70	Rizalinda, Rafdina, and Sukal Minsas	Decomposition Rate and Dynamics of Litterfall in The Mangrove Forest of Mempawah District West Kalimantan

Conference Room 3

Submission #	Author(s)	Title
3	Dia Widi Hastika and Entin Daningsih	Stomatal Number and Size of Dicotyledons Plants
11	Ruhyat Partasasmita, Fezih Fathimah Nisyapuri and Johan Iskandar	Diversity of Home-garden Plants: A Case Study of the Jatigede Dam Affected Community in Sukamenak Village and Mekarasih Village, Sumedang Regency, West Java
13	Ikka Lisnawati, Shanti Listyawati and Tetri Widiyani	The Effect of *Centella asiatica* Extract on Spatial Memory and Malondialdehyde Levels of Rats Exposed to Cigarette Smoke
19	Dwi Imam Prayitno	Bio-pigment Elucidation and Molecular Identification based on 16S rDNA for Bacterium Associated with *Anemon* sp.

63	Nani Radiastuti, Wiwid Wildatus Sholihah and Siti Nurbayti	Production of Cinchona Alkaloid from Endophytic Fungus (*Colletotricum* spp.) oF Cinchona Plant (*Cinchona calisaya* Wedd.)
71	Ning Setiati, Ely Rudiyatmi and Krispinus Kedatipukan	Community Assistance of Indigofera Cultivation as Natural Batik Dyes in Kampung Alam Malon Gunungpati, Semarang City

Conference Room 4

Submission #	Author(s)	Title
4	Heni Arista, Syamswisna and Titin	Importance Value Index of *Nepethes* sp. in the Protected Forest in Sadaniang Subdistrict of Mempawah Regency
15	Shafira Inggrid El Islami, Medania Purwaningrum and Aris Haryanto	Rapid Sex Determination of Masked Lovebird (*Agapornis personata*) by Polymerase Chain Reaction Method
20	Ari Hepi Yanti, Tri Rima Setyawati and Rikhsan Kurniatuhadi	Isolation and Characterization Gut Lactid Acid Bacteria from Digestive Tract of *Namalycastis rhodochorde* from West Kalimantan
27	Adi Pasah Kahar, Hanum Mukti Rahayu and Endah Angestyaningrum	Analysis of Local Potential of Plants in Taman Digulis Kota Pontianak as Biology Learning Resources
30	Ratna Siahaan, Nio Song Air and Susan Marlein Mambu	Ecological Functions of *Ficus* in Riparian Zone of Upper Ranoyapo River, South Minahasa, North Sulawesi - Indonesia
32	Nora Idiawati, Mega Sari Juane Sofiana, and Rika Antonia	Screening for Antibacterial Activity of Associated Bacteria of Seagrass *Thalassia hemprichii* from Kabung Island Waters
38	Arif Didik Kurniawan, Ari Sunandar, and Ida Kurniawati	Teaching Natural Sciences using Local Natural Resources through Lesson Study-Based Scientific Approach to Enhance Students Learning Interest and Outcomes
39	Ning Setiati, Partaya and Endah Peniati	Phylogenetic Analysis and Conservation Status on Traded Stingray in Fish Auction in Semarang based on Mitochondrial COI Gene

KEYNOTE SPEAKERS

Prof. Jatna Supriatna, PhD

Faculty of Mathematics and Natural Science, University of Indonesia
Chairman of Research Center for Climate Change
UN Sustainable Development Solutions Network, Indonesia

Sustainable Landscape and Biodiversity Conservation in the era of SDGs and Paris Agreement

The Sustainable Development Goals (SDGs) started in 2016 and the Paris Agreement on Climate Change in 2015 both call for deep transformations in every country that require complementary actions by governments, civil society, science, and business. While significant progress is being made on some goals, no country is currently on track towards achieving all SDGs including Indonesia. The SDGs have become the world's shared framework for sustainable development, but countries need more clarity on how to operationalize and track progress towards the 17 goals. Similarly, businesses, science, and civil society must support SDG achievement. Many scientists urge transformations that may provide an integrated and holistic framework for action that reduces the complexity, yet encompasses the 17 SDGs, their 169 Targets and the Paris Agreement. Both world policy agreements should provide a new approach to shift from incremental to transformational change; to identify synergies using sustainable development pathways; formulate actionable roadmaps; and a focus on inter-relationships to uncover multiple benefits and synergies.

Success of the SDGs and Paris agreement implementation can be shown in the transformation of landscape or seascape from work plan into implementation. An example of how do we harmonize multisector needs in the landscape can be traced in the goals and indicators of SDG 13, 14 and 15 and other SDGs related to the achievement of food security, improved nutrition, supply of water, good quality of air, renewable energy, health and medicine, agriculture products plus ecosystem integrity. Landscape approach is in the search for solutions to reconcile conservation and development trade-offs. It can provide tools for managing land to achieve social, economic, and environmental objectives in areas where agriculture, mining, and other productive land uses compete with environmental and biodiversity goals. I will discuss the landscape of forest related to the currently planned and ongoing expansion roads and rail lines in Kalimantan that may have severe deleterious impacts on native forests in the region. These expansions may also promote and shape future investments, particularly for logging, mining, and oil palm development, but at the same time will have major impacts on existing forests and wildlife, and carry serious and poorly recognized economic, financial, social, and political risks.

Prof. Joseph M A Holtum, PhD

College of Science and Engineering
James Cook University

Succulents and CAM across Australia: A Detective Tale of Systematics, Ecophysiology, Biogeography and Evolution

The seminar will broadly address the question as to why, in the predominately arid continent of Australia, terrestrial succulent plants are not prominent in the landscape. Why does the most water-use efficient form of photosynthesis, Crassulacean acid metabolism (CAM), also appear under-represented in this water-limited continent?

While large succulents are essentially absent from Australia, the continent supports a widespread hidden flora of small terrestrial succulents, many of which exhibit low-level CAM only when subjected to water-stress. A similar facultative expression of CAM was observed in the Atacama Desert (Chile). Using the Australian *Calandrinia* (Montiaceae) as a model, we detect diversification during the middle Miocene drying (15 My) but low rates of speciation (or higher extinction rates) coincident with the establishment of severe aridity during the later Miocene to Pleistocene. We propose that the presence of low-level CAM in ancestral *Calandrinia* promoted radiation and dispersal across Australia as the continent dried. Rather than developing into large thick-stemmed perennials capable of surviving extensive dry periods the plants remained small and annual, becoming specialists suited to exploiting short-term water availability in low-nutrient environments. As a result, low-level and facultative CAM are the norm in *Calandrinia*. Strong CAM is unknown.

The study is also uncovering multiple species that simultaneously exhibit C_4 and CAM photosynthesis in the same plant.

Assoc. Prof. Antónia Monteiro, PhD

Department of Biological Sciences
National University of Singapore

The molecular and developmental evolution of a novel complex trait: butterfly eyespots

An important and still largely unanswered question in the field of evolution concerns the molecular changes that lead to the origin of novel complex traits. One such trait is the eyespot pattern on the wings of nymphalid butterflies. My lab is combining a series of approaches to identify the molecular and developmental changes underlying eyespot origins. A multi-species comparative phylogenetic approach led to the identification of the ancestral lineage where eyespots likely evolved. A CRISPR/Cas9 gene editing approach showed that several of these genes are required for eyespot development and when mutated lead to wings without eyespots. In addition, in situ hybridizations and modeling work led to identification of two potential ligands involved in eyespot center differentiation via simple reaction-diffusion mechanisms, which were further tested against CRISPR mutant backgrounds. FAIRE-Seq further identified regulatory sequences flanking one of the genes, Distal-less, which is potentially involved in this reaction-diffusion network. When these regulatory sequences were deleted, they led to eyespot deletions as well as deletions of legs and wings, indicating regulatory sequences with pleiotropic functions. So far, our work suggests that eyespot color patterns originated via the recruitment of the preexistent appendage gene regulatory network to very specific locations on the wings of nymphalid butterflies.

INVITED SPEAKERS

Prof. Latiffah Zakaria

Pusat Pengajian Sains Kajihayat
Universiti Sains Malaysia

The Genus *Fusarium*: Species concept and phylogeny

There species concepts, morphological, biological and phylogenetic are employed for identification and characterization of species in the genus *Fusarium*. Morphological species concept is based on the similarity of microscopic and macroscopic characteristics which include size and shapes of macroconidia, phialide formation and colony appearance. Biological species concepts or cross-fertility test is based on successful crosses between members of the same species and the progeny formed are viable and fertile. Most cross-fertility test for identification are conducted with members of the *Fusarium fujikuroi* species complex. Phylogenetic analysis is based on sequencing of at least two genes to increase the accuracy of species identification. Three genes, translation elongation factor-1α, β-tubulin and RNA polymerase I and/or II are commonly used for phylogenetic analysis of *Fusarium* species. Accurate species identification of *Fusarium* is important for communication and sharing information in scientific community, to strategize suitable plant disease management and for establishment of appropriate quarantine regulations and practices.

Prof. Dr. Ir. Yohanes Purwanto, DEA.

Research Center for Biology, The Indonesian Institute of Sciences (LIPI)
The Indonesian MAB-UNESCO Program National Committee, LIPI

Applying Ethnobiology in Sustainable Management and Utilization of Biological Resources in Indonesia

In recent decades ethnobiology has become extremely broad and its studentship diverse. The application of ethnobiological data has expanded considerably and ethnobiological research has been applied to the practical areas such as bio-resources management, landscape management, bio-resources conservation, biodiversity prospecting, etc. In this presentation explain the main areas of modern ethnobiological research that constitutes a diverse field of study, which examines all aspects of the reciprocal relationship between human and biological resources diversity and their ecosystem. Specifically, ethnobiology includes any such studies, which relate to bio-resources, including how they are classified and named, how they are used and managed, and how their exploitation has influenced their evolution. The main area of modern ethnobiological investigation consist of: (1) *Ethnoecology*: we would like to discuss the local knowledge of natural ecosystem and environment impact of local bio-resources management; (2) *Ethnobotany*: we explain the dynamic relationship between plants and people, and investigate the strategies employed by communities, past and present, to manage plant species, and whether these actions are environmentally sustainable; (3) *Traditional Production Activities System*: in this field, we would like to explain local knowledge of traditional production activities system: agriculture (farming, fishery, animal husbandry, forestry, local technology and innovation of biological resources management and nature and environmental impact of bio-resources management; (4) *Cognitive ethnobiology*: we would like to discuss local perception of the natural world through the analysis of symbolism in ritual and myth) and their ecological consequences; organization of knowledge system through ethno-taxonomic study, etc.; (5) *Material culture*: we explain local knowledge and use of biodiversity and bio-resources products in art and technology; (6) *Traditional bio-phytochemistry*: we would like to discuss local knowledge and use of bio-resources for bio-chemicals, for example in pest control, poison, pungent, coloring and traditional medicine; (7) *Economic plants* are defined as those plants utilized either directly or indirectly for the benefit of Man; and (8) *Palaeoethnobiology*: this part explains the past interaction of human populations and bio-resources based on the interpretation of archaeobiological remains. We would discuss the ethnobiological data would play an increasingly important role in conservation and sustainable use of bio-recourses.

Dr. Junardi

Department of Biology
Universitas Tanjungpura, Pontianak
Indonesia

The Giant Nypa Palm Worm *Namalycastis rhodochorde* (Polychaeta: Nereididae) in West Kalimantan: Reproduction and Aquaculture Studies

West Kalimantan exhibits many reproductive events of Nereidid worms in the estuary ecosystem. The Estuaries of Peniti and Karimunting become Nereidid mass-spawning sites every year. Other estuaries, such as in Kapuas River, is also one of the habitats of Nereidid worm commonly known as the giant Nypa palm worm, *Namalycastis rhodochorde*. The giant Nypa palm worm has a magnificent length in body size and popular use for fishing bait. Unfortunately, the high demand for this worm has caused its habitat destruction and population decrease in nature so that cultivation efforts are crucial to do. Basic data including habitat characteristics, reproduction strategy, feeding behavior, growth and development, as well as larval rearing to enhance cultivation efforts, have been obtained. Further studies on harvesting techniques, specific-pathogen-free (SPF) products, and also sustainable products need to be carried out at the industrial-aquaculture level.

Tori Dawn Bakley

Research Assistant
Gunung Palung Orangutan Conservation Program (GPOCP)
West Kalimantan, Borneo, Indonesia

Feeding and Behavior of Mother-offspring Pairs of Bornean Orangutans

Orangutans are unique for their solitary lifestyle, habitat type, slow growth, and long inter-birth interval. All of these factors intertwine when we attempt to understand any aspect of their biology. This research begins with the acknowledgment of the impact of these traits on their overall life history, and leads into a focused study on the feeding behaviors and abilities of mother orangutans and their offspring. By understanding and controlling for the unpredictable food availability within their habitat, we identify correlations between the digestion abilities of these mother-offspring pairs and how consumption may vary during times of various food availability. This research also presents a case study on one of the most well-studied orangutans in our project to explore how her feeding behavior is impacted by her maternal status.

Natalie Robinson

Research Assistant
Gunung Palung Orangutan Conservation Program (GPOCP)
Cabang Panti Research Station, West Kalimantan, Borneo, Indonesia

Intestinal Parasite Infection among Bornean Orangutans (*Pongo pygmaeus wurmbii*) in Gunung Palung National Park

As wild orangutan populations become increasingly endangered, knowledge of their physiological and disease status provides critical information on how human disturbances, such as habitat loss, affect their health and long-term viability. An important tool in the assessment and monitoring of orangutan health is the detection of parasites in feces, as parasites can impact a wide range of biological functions. Intestinal parasites place stress on the host system, affecting nutrition, energy expenditure, travel, feeding patterns, immune function, and reproductive success. Thus, the analysis of non-invasively collected fecal samples provides a useful proxy for population health. Forty-nine samples from 14 unique individuals were analyzed using both direct smear and single centrifuge flotation techniques. Samples were examined under a microscope and parasites were identified using movement type and morphological characteristics. A 100 percent overall parasite prevalence was found. Species of *Balantidium*, *Entamoeba*, *Enterobius*, *Trichuris*, *Ascaris* and Strongyle-type parasites were found. Larvae were also observed in all samples. An independent samples Mann-Whitney U test found that the distribution of *Balantidium sp.* and *Trichuris sp.* was not even, and the prevalence among females was significantly higher. These results were unexpected, as they differ from the findings of prior parasitology studies, which found no difference in parasite prevalence between the sexes. This further emphasizes the need for continuing research as part of a longitudinal study.

PRESENTING PARTICIPANTS

Submission #17

THE MORPHOLOGICAL CHARACTER OF CACAO (*Theobroma cacao* L.) LINDAK F1 HYBRIDS IN EDUCATIONAL TOURISM OF KAMPUNG COKLAT

Anisa Fajar Kumala Wardani[1] and Eni Setyowati[1*]

Study Program of Biology Education, Institut Agama Islam Negeri Tulungagung
Jl. Mayor Sujadi Timur 46, Tulungagung, Jawa Timur, Indonesia 66221
*E-mail: enisetyowati@iain-tulungagung.ac.id

Abstract. This research aimed to describe the characteristics of cacao plant Lindak F1 hybrid in Educational Tourism of Kampung Coklat, Blitar, Indonesia. This was qualitative research with the method of observation and documentation. The results showed that the rooting system of cacao Lindak F1 hybrid plant had radix primaria rooting system and the stem had a sympodial branching type with two forms of vegetative bud, namely orthotropic buds or chupon and plagiotropic buds or fan. The stems grown from water would form jorket. The forms of cocoa leaves were round-elongated and the base of the leaf was pointed and rounded, meanwhile, the tip of the leaf was pointed and tapered. Young leaves had three different colour variations including brownish-yellow, brown and red. At the tip and base of the stem, there were two joints. The cacao flower had the formula of K5C5A5 + 5G (5). The form of cacao fruit was pushes and the surface of the fruit had 10 grooves consisting of 5 shallow grooves and 5 deep grooves. The young fruits were green and red, while the ripe fruit was yellow. The number of seeds reached 30-50 seeds in which purple seed chips as a characteristic of Lindak cacao.

Keywords: cacao, educational tourism, morphological characters

Department of Biology
Faculty of Mathematics and Natural Science
Universitas Tanjungpura
Jl. Prof. Dr. H. Hadari Nawawi, Pontianak, Kalimantan Barat
Indonesia 78124