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PROCEEDING



THE THIRD INTERNATIONAL SEMINAR ON ANIMAL INDUSTRY

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"Sustainable Animal Production For Better Human Welfare and Environment"

September, 17-18 2015

IPB International Convention Center

Bogor-Indonesia



Organized by:



Sponsored by:



**FACULTY OF ANIMAL SCIENCE
BOGOR AGRICULTURAL UNIVERSITY
2015**

Bogor Agricultural University

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FOREWORD FROM CHAIRPERSON OF ORGANIZING COMMITTEE

Good morning,

Selamat pagi, salam sejahtera bagi kita semua

Rector of Bogor Agricultural University, Prof. Dr. Ir. Herry Suhardiyanto, M.Sc.

Director General of Livestock and Animal Health, Ministry of Agriculture, Republic of Indonesia, Prof. Dr. Ir. Muladno, MSA.

Dean of Faculty of Animal Science, Bogor Agricultural University, Prof. Dr. Ir. Luki Abdullah, M.Sc.Agr.

All participants of the International Seminar on Animal Industry 2015

Distinguished guests, ladies and gentlemen.

It is my great pleasure to welcome you all, our distinguished guests, speakers and participants, to the Third International Seminar on Animal Industry (ISAI 3rd, 2015) held at the IPB International Convention Center Bogor Indonesia. This seminar with the theme “**Sustainable Animal Production for Better Human Welfare and Environment**” is organized by Faculty of Animal Science, Bogor Agricultural University in collaboration with Association of Indonesia Animal Scientist (HILPI).

Following the recommendations from ISAI 1 and ISAI 2, which were held in Indonesia in 2009 and 2012, the strategic issues of ISAI 3rd is emphasized on animal production systems and technology and the wise use of natural resources in relation with environmental aspects, toward a sustainable animal production. There will be 98 papers presented during the two days seminar; 9 by invited speakers, 69 for oral and 29 for poster presentations. The speakers came from different countries including Australia, Egypt, France, Korea, Germany, Netherland, Indonesia, Malaysia, Nigeria, Pakistan, Thailand and USA.

This is a great opportunity for scientist, researchers, private sectors and policy makers to discuss, share information and experiences on interesting topics in animal production in a broad sense, including good farming practices, recent technologies and save animal products. I believe, there is an open window for initiating and strengthening collaboration amongst scientist and institutions during and after the seminar.

On behalf of the Organizing Committee, I would like to express my sincere appreciation and thanks to IPB, and some units within, including Institute of Research and Community Empowerment, Faculty of Animal Science, Department of Animal Production and Technology, Department of Nutrition and Feed Technology, Diploma Program, Management and Business Program for all advice and funding support.

The success of this seminar could only be achieved with all the valuable supports and sponsorship we received from some recognized parties and institutions in this country. In this regards, I would like to address my grateful thanks to Directorate General of Livestock and Animal Health, Ministry of Agriculture Republic of Indonesia for participation and funding support, Infovet and Trobos, Green TV as promotion agency. To: PT. Sierad Produce, Tbk, PT. Kaltim Prima Coal, Tbk, PT. BRIngin Life, PT. Adaro Indonesia, Tbk, PT. Trouw Nutrition Indonesia, PT. Nutricell Pasific, PT. Sweni Transfer Indonesia, PT. Charoen Phokphand Indonesia, Tbk, PT. Wide & Pin, PT. Pupuk Kujang, Tbk, and PT. ANTAM, Tbk, thank you so much with big appreciation, for having being part of this important event and such enormous contributions.

My recognition and gratitude are also forwarded to the Steering Committee for advice and assistance, to international and national reviewers and the Scientific Committee for hard working and such great support. Last but not least, to all my dear colleagues of the Organizing Committee members, who have been working smartly and full of dedication and passion, to make this seminar a great successful event.



To all participants, hopefully, the two days seminar may bring fresh ideas, and enhancing collaborations for future success toward sustainable animal production and industry. Big appologies for any inconvienences during the seminar, wish you all having friutfull discussions and good times.

During your short stay, please enjoy the surrounding of Bogor city, the Museum of Presidential Palace and Historical Botanical Garden of Bogor.

Bogor, September 17th, 2015

17th - 18th September 2015,

Chairperson of Organizing Committee

Susan M. Fua

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REMARKS FROM DEAN OF ANIMAL SCIENCE FACULTY

Prof. Dr. Muladno, MSA
Director General of Livestock and Animal Health-Ministry of Agriculture Republic of Indonesia,

Prof. Dr. Ir. Herry Suhardiyanto, M.Sc.
Rector of IPB

Dr. Ir. Asnath Maria Fuah
Chairperson, The 3rd International Seminar on Animal Industry

Our Colleagues from Indonesian universities and research institutes,
Distinguished foreign participants and speakers,

Representative of livestock services officers of local government from all over Indonesia,

Distinguished guests, ladies and gentlemen.

Assalamu'alaikum warahmatullaahi wabarakatuh,

I am pleased to welcome you all to Bogor city for attending "The 3rd International Seminar on Animal Industry 2015" held at Faculty of Animal Science, Bogor Agricultural University (IPB). As the Dean of Faculty, I am also really honored to host this conference.

First, let me introduce briefly about Bogor city. Bogor is one of the major scientific and educational centers in Indonesia. A significant part of academic and research base was laid in the period of Dutch colonization. In particular, since the beginning of the 19th century there were established laboratories and professional schools focused primarily on improving the efficiency of the colonial agriculture. Similar to the prevailing profile of research and academic activity was retained in Bogor after gaining independence. As in the second half of 20th century, and in the 2000s strongest areas were Agricultural sciences, Biology, Animal and Veterinary Sciences. The main educational and scientific center with the utmost national importance is the Bogor Agricultural University (IPB). It is therefore the city regularly hosted various international events, such as international seminars and conferences.

I would like to express my gratitude to IPB for supporting us to hold this conference, and also to the organizing committee of the present conference for their hard work and persistence. I convey my sincere gratitude to all the parties which is supporting this event, such as Directorate General of Livestock and Animal Health-Ministry of Agriculture Republic of Indonesia, Infovet Trobos, Agrina, Green TV as promotion agency and Sierad Produce, Kaltim Prima Coal, BRIngin Life, Adaro Indonesia, Trouw Nutrition Indonesia, Nutricell Pasific, Sweni Transfer Indonesia, Charoen Phokphand, Wide & Pin, Pupuk Kujang, and ANTIAM thank you so much with big appreciation, for having being part of this important event and such enormous contributions. I am very pleased to see here the delegates from various foreign countries as well as representatives from many domestic institutions.

I hope you find this conference and the city, both interesting and stimulating and that you enjoy meeting up with your professional colleagues as well as having pleasure time during your stay in Bogor.

Thank you very much and
Wassalamu'alaikum warahmatullaahi wabarakaatuhu.

Bogor, September 17, 2015
Prof. Dr. Ir. Luki Abdullah, MSc.Agr
DEAN



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SEMINAR PROGRAM

Conference Program Thursday, September 17, 2015

Time Slot	Venue : IICC Ballroom	
	Event	Speaker
08.00-09.00	Registration	Committee
09.00-09.05	Opening Ceremony	Master of Ceremony
09.05-09.15	Report from Organizing Committee	Dr. Ir. Asnath M.Fuah, MS
09.15-09.25	Welcome Address from Dean Faculty of Animal Science	Prof. Dr. Ir. Luki Abdullah, M.Sc.Agr.
09.25-09.35	Welcome Address from Rector of Bogor Agricultural University	Prof. Dr. Ir. Herry Suhardiyanto, M.Sc
09.35-10.00	Opening and Keynote Speech by Ministry of Agriculture / Directorate General of Livestock and Health Services	Prof. Dr. Ir. Muladno, MSA
10.00-10.05	Appreciation for Keynote Speakers from Dean Faculty of Animal Science	Prof. Dr. Ir. Luki Abdullah, M.Sc.Agr.
10.05-10.20	Sponsorship Appreciation from Chairman of Organizing Committee	Dr. Ir. Asnath M.Fuah, MS.
10.20-10.25	Photo session	Photographer
10.25-10.40	Coffee break	
	Plenary Session 1 <i>Moderator: Prof. Dr. Ir. Komang G. Wiryawan</i>	
10.40-11.00	Invited speaker 1	Prof. Dr. Ir. Bas. Kemp Preserving Health, Welfare and Productivity in a Challenging Environment
11.00-11.20	Invited speaker 2	Dr. Jean Pierre Bidanel Genomic Selection for More Sustainable Livestock Production
11.20-11.40	Invited speaker 3	Ir. Yunus Triyonggo, MM Building Human Resources Competency Model in Poultry Industry
11.40-12.00	Discussion	
12.00-12.05	Invited Speaker Appreciation from Scientific Committee	Prof. Dr. Ir. Dewi Apri Astuti, MS.
12.05-12.15	Sponsorship Appreciation from Vice Dean Faculty of Animal Science	Dr. Ir. Moh. Yamin, M.Agr.Sc.
12.15-12.25	Student Plenary	
12.25-13.20	Lunch	
13.20-13.50	Poster session	

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	Room A (Theme D)	Room B (Theme B and C)
Session 1	Moderator : Dr. Rajesh Jha	Moderator : Ummi Noorhakimah
14.00-14.10 Thongsuk Jetana Rain Tree Pod in Livestock Feeds: Opportunity, Challenges and Possibility		Yeni Widiawati Fermentation Kinetics Of Palm Oil Plantation By-Product Based Diet
14.10-14.20 Supriyati Kompiang Effect of Different Protein and Energy Levels in Concentrate Diets on Performances of Anglo-Nubian Goat During Pregnancy and Lactation Periods		Ainissya Fitri Utilization Of Haylage Of Local Agro- Industry By product Pretreated With Afex Method
14.30-14.40 Rusdi Evaluation of Eleutherine (<i>Eleutherine americana</i>) as Feed Additive for Poultry		H. A. Sukria Physical Quality And Storage Time Pellet Indigofera Spleaves
14.40-14.40 Discussion		Discussion
Session 2	Moderator : Thongsuk Jetana	Moderator : Imana Martaguri
14.45-14.55 Utsav Prakash Tiwari Nutrient Profile And In Vitro Digestibility Of Fresh And Ensiled Cassava In Swine		Moh Ali Hamdan Potential Of Dwarf Elephant Grass (<i>Pennisetum Purpureum</i> Schum. Cv. Mott) In Dry Land Areas Of Bojonegoro As Forage- Based Feed Sustainability
14.55-15.05 Alif Putri Effect of Combination Silkworm Pupae Meal and Garlic Meal on Blood Profiles, Visceral Organs and Carcass Broiler		Rido Pande Pardede Development Of Indigofera Zoolingeriana And Pueraria Javanica On Dry Land Integrated With Teak Forest In Bojonegoro
15.05-15.15 Burhanudin Sundu The effect of NaOH Concentrations and Polysaccharides Extract of Palm Kernel Meal on Performance of 4 Weeks Old-Broiler Chickens		Malcky Telleng Growth and Productivity of Different Sorghum Varieties Cultivated with Indigofera in Intercropping System
15.15-15.25 Discussion		Discussion
15.25-15.40 Coffee break		
Session 3	Moderator : Anis Muktiani	Moderator : Lisa T. Praharani
15.40-15.50 Muhamad Nasir Rofiq Combination Effect of Nutritech Feed Additive Containing Saponin, Tanin and Eugenol Essential oils on In Vivo Rumen Methane Production in Dairy Cattle Using Open Circuit Respiration Chamber Technique		Imana Martaguri Carbon Storage Capacity of Forage Native Grasses Growing in Palm Plantation at Transformation Forest Ecosystem in Jambi
15.50-16.00 Dwi Yulistiani Nitrogen Utilization and Ruminant Fermentation of Five Breed of Sheep Fed Concentrate Containing Different Levels of Rumen Undegradable Protein		I Gusti Ngurah Jelantik Herbage Production and Nutritive Value of Some Forage Legumes as Calf Feed Supplement
16.00-16.10 Sutresniwati A Willingness to Pay Evaluation for Silage Implementation for Small Dairy Farmers		Riesi Sriagtula Evaluation of Growth and Production of Sorghum Lines (Sorghum Brown Midrib) at Different of Harvest Time as Feed
16.10-16.20 Discussion		Discussion
Session 4	Moderator : Rusdi	Moderator: Veronica
16.25-16.35 Anita S. Tjakradidjaja Fermentability and Digestibility of Rice Straw - Concentrate Base Ration Added with Probiotic		Nur Rochmah Kumalasari Modelling of Forage Availability Response to Landuse Exchange in Bogor



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Time	Room A (Theme D)	Room B (Theme B and C)
16.35-16.45	Gusti A. Gultom Effects of Solid or Liquid Probiotic Supplementation on Rumen Microbial Population and Enzyme Activity	Khalil The Diversity and Quality of Forages Used for Feeding of Goat in Payakumbuh of West Sumatra
16.45-16.55	Eissa M. M Effect Of Ammoniated Straw On Methane Production In An In Vitro System And On Growth Performance	P.D.M.H. Karti The Addition of Arbuscular mycorrhizal Fungi in Enhancing Productivity and Drought Tolerance Mechanisms of Indigofera zollingeriana
16.55-17.05	Discussion	Discussion

Time	Ballroom (Theme A)
Session 1	Moderator : Iis Arifiantini
14.00-14.10	Fuah A.M Beef Cattle Production, Constraints and Opportunities for Small Farmers in South Central Timor Regency West Timor
14.10-14.20	S.N. Sirajuddin The Application of Tesang Sharing System at Cattle Farms in Indonesia
14.20-14.30	Niken Ulupi Production Performance of Laying Hen in Cage System with Different Housing Temperature
14.30-14.40	Lucia Cyrilla Evaluation of Good Dairy Farming Practice Implementation in Dairy Goat Farm
14.40-14.50	Discussion
Session 2	Moderator : Prof. Cece Sumantri
14.50-15.05	Lindawati Doloksaribu Constraints to, Challenges of, and Opportunities for Rearing Goats in Bali Province. A case study: Rearing Kids in Karangasem Regency
15.05-15.15	Hearty Salatnaya Trigona Spppropolis, Pollen, And Honey Production In Two Different Agroecosystem
15.15-15.25	Prabowo, S Distribution of Thermal Body Surface Ettawah Grade in Different Tropic Microclimates
15.25-15.35	Bram Brahmantiyo Hycole and Hyla Rabbits Performance were Raised in Indonesia
15.35-15.45	Discussion
15.45-16.00	Coffee break

Welcoming dinner. Venue IICC Ballroom

Time Slot	Event
18.20-19.00	Registration and Dinner (Instrument from Gentra)
19.00-19.05	Opening by Master of Ceremony
19.05-19.15	Speech from Chairman of Committee
19.15-19.25	Speech from Dean of Animal Science Faculty
19.25-20.00	Gentra Kaheman
20.00-20.20	Prof. Singer
20.20-21.20	Spontaneity from Country Representative
21.20	Closing



Friday, September 18, 2015

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Time		Venue : IICC Ballroom	
		Event	Speaker
08.00-8.30	1. Diarahkan a. Pengutipan Hak Cipta Diilindungi Undang-Undang Hak cipta milik IPB (Institut Pertanian Bogor)	Registration	Committee
08.30-8.35		Opening Ceremony	Master of Ceremony
		Plennary Session 2 <i>Moderator: Dr. Jean Pierre Bidanel</i>	
08.45-8.55		Invited speaker 1	Prof. Wayne Pitchford Outcomes of Selection for Residual Feed Intake in Australian Beef Cattle
08.55-9.15		Invited speaker 2	Prof. Myunggi Baik Molecular Mechanisms Regulating Beef Quality in Korean Cattle
09.15-9.35		Invited speaker 3	Prof. I Wayan Teguh W. Vaccination and Subclinical Manifestasion of Avian Influenza in Indonesia
09.35-9.50		Discussion	
09.50-10.00		Appreciation to Invited Speaker	Prof. Luki Abdullah
10.00-10.10		Coffee Break	
		Plennary Session 3 <i>Moderator: Prof. Wayne Pitchford</i>	
10.10-10.30		Invited speaker 1	Dr. Kai J. Kuehlmann The Role of Feed Additive in Animal Industry under Tropical Condition
10.30-10.50		Invited speaker 2	Dr. Anjas Asmara Samsudin Recent Advances in Gut Microbiology Research in Relation to Animal Nutrition
10.50-11.10		Invited speaker 3	Prof. Bustanul Arifin Social Economic and Policy in Animal Industry
11.10-11.25		Discussion	
11.25-11.30		Appreciation for Invited Speaker	Prof. Dr. Ir. Sumiati, M.Sc.
11.30-13.20		Lunch and Prayer	
13.20-13.50		Poster session	

Time	Room A (Theme D and G)	Room B (Theme F and J)
Session 5	<i>Moderator: Sutresniwati</i>	<i>Moderator : Dr. Irma Isnafia Arif</i>
13.50-14.00	Sumiati Effect of drinking gambir extract (<i>Uncaria gambir Roxb</i>) as Antioxidant on Performance of 40-43 Weeks Old of Laying Hens	Rudi Afnan Weight Loss And Mortality Of Broiler During Transportation From Different Distances To Slaughterhouse
14.00-14.10	Muktiani, A Live Weight Gain of Beef Cattle Fed on Complete Feed Silage of Water Hyacinth Supplemented with Mineral Zinc-Protein	Suharyanto Skim Milk Powder Substitution With Soymilk Powder Could Improve Physical Properties Of Beef Surimi-Based Sausage
14.10-14.20	Putri O. N The Effect of Adding Fermented Waste Cabbage in Calf Starter Pellets on Total Lactic Acid Bacteria And <i>Escherichia coli</i>	Iwan Prihantoro The Potency of <i>Azollapinnata</i> as A High Protein Forage for High Productivity Livestock
14.20-14.30	Discussion	Discussion
Session 6	<i>Moderator : Prof. Khalil.</i>	<i>Moderator : Salina AB</i>
14.35-14.45	Ninasari Ra Substitution of Fish Meal by Cricket or Indigofera Shoot Leaf Meal on Japanese Quail (<i>Coturnix japonica</i>) Performance	Lilis Suryaningsih Effects Of Local Flour Types On Physical Properties And Acceptability Of Beef Sausage



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Time	Room A (Theme D and G)	Room B (Theme F and J)
14.45-14.55	Tresia G.E Benefit of Kemuning Leaves Meal (<i>Murraya paniculata</i> [L.] Jack) Addition in Ration Containing Date Fruit Waste to Suppress Gastrointestinal Parasites Infestation of PE Goat	Soenarno Ms Characteristic Of Lactic Acid Bacteria Isolated From Dangke From Sinjai, South Sulawesi
14.55-15.10	Sri Suharti Rumen Microbe, Protein Microbial Synthesis, Celullase Activity and Nutrient Digestibility of Bali Cattle Rumen with the Addition of Calcium Soap-Soybean Oil In vitro	M. Aman Yaman Increase on Commercial Weight, Carcass Quality and Economic Benefit of Selected Local Meat Chicken Fed on Fermented Diet Contained Digestive Enzymes and Probiotics
15.10-15.15	Discussion	Discussion
15.15-15.30	Coffee break	
Session 7	Moderator : Dr. Lindawati Doloksaribu	Moderator : Dr. Asnath Maria Fuah
15.30-15.40	G. F. Bira Incremental Level Of Chromolaena Odorata In Complete Diet Does Not Impair Intake, Rumen Fermentation And Microbial Protein Synthesis Efficiency In Cattle	Salina A.B An Analysis Of Cattle Traders Practices On Animal Traceability In Malaysia
15.40-15.50	Arini NMJ Substitution Of Fish Meal By Cricket Or Indigoferasp Shoot Leaf Meal To Evaluate Protein Balance Of Japanese Quail (Coturnix Japonica)	Hotnida C H Siregar Effect Of Moisture Reduction Method, Storage Period And Temperature On Honey Quality
15.50-16.00	Mokhamad Faesal R. Hakim Feeding Ecology of Sumatran Orangutan (Pongo abelii, Lesson 1827) in West Batang Toru Forest Block, North Sumatra	Iman Rahayu Biodiversity Based On Fatty Acid And Amino Acid Profile Of Indonesian Local Chickens
16.00-16.10	Discussion	Discussion
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15.00-15.00	Maria Haryulin Astuti Service Per Conception In Beef Cattle With Artificial Insemination In Kapuas Basarang District of Central Kalimantan
15.00-15.10	Anneke Anggraeni Association Of Growth Hormone (Gh Mspi) And Growth Hormone Releasing Hormone (Ghrh Haeiii) Genes With Milk Components Of Hf Cows Under Small Farmers In Lembang, West Java
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Development of *Indigofera zoolingeriana* and *Pueraria javanica* on Dry Land Integrated with Teak Forest in Bojonegoro

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Abstract

Forage needed by ruminant to reach optimum production of meat especially in tropical areas such as Indonesia. Therefore good quality and quantity production should be developed to supply that requirement. This study was aimed to develop *Indigofera zoolingeriana* and *Pueraria javanica* that integrated with teak forest in dry land of Bojonegoro. This study was conducted during the period of September 2014 to April 2015. This study consist of two phase. The first phase conducted on green house to evaluate the adaptability of *Indigofera z.* and *Pueraria javanica* in drought stress. The result showed *Indigofera z.* and *Pueraria javanica* both adaptive in 100% field capacity (cp), 75% cp, 50% cp, 25% cp, without decreasing their dry matter (DM) productivity ($P < 0.01$). The second phase conducted on dry land bojonegoro under teak forest in opened area by using completely randomised design (2x5) first factor was location and second factor was fertilizer level (LEISA model). The result showed that first factor affected DM production ($P < 0.01$). The interaction between both factors also affected DM production ($P < 0.01$). *Indigofera z.* Showed best result of planting using (50% organic + 50 % anorganic) fertilizer on under teak forest and (75% organic + 25% anorganic) fertilizer on opened area ($P < 0.01$). *Pueraria javanica* showed best result of planting using (100% anorganic) fertilizer on under teak forest and (50% organic + 50% anorganic) fertilizer on opened area ($P < 0.01$). This study conclude that *Indigofera zoolingeriana* and *Pueraria Javanica* have a good adaptabilin in dry land areas and have capability to integrated with teak forest, it means *Indigofera zoolingeriana* as tree legume and *Pueraria javanica* as bush legume potential to developed on bojonegoro.

Keywords: drought stress, fertilizer, *Indigofera zoolingeriana*, Leguminose, *Pueraria javanica*

Introduction

Forage is a ruminant's husbandry important factor to boots Indonesia's husbandry development. Leguminose is a kind of feed crop that has better quality of protein than tropical grass, beside legume also can produce more digestible dry matter per hectare (Odihiambo and Bomke, 2001).

The limited availability of agricultural land due to the usage of land for habitation causing the importance of the dry land should be optimized as forage development area, especially for legume. Bojonegoro is one of district located in East Java Province. Bojonegoro has enough area to develop as forage centre, but it has dryland condition, high light intensity and limited water availability in dry season. Those problem should be solve by integrate legume with teak forest and determine the dose of optimal fertilizer to sustain green forage growth and produce good nutritional quality .

Indigofera zoolingeriana is a kind of tree legume which has high nutrition and high production with drought tolerant characteristic (Hassen *et al.*, 2007). In other side, *Pueraria javanica* is a kind of herbs legume which has high quality of protein and the production reach to 10 tones per hectare (Valentim & Andrade, 2005). *Pueraria javanica* has low light intensity tolerant characteristic. Because of that, both of legume, has potency to be developed on dry land by integrated system.

This study aim to learn the morphology and nutrition response of *Indigofera zoolingeriana* and *Pueraria javanica* in integrated system with teak forest on dry land in Bojonegoro and to determine the optimal fertilizer dose to get good legume quantity and quality.

Materials and Methods

This study consisted of two phases, the first phase was done in the greenhouse of Agrostology Unit in farm field laboratory, Bogor Agricultural University (IPB) on October to December 2014. The second phase was done in the Sambeng Village, District Kasiman, Bojonegoro on December 2014 to January 2015.



The first phase used sixteen seeds for each kind of legume (*Indigofera zoolingeriana* and *Pueraria javanica*) that planted in medium contained organic and inorganic fertilizers (Urea, SP36, KCL). This phase used Completed Random Design (CRD) with four treatments and four replications. Those treatments were: P1: 100% field water capacity, P2: 75 % field water capacity, P3: 50 % field water capacity, P4: 25 % field water capacity. Watering was done every six days according to the treatment dose to maintain water content on growing media. The parameters were: plant morphology such as plant height, diameter of stems and amount of leafs.

The experimental design in the second phase of this study used Completed Random Design (CRD) with five treatments and four replications. Each replication consisted of eight plants. The amount of each type of plants used 160 seeds. Those five treatments were: T1: 100% organic fertilizer, T2: 75 % organic fertilizer + 25% chemical fertilizer, T3: 50% organic fertilizer + 50 % chemical fertilizer. T4: 25 % organic fertilizer + 75% chemical fertilizer. T5: 100 % chemical fertilizer.

The parameters were: plant morphology i.e.: plant height and DM production. Nutrition Parameter plant is proximate plant using method AOAC (2005) and Van Soest (1991).

Results and Discussion

The first phase of this study showed that a response of plant on drought stress based on morphological aspects in Table 1.

Table 1 *Indigofera zoolingeriana* and *Pueraria javanica*'s response based on morphological aspect of plants

Variables measured	<i>Indigofera zoolingeriana</i>				<i>Pueraria javanica</i>			
	P1	P2	P3	P4	P1	P2	P3	P4
Plant's height (cm)	52.25±11.4a	65.42±12.8ab	75.55±12.8b	75.37±10.2b	87.67±21.6a	121.85±22.3ab	124.57±34.8ab	148.20±11.9b
Stem diameter (cm)	0.35±0.03a	0.41±0.04ab	0.52±0.07c	0.48±0.06bc	0.35±0.08	0.34±0.08	0.36±0.06	0.36±0.04
Amount of leafs	11.75±1.5a	17.25±5.1b	20.25±5.5b	18.25±1.0b	11.00±3.8a	17.75±5.5ab	22.75±1.25b	24.75±5.7b

Description: P1: the moisture content of 25% field capacity; P2: 50% field capacity; P3: 75% field capacity; P4: 100% field capacity. Figures followed by different letters in the same row showed there is a significant effect ($P < 0.05$).

Results showed that drought stress treatment has significant effect ($P < 0.05$) on *Indigofera zoolingeriana* plant's height, stem diameter and amount of leaves. The highest morphology response values of *Indigofera zoolingeriana* were showed by treatment P3 and P4, while the lowest value was showed by treatment P1. This was due too P3 and P4 were optimal conditions for plant growth while on P1 is severe drought stress conditions that can inhibit plant growth rate. Prasad *et al.* (2008) state that generally the division and growth of plant cells is strongly influenced by the presence of water both inside and outside the plant cell, because water is a medium growth and cell metabolism. The decrease percent age in plant height, stem diameter, and amount of leaves of P4 (100% field capacity) to P1 (25% field capacity) respectively were 30.8%, 32.6%, 41.9%.

Results showed that drought stress treatment has significant effect ($P < 0.05$) on *Pueraria javanica* plant height, stem diameter and amount of leaves. Plant height and amount of leaves showed that the best values was treatment P4 while the lowest value was P1. Treatment P4 was an optimal condition for plant's growth while on P1 was severe drought stress conditions that can inhibit plant growth rate. The decrease percentage of plant height and amount of leaves on treatment P4 to P1 were 40.9% and 55.5%, respectively.

Table 2 showed that response of *Indigofera zoolingeriana* in integrated with teak forest was significant ($P < 0.05$) on fertilizer treatment.

Table 2 Morphology observation result on *Indigofer zoolingeriana* in Bojonegoro

Variables measured	<i>Indigofera zoolingeriana</i>									
	N1	N2	N3	N4	N5	T1	T2	T3	T4	T5
Plant height	81.7	71.6	93.2	95.2	73.5	99.4	93.2	66.5	59.7	56.9
Biomass production (g)	74.0ab	30.0a	88.8b	24.8a	56.5ab	38.2a	50.7ab	71.5b	144.4c	44.0a

Description: N : Planting location in the shade of teak; T : Planting location without shade; 1,2,3,4,5 which follows the description of the location of planting (N or T) is a description of fertilizer treatment; Numbers followed by different letters in the same row showed there is significant effect ($P < 0.01$).



The highest DM value was showed by fertilizer treatment N3 (50% organic fertilizer + 50% anorganic) that is 88.8 gram and plant height 93.2 cm. *Indigofera zoolingeriana* that planted on opened area showed the highest response at treatment T4 (25% organic fertilizer + 75% anorganic) i.e.: DM value was 144.4 g and plant height was 59.7cm.

Table 3. Morphology observation result on *Pueraria javanica* in Bojonegoro

Variables measured	<i>Pueraria javanica</i>									
	N1	N2	N3	N4	N5	T1	T2	T3	T4	T5
Plant height	72.7	52.5	92.00	81.2	57.50	97.13	88.00	122.2	74.50	130.2
Fresh weight harvest (g)	83.2b	42.7a	100.9c	65.5ab	112.0c	187.3b	187.2b	184.8b	136.8a	128.4a

Description: N: Planting location in the shade of teak; T: Planting location without shade; 1,2,3,4,5 which follows the description of the location of planting (N or T) is a description of fertilizer treatment; Numbers followed by different letters in the same row showed there is significant effect ($P < 0.01$).

Response of *Pueraria javanica* that plant integrated with teak forest (Table 3.) showed significant effect ($P < 0.05$) on fertilizer treatment. The highest response showed in fertilizer treatment N5 (100% anorganic fertilizer) that was DM value 112.0 gram and plant height 57.50 cm. *Pueraria javanica* that planted on opened area showed the highest response in treatment T3 (50% organic fertilizer + 50% anorganic) that was DM value 184.8 gram and Plant height 122.2cm.

Table 4. Proximate and Van Soest result on plants in di Bojonegoro

Variables measured	<i>Indigofera zoolingerian</i>		<i>Pueraria Javanica</i>	
	N3	T4	N5	T3
Proximate				
Water Content (%)	90.97 ± 0.63	90.32 ± 0.43	93.17 ± 0.16	93.12 ± 0.65
CP (%)	20.08 ± 0.04	21.41 ± 0.13	9.51 ± 0.31	11.78 ± 0.33
CF (%)	17.45 ± 0.98	17.55 ± 0.73	23.94 ± 2.94	37.29 ± 0.42
Lipids (%)	1.30 ± 0.04	2.26 ± 0.07	0.61 ± 0.01	0.78 ± 0.07
Ash (%)	16.29 ± 0.95	15.00 ± 0.66	27.20 ± 3.20	11.36 ± 1.23
Van Soest				
ADF	34.20 ± 1.97	35.87 ± 1.40	57.70 ± 3.52	46.30 ± 3.27
NDF	35.86 ± 0.07	39.08 ± 1.64	55.34 ± 0.80	52.89 ± 1.84
Lignin	16.65 ± 3.62	8.81 ± 2.39	19.80 ± 1.78	26.90 ± 0.35
Selulosa	16.99 ± 3.39	27.06 ± 1.90	37.90 ± 5.28	19.41 ± 2.93

Description: Analytical result from LIPI Laboratory (2015).N: Planting location in the shade of teak; T: Planting location without shade; CP: Crude Protein; CF: Crude Fiber; 1,2,3,4,5 which follows the description of the location of planting(N or T) is a description of fertilizer treatment.

Nutrient and fiber fraction of *Indigofera zoolingeriana* and *Pueraria javanica* were showed in Table 4. Proximate and Van Soes analyses (CP, CF, Lipid and Ash) on *Indigofera zoolingeriana* and *Pueraria javanica* plants showed that has no differences between plants grown in opened area with those that integrated with teak forest.

Conclusion

Legume tree *Indigofera zoolingeriana* and legume grass *Pueraria javanica* has potential to be developed in dry land because both of them has has high adaptability to drought stress. Integration between legume with teak forest were optimal at fertilizer dose 50% organic fertilizer +50% anorganic for *Indigofera zoolingeriana* and 100% anorganic fertilizer for *Pueraria javanica*. On opened area, plant were optimal at fertilizer dose 25% organic fertilizer +75% anorganic for *Indigofera zoolingeriana* and 50% organic fertilizer +50% anorganic for *Pueraria javanica*.

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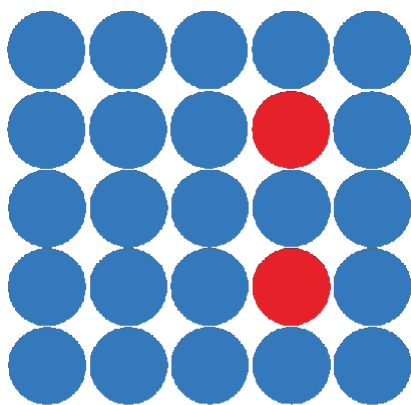


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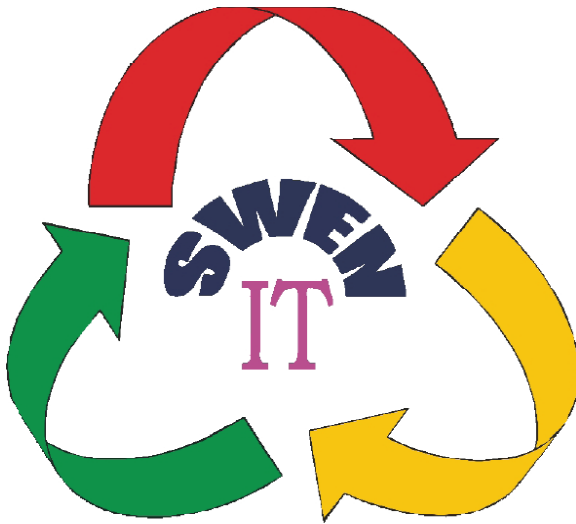
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