



CERTIFICATE OF RECOGNITION

This is to certify that

WIDI SUNARYO

participated as

Oral Presentation

at the International Conference on
Food, Agriculture and Culinary Tourism

Samarinda, Indonesia, 4-6 August 2015



Ary Yasir Pilipus
Head of Food Security Bureau
Samarinda



Anton Rahmadi
Chairman of Conference



The 1stICFACT2015 Rundown

Agenda	
Date	Time
04 Aug 2015	19.00
Dinner and guest welcoming with Rector of Mulawarman University and Major of Samarinda City	
05 Aug 2015	08.00-08.30
Registration	
05 Aug 2015	08.30-09.45
Opening ceremony	
Welcome Speech by Committee of ICFACT	
Welcome Speech by Head of Food Security Bureau Samarinda	
Welcome Speech by The Major of Samarinda	
Coffee Break	
09.45-10.00	
10.00-11.15	
PLENNARY SESSION 1	
Chair: Prof. Dr. Winiati Pudji Rahayu (IAFT)	
<ol style="list-style-type: none"> 1. Agricultural Policy and Efforts to Feed People and to Support Tourism with Quality Food (National Board of Food Security) 2. Experiences on Establishing Food Self-Sufficiency (Dr. Anton Apriyantono, Former Indonesian Minister of Agriculture): Chaiwanichsiri, Chulalongkorn University, Thailand) 3. Strategy and innovation to Increase Food Processing Quality Embracing ASEAN Economy Community (Assoc. Prof. Saiwarun Chaiwanichsiri, Chulalongkorn University, Thailand) 	
11.15-12.30	
PLENNARY SESSION 2	
Chair: Prof. Dr. Mariam AbdLatif (UMS)	
<ol style="list-style-type: none"> 4. Culinary and Halal Food Prospective to Support ASEAN's Growing Tourism and Population (Prof. AzmawaniAbdRahman, University Putra Malaysia, Malaysia) 5. Food Industrial Prospective for Regional Food and Culinary Markets (Adhi S. Lukman, Chairman of GAPMMI) 6. Lead Presentation: Prof. Dato Dr. Othman Yatim (University of Brunei Darussalam) 	
12.30-13.30	
LUNCH BREAK	
13.30-14.30	
PARALLEL SESSION 1	
SESSION A	SESSION B
Food Safety as an Important Factor to Food Security	Functional Food Development
Panel 1A	Panel 1B
Chair: Netty Maria Naibaho, S.TP. M.Sc.	Chair: Prof Dr. Azmawani AbdRahman
Paper 1: Transformability of <i>Cronobacter sakazakii</i> using Green fluorescent	Paper 1: Hypocholesterolemic effect of edamame (<i>Glycine max (l) meril</i>)
SESSION C	SESSION D
Development of New Food Product	Natural Food Production
Panel 1C	Panel 1D
Chair: Dr. Baig Rien Handayani, M.Si	Chair: Prof. Dr. Mariam AbdLatif
Paper 1: Moisture sorption isotherm (msi) of tuna (<i>Thunnus macoyii</i>) se ² i,	Paper 1: Extraction optimization and characterization of gelatin from

		Agenda			
Date	Time				
		protein is related to ampicillin resistant traits (RathDewantiHarryadi)	-based functional food products (Nurul Isnaini Fitriyana)	smoked with liquid smoke (Ayub U. I. Meko)	fish dry skin of spanish mackerel (<i>Scomberomorus commersoni</i>) (Indrati Kusumaningrum)
		Paper 2: Reducing <i>Bacillus cereus</i> in rice and cook-chill foods by microwave heating (Harsi D. Kusumaningrum)	Paper 2: Bioactivities of peptides from sunbawa horse milk hydrolyzed by bromelain (Eni Kusumaningtyas)	Paper 2: Use of crude extract water-soluble polysaccharides of durian (<i>Durio zibethinus</i> Murr) seeds as stabilizer for pineapple juice production (Herlina)	Paper 2: Quality change during postharvest handling chain of black tiger shrimp (<i>Penaeus monodon</i> fab. 1897) from brackish water pond in mahakam delta region: case study (Andi Noor Aslkin)
		Paper 3: Sub-lethal pre-heating improved the survival and shelf-life predictions of microencapsulated <i>Lactobacillus plantarum</i> in spray dried guava powder (Betty Sri Laksmlenie)	Paper 3: Red palm oil in the supplementary feeding for elementary school children increases the retinol serum and nutritional status (HidayahDwiyanti)	Paper 3: The effect of temperature and heating time duration on the yield and chemical quality of red fruit (<i>Pandanus conoides</i>) oil using dry method extraction (Zita Letriany Sarungallo)	Paper 3: Carcass percentage and abdominal fat percentage of broiler chickens fed pineapple waste meal fermented by "ragi tape" in diet (Jet Saartje Mandey)
		Paper 4: Weak antimicrobial activity of ethanolic and aqueous extracts of red rambai (<i>Lepisanthes alata</i>) (Anton Rahmadi)	Paper 4: Antioxidant activity and physicochemical properties of kecombrang fruit extract nanoencapsulan (Nicolaila speciosa horan) (Rifda Naufalin)	Paper 4: Characteristic of two forms of pasta (fettuccine and macaroni) of local composite flour based (rasi and mung bean) with various steaming way (Marleen Sunyoto)	Paper 4: Egg quality parameters of laying hens fed dried tomato meal in diet (Jeln R. Leke)
		Discussion	Discussion	Discussion	Discussion
	14.30–15.30	SESSION A Food Safety as an Important Factor to Food Security Panel 2A Chair: Assoc. Prof.Dr.Saiwarum Chaiwanichsiri	SESSION B Functional Food Development Panel 2B Chair: Prof.Dr. Rifda Naufalin	SESSION C Development of New Food Product Panel 2C Chair: Prof.Dr.Dato' Othman Yatim	SESSION D Development of New Food Product Panel 2D Chair:Dr. Jet Saartje Mandey

		Agenda			
Date	Time				
		<p>Paper 1 : Chemical composition and antimicrobial activities of essential oil extract from the leaves of <i>Tiliacora triandra</i> (Netty Maria Naibaho)</p> <p>Paper 2: Fish based food vendor compliance to good practices (Winiati P. Rahayu)</p> <p>Paper 3: Potential Use of Red Mangosteem (<i>Garcinia forbesii</i>) as A Natural Preservative and Functional Beverage (Sedarnawati Yasni)</p> <p>Paper 4: Activity of crude tanninextract of pepaya leaves in reducing Staphylococcal enterotoxin agent expression (Tri Istiti Rahayu)</p> <p>Discussion</p>	<p>Paper 1 : Application of Jambolan fruit's anthocyanins pigmented with rosemary polyphenol extract in jelly and carbonated drink (Puspitasari)</p> <p>Paper 2: Prebiotic potential of bamboo shoot powder produced from tabah bamboo (<i>Gigantochloa nigroclathrata</i> Busse-kurz) (Nyoman Semadi A.)</p> <p>Paper 3: Potential use of gamma irradiated ethnic ready to eat foods to improve nutritional status of school children (Zubaidah Irawati)</p> <p>Paper 4: Detection of tetracyclines residue in dairy milk powder using a high performance liquid chromatography (Raphaella Widastuti)</p> <p>Discussion</p>	<p>Paper 1 : Liquid smoke improved the quality and storage life of local beef satay (Zainuri)</p> <p>Paper 2: Structural changes of arrowroot starch (<i>Marantha arundinacea</i> L.) As the impact of acid hydrolysis, debranching, heat moisture treatment (HMT), and autoclaving-cooling cycles (MutiarPratiwi)</p> <p>Paper 3: Sensory & microbial quality and shelf life of beef jerky ready to eat produced by very small jerky processing bussines at West Nusa Tenggara (Baig Rien Handayani)</p> <p>Paper 4: The Effect of local and import Soybean (<i>Glycine max</i> L.) and Blanching Time on the Chemical and Sensory characteristic of Soy milk Powder (Miftakhur Rohmah)</p> <p>Discussion</p>	<p>Paper 1 : Traditional Herbal Medicinal From Localy Medicine Plants of Dayak Tidung Ethnic in North Kalimantan Province (HadriPranoto)</p> <p>Paper 2: Modified processing of tea from coffe leaves (air kawa) (Khusnul Khotimah)</p> <p>Paper 3: Development processing of labulo as gorontalo local food (Mohammad Rifandi Thalib)</p> <p>Paper 4: A validated rp-hplc method for quantification of β-carotene in red fruit (<i>Pandanus conoides</i>) oil (Mathelda K. Roreng)</p> <p>Discussion</p>
	15.30-15.45	Coffee Break			
	15.45-16.30	PARALLEL SESSION 3			
		SESSION A Food Safety as an Important	SESSION B Development of Food	SESSION C Development of New Food	SESSION D Natural Food Production

Date	Time	Agenda			
		<p>Factor to Food Security Panel 3A Moderator: Dr.Ir. Harsi D. Kusumaningrum</p> <p>Paper 1: Antifungal activity of kebar grass (<i>Biophytum persianum</i>Kloiszech) stem ethanol extract on the growth of aflatoxigenic <i>Aspergillus flavus</i> in corn and peanut based media (Melke M. Lisangan)</p> <p>Paper 2: Assessment of combined red ginger (<i>Zingiber officinale</i> var. Rubrum) and red galangal (<i>Alpinia purpurata</i> k. Schum) essential oils as preservatives in chicken meat (Tita Rialita)</p> <p>Paper 3: The impact of intervention feeding parenting women on nutritional status of children in the Village Sangkima Kutai National Park East Kutai (BernataSaragih)</p> <p>Discussion</p>	<p>Functional Panel 3B Moderator: Ir. Eni Kusumaningtyas, M.Sc.</p> <p>Paper 1: Formulation of Bawang Dayak Bulb Water Extract As Antidiabetic Instant Drink (Andi Early Febrinda)</p> <p>Paper 2: Evaluation of Glycemic Index Determination Method On Cookies Made from HMT-Modified Arrowroot Starch (Ratna Sari Lisyaningrum)</p> <p>Paper 3: Plant sterols as functional food and its genetic study (Nurhasanah)</p> <p>Discussion</p>	<p>Product Panel 3C Moderator: Dr.Zita Letviany Sarungallo</p> <p>Paper 1: Determination of incubation time and enzyme alpha amylase concentration on liquification of elephant cassava starch (WiwitMurdianto)</p> <p>Paper 2: Weibull model approach: Using validated sensory value for black tea shelf life prediction (TarsisusDwiWibawaBudianta)</p> <p>Paper 3: The effect of type and concentration of natural food additives made from fisheries products in improving quality of tofu (Tri WinarniAgustini)</p> <p>Discussion</p>	<p>Panel 3D Moderator: Dr. Noor Rofiq Ahmadi.</p> <p>Paper 1: Study of bawang tiwai (<i>Eleutherine americana</i>Merr) a traditional medicines of local people in Kalimantan (Ellok Dwi Sulichantini)</p> <p>Paper 2 Encapsulation of antioxidant from coffee cherries extract using arabic gum combined with oxidized tapioca as encapsulan material: application on klenetik oil (Nurul Isnaini Fitriyana)</p> <p>Paper 3: Fruit performance and nutritional value variation of <i>Durio</i> spp. from East Kalimantan (Widi Sunaryo)</p> <p>Discussion</p>
	16.30-17.00	Closing Remarks from conference chairman of International on Food, Agriculture and Culinary Tourism.			
06 Aug 2015	08.00-selesai	Field trip to cultural village of Pampang and Souvenir Shop (Citra Niaga)			

Fruit performance and nutritional value variation of *Durio spp.* from East Kalimantan

Widi Sunaryo

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Kalimantan island is a center of genetic resources and species diversity of *Durio spp* (Durian) in Indonesia. It was reported that 18 species from a total 20 species encountered Indonesia occurred in Kalimantan Island. The economic value of the *Durian* fruit is determined by the fruit performance and the nutritional value. In this paper, we reviewed the fruit performance and nutritional value variation of *Durian* from East Kalimantan. There were two groups of *Durio spp* classified based on their edibility, i.e. edible and inedible Durian. In general, there were wide range of variation in fruit performance including fruit and flesh colour (from white, yellowish, yellow goldish, orange, red and dark red), shelf life (from 1 to 15 days after ripening), fruit odor (odorless, fragrant, and sharp fragrant), the thickness of flesh (thin, medium and thick), sweetness (from bitter to very sweet), flesh texture, number of seeds (seedless, many seed), and fruit size and shape. The variation was also observed in nutritional value such as sugar, fat, protein, carbohydrate, water, vitamins and mineral content. Because of the open pollinated characteristic, the variation was very high in the species (intra species) and also among species (inter species). The most popular of edible *Durio* species in East Kalimantan is *Durio zibethinus* (Durian, Local Name) and *Durio kutejensis* (Lai, Local Name).

Key words: Fruit Performance, Nutritional Value, Durio spp., East Kalimantan

INTRODUCTION

Most of genetic resources and species diversity of *Durio spp* was reported existing in Kalimantan Island. From a total 20 *Durio* species encountered in Indonesia, 18 species occurred in Kalimantan (Uji, 2005). Due to the open pollinated characteristic, the genetic diversity of *Durio spp* is enlarging and spreading significantly. *Durio spp* is a tropical fruit that can grow at broad range of climate and season, therefore this plant can grow in almost all of Indonesian island. Among these *Durio* species, *Durio zibethinus* and *Durio kutejensis* are the popular edible *Durio* in East Kalimantan.

The economic value and consumer preference of *Durio sp* are determined by Fruit Performance and Nutritional Value. The most important consideration to determine the Fruit performance is based on the fruit size, flesh colour, flesh thickness, taste (based on Preference), shelf life, texture (soft or fibrous, dry or wet), the percentage of edible part, odor, and alcohol content. In addition to those consideration, the nutritional values such as moisture (water content), energy, protein, carbohydrate, fat, sugar, and minerals content are also influencing the consumer preference.

This paper will present the Fruit performance and nutritional value variation of *Durio spp.* from East Kalimantan

DURIO SPP IN EAST KALIMANTAN

Based on the observation there are 10 inedible *Durio spp*: *D. acutifolius* (Durian Enggang), *D. affinis*, *D. beccarianus*, *D. bukitrayaensis*, *D. carinatus* (Durian Paya), *D. griffithii* (Lai Kuyu), *D. lanceolatus* (Durian Bengang), *D. lissocarpus* (Tarutung Burung), *D. oblongus*, *D. purpureus* (Durian Tigang) and 8 edible *Durio spp*: *D. zibethinus* (Durian), *D. dulcis* (Lahong), *D. excelsus* (Apun), *D. glandiforus* (Sukang), *D. graveolens* (Tuwala), *D. kutejensis* (Lai), *D. oxleyanus* (Kerantungan), *D. testudinarum* (Durian Kura-kura) (Uji, 2005) as shown ini figure 1.



***Durio zibethinus* (Durian),**
Sunaryo et al (2015)



***Durio kutejensis* (Lai, Pampaken),**
Sunaryo et al (2015)



***Durio excelsus* (Apun),**
Year of Durian (2013)



***Durio dulcis* (Lahong),**
Sunaryo et al (2015)



***Durio oxleyanus* (Kerantungan),**
Sunaryo et al. (2015)



***Durio testudinarum* (Durian Kura2),**
Year of Durian (2013)



***Durio glandiforus* (Sukang),**
Year of Durian (2013)



***Durio graveolens* (Red),**
Year of Durian (2013)



***Durio graviolens* (Yellow),**
Year of Durian (2013)

Figure 1. Some of *Durio spp* in East Kalimantan

FRUIT PERFORMANCE VARIATION

The fruit performance of 9 species of *Durio* spp (*D. zibethinus*, *D. kutejensis*, *D. excelsus*, *D. dulcis*, *D. oxyleanus*, *D. testudinarum*, *D. glandiforus*, and *D. graviolens*) is presented in **Figure 2**. The variation in fruit size and weight, flesh colour, flesh thickness, flesh odor, texture, sweetness, and the alcohol content is observed indicating the high fruit performance variation of *Durio* spp in East Kalimantan. These high variation would give many preference to consumer and supply a gene pool for plant breeding.



***Durio zibethinus* (Durian),**
Sunaryo et al. (2015)

Δ Size: small – very big
 Δ Flesh: thick - very thick
 Δ Flesh Colour: White – yellowish
 Δ Odoriness: medium – very sharp
 Δ Alcohol content: medium – very high
 Δ Texture : soft, wet
 Δ Water Content: high
 Δ Taste: Sweet – bitter
 Δ Shelf life : short - long



***Durio kutejensis* (Lai, Pampaken),**
Sunaryo et al. (2015)

Δ Size: small – small -medium
 Δ Flesh: thick - very thick
 Δ Flesh Colour: orange
 Δ Odoriness: odorless
 Δ Alcohol content: no alkohol
 Δ Texture : soft, dry
 Δ Water Content: low
 Δ Taste: medium - sweet
 Δ Shelf life : very long



***Durio excelsus* (Apun),**
Year of Durian, (2013)

Δ Size: very small
 Δ Flesh: thin
 Δ Flesh Colour: orange
 Δ Odoriness: odorless
 Δ Alcohol content: no alkohol
 Δ Texture : soft, dry
 Δ Water Content: low
 Δ Taste: medium - sweet
 Δ Shelf life : very short



***Durio dulcis* (Lahong),**
Year of Durian (2013)

Δ Size: medium
 Δ Flesh: thin
 Δ Flesh Colour: white - yellowish
 Δ Odoriness: odorless - medium
 Δ Alcohol content: medium
 Δ Texture : soft, wet
 Δ Water Content: high
 Δ Taste: medium - sweet
 Δ Shelf life : short - medium



***Durio oxleyanus* (Kerantungan),**
Year of Durian (2013)

Δ Size: small
 Δ Flesh: thin - thick
 Δ Flesh Colour: yellowish
 Δ Odoriness: odorless - medium
 Δ Alcohol content: medium
 Δ Texture : soft, wet
 Δ Water Content: high
 Δ Taste: medium - sweet
 Δ Shelf life : short - medium



***Durio testudinarum* (Durian Kura2),**
Year of Durian (2013)

Δ Size: small
 Δ Flesh: thin
 Δ Flesh Colour: white - yellowish
 Δ Odoriness: sharp
 Δ Alcohol content: high
 Δ Texture : soft, wet
 Δ Water Content: high
 Δ Taste: medium – sweet - bitter
 Δ Shelf life : short - medium



***Durio glandiflorus* (Sukang),**
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thin
- Δ Flesh Colour: Dark red
- Δ Odoriness: odorless - medium
- Δ Alkhol content: medium
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : short - medium



***Durio graveolens* (Red),**
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thick
- Δ Flesh Colour: Dark red
- Δ Odoriness: odorless
- Δ Alkhol content: no alcohol
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : medium



***Durio graviolens* (Yellow),**
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thick
- Δ Flesh Colour: orange
- Δ Odoriness: odorless
- Δ Alkhol content: no alcohol
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : medium

Figure 2. Fruit performance variation of 9 species *Durio* spp from East Kalimantan.

NUTRITIONAL CONTENT VARIATION

The nutritional composition of species of *Durio* SPP is shown in Table 1. Four species *D. Zibethinus* (Durian), *D. Kutejensis* (Lai/Pampaken), *D. Graviolens*, and *D. Oxelyanus* (kerantungan) are ver nutritious as they have ver high energy (120 – 152 Kcal). The sugar content of these fory species is varied from 10 – 10 brix. On the other nutrient, the most variable content from four species analyzed is percentage of edible part, minerals (P, K, Ca, Mg, Fe, Mn, Cu, Zn) and Vitamnine C.

Table 1. Nutritional composition of four *Durio* spp based on Sunaryo et al (2015); Hoe and Siong, (1999); Brown (1997).

Nutritional Value	<i>D. zibethinus</i>	<i>D. kutejensis</i>	<i>D. graviolens</i>	<i>D. oxleyanus</i>
Energy	128 - 188cal	149 Kcal	152 Kcal	120 Kcal
Sugar	20,18° brix	10,8° brix	19,1° brix	15,2° brix
Protein	3,2%	4,8%	2,6%	7,7%
Lipid	3,2%	2,1%	6,2%	2,1%
Water content	62,7%	58,4%	66,7%	30,3%
Carbohydrates	31,0%	19,9%	21,5%	18,4%
Fibre	3,0%	1,4%	2,0%	1,9%
The percentage of edible part	20,5%	33,9%	30,2%	19,7%

Shelf life at room temperature	7 days	8,6 days	7 days	7 days
P	19,6 - 65,4 mg	25 mg	43 mg	13 mg
K	431,2 - 488,1 mg	362 mg	529 mg	159 mg
Ca	4,5 - 41,5 mg	19 mg	10 mg	3 mg
Mg	33 - 330 mg	19 mg	27 mg	8 mg
Fe	0,38 - 1,9 mg	0,7 mg	0,6 mg	1,7 mg
Mn	0,8 ppm	5,0 ppm	4,0 ppm	1,2 ppm
Cu	1,0 ppm	3,2 ppm	7,0 ppm	2,1 mg
Zn	1,4 ppm	7,3 ppm	5,9 ppm	1,7 mg
Vit. C	22,9 - 107 mg	15,9 mg	10,4 ppm	20,8 mg

CONCLUSION

There were two groups of *Durio spp* classified based on their edibility, i.e. edible and inedible Durian. In general, there were wide range of variation in fruit performance including fruit and flesh colour (from white, yellowish, yellow goldish, orange, red and dark red), shelf life (from 1 to 15 days after ripening), fruit odor (odorless, fragrant, and sharp fragrant), the thickness of flesh (thin, medium and thick), sweetness (from bitter to very sweet), flesh texture, number of seeds (seedless, many seed), and fruit size and shape. The variation was also observed in nutritional value such as sugar, fat, protein, carbohydrate, water, vitamins and mineral content. Because of the open polinated characteristic, the variation was very high in the species (intra species) and also among species (inter species). The most popular of edible *Durio* species in East Kalimantan is *Durio zibethinus* (Durian, Local Name) and *Durio kutejensis* (Lai, Local Name).

ACKNOWLEDGEMENT

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REFERENCES

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Fruit Performance and Nutritional Value Variation of *Durio spp.* from East Kalimantan

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Most of genetic resources and species diversity of *Durio spp* was reported existing in Kalimantan Island.

- From a total 20 *Durio* species encountered in Indonesia, 18 species occurred in Kalimantan (Uji, 2005)
- Due to the open pollinated characteristic, the genetic diversity of *Durio spp* is enlarging and spreading significantly
- *Durio spp* is a tropical fruit that can grow at broad range of climate and season

The economic value and consumer preference of *Durio sp* are determined by Fruit Performance and Nutritional Value

- **Fruit performance: fruit size, flesh colour, flesh thickness, taste (based on Preference), shelf life, texture (soft or fibrous, dry or wet), the percentage of edible part, odoriness, and alcohol content**
- **The nutritional value: moisture (water content), Energy, protein, carbohydrate, fat, sugar, and minerals content**

DURIO SPP IN EAST KALIMANTAN?

- **10 inedible *Durio spp***: *D. acutifolius* (Durian Enggang), *D. affinis*, *D. beccarianus*, *D. bukitrayaensis*, *D. carinatus* (Durian Paya), *D. griffithii* (Lai Kuyu), *D. lanceolatus* (Durian Bengang), *D. lissocarpus* (Tarutung Burung), *D. oblongus*, *D. purpureus* (Durian Tigang).
- **8 edible *Durio spp***: *D. zibethinus* (Durian), *D. dulcis* (Lahong), *D. excelsus* (Apun), *D. glandiforus* (Sukang), *D. graveolens* (Tuwala), *D. kutejensis* (Lai), *D. oxleyanus* (Kerantungan), *D. testudinatum* (Durian Kura-kura).
(Uji, 2005).

EDIBLE DURIO SPP



***Durio zibethinus* (Durian),**
Sunaryo et al (2015)



***Durio kutejensis* (Lai, Pampaken),**
Sunaryo et al (2015)



***Durio excelsus* (Apun),**
Year of Durian (2013)

EDIBLE DURIO SPP



***Durio dulcis* (Lahong),**
Sunaryo et al (2015)



***Durio oxleyanus* (Kerantungan),**
Sunaryo et al. (2015)



***Durio testudinarum* (Durian Kuraz),**
Year of Durian (2013)

EDIBLE DURIO SPP



***Durio glandiflorus* (Sukang),**
Year of Durian (2013)



***Durio graveolens* (Red),**
Year of Durian (2013)



***Durio graviolens* (Yellow),**
Year of Durian (2013)

FRUIT PERFORMANCE OF DURIO SPP



***Durio zibethinus* (Durian),**

Sunaryo et al. (2015)

- Δ Size: small – very big
- Δ Flesh: thick - very thick
- Δ Flesh Colour: White – yellowish
- Δ Odoriness: medium – very sharp
- Δ Alcohol content: medium – very high
- Δ Texture : soft, wet
- Δ Water Content: high
- Δ Taste: Sweet – bitter
- Δ Shelf life : short - long



***Durio kutejensis* (Lai, Pampaken),**

Sunaryo et al. (2015)

- Δ Size: small – small -medium
- Δ Flesh: thick - very thick
- Δ Flesh Colour: orange
- Δ Odoriness: odorless
- Δ Alcohol content: no alkohol
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : very long



***Durio excelsus* (Apun),**

Year of Durian, (2013)

- Δ Size: very small
- Δ Flesh: thin
- Δ Flesh Colour: orange
- Δ Odoriness: odorless
- Δ Alcohol content: no alkohol
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : very short

FRUIT PERFORMANCE OF DURIO SPP



***Durio dulcis* (Lahong),**
Year of Durian (2013)

- Δ Size: medium
- Δ Flesh: thin
- Δ Flesh Colour: white - yellowish
- Δ Odorless: odorless - medium
- Δ Alcohol content: medium
- Δ Texture : soft, wet
- Δ Water Content: high
- Δ Taste: medium - sweet
- Δ Shelf life : short - medium



***Durio oxleyanus* (Kerantungan),**
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thin - thick
- Δ Flesh Colour: yellowish
- Δ Odorless: odorless - medium
- Δ Alcohol content: medium
- Δ Texture : soft, wet
- Δ Water Content: high
- Δ Taste: medium - sweet
- Δ Shelf life : short - medium



***Durio testudinatum* (Durian Kuraz),**
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thin
- Δ Flesh Colour: white - yellowish
- Δ Odorless: sharp
- Δ Alcohol content: high
- Δ Texture : soft, wet
- Δ Water Content: high
- Δ Taste: medium – sweet - bitter
- Δ Shelf life : short - medium

FRUIT PERFORMANCE OF DURIO SPP



Durio glandiflorus (Sukang),
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thin
- Δ Flesh Colour: Dark red
- Δ Odoriness: odorless - medium
- Δ Alkhol content: medium
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : short - medium



Durio graveolens (Red),
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thick
- Δ Flesh Colour: Dark red
- Δ Odoriness: odorless
- Δ Alkhol content: no alkohol
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : medium



Durio graveiolens (Yellow),
Year of Durian (2013)

- Δ Size: small
- Δ Flesh: thick
- Δ Flesh Colour: orange
- Δ Odoriness: odorless
- Δ Alkhol content: no alkohol
- Δ Texture : soft, dry
- Δ Water Content: low
- Δ Taste: medium - sweet
- Δ Shelf life : medium

NUTRITIONAL VALUE OF DURIO SPP

Nutritional Value	<i>D. zibethinus</i>	<i>D. kutejensis</i>	<i>D. graviolens</i>	<i>D. oxleyanus</i>
Energy	128 - 188 Kcal	149 Kcal	152 Kcal	120 Kcal
Sugar	20,18° brix	10,8° brix	19,1° brix	15,2° brix
Protein	3,2%	4,8%	2,6%	7,7%
Lipid	3,2%	2,1%	6,2%	2,1%
Water content	62,7%	58,4%	66,7%	30,3%
Carbohydrates	31,0%	19,9%	21,5%	18,4%
Fibre	3,0%	1,4%	2,0%	1,9%
The percentage of edible part	20,5%	33,9%	30,2%	19,7%
Shelf life at room temperature	7 days	8,6 days	7 days	7 days
P	19,6 - 65,4 mg	25 mg	43 mg	13 mg
K	431,2 - 488,1 mg	362 mg	529 mg	159 mg
Ca	4,5 - 41,5 mg	19 mg	10 mg	3 mg
Mg	33 - 330 mg	19 mg	27 mg	8 mg
Fe	0,38 - 1,9 mg	0,7 mg	0,6 mg	1,7 mg
Mn	0,8 ppm	5,0 ppm	4,0 ppm	1,2 ppm
Cu	1,0 ppm	3,2 ppm	7,0 ppm	2,1 mg
Zn	1,4 ppm	7,3 ppm	5,9 ppm	1,7 mg
Vit. C	22,9 - 107 mg	15,9 mg	10,4 ppm	20,8 mg

Ref: Sunaryo et al (2015); Hoe and Siong, (1997); Brown (1997)

The most popular of edible *Durio* species in East Kalimantan is *Durio zibethinus* (*Durian*, local name) and *Durio kutejensis* (*Lai*, Local Name).



Durio zibethinus (Durian), General Characters:

- Sweet
- sharp Odor/fragrant
- Wet and soft Texture
- White, white yellowish, yellow, yellow Goldish
- High alkohol content while ripening
- High water content



Durio kutejensis (Lai, Pampaken), General Characters

Sweet

- Odorless/ not fragrant
- Dry and Dense Texture
- Yelow until orange
- No alkohol content while ripening
- Low water content

LAI DURIAN: a new variant of Durio spp having high potential economic value to be improved as a National Excellent Variety from East Kalimantan

Name: LAI DURIAN; DURIAN LAI

Local Name: Holai, Mandong, Mading

Origin: Putative Natural Crossing between
Durio zibethinus x *Durio kutejensis*

Distribution: East Kalimantan

Economic Value: Sweet, Odorless,
Gold yellowish, Low water content,
No alcohol, Dry and Dense texture

Preferred by consumers

Morphological Characters analysis: strongly indicates that *Lai Durian* originated from natural crossing between *D. zibethinus* and *D. kutejensis*

No.	Observed Morphological Characters	<i>Durio zibethinus</i>	<i>Lai Durian</i>	<i>Durio kutejensis</i>
1.	Mean value of leaf length (cm)	16,40	19,62	23,86
2.	Mean value of leaf width (cm)	5,23	7,03	9,10
3.	Mean value of petiole (cm)	1,94	2,17	2,14
4.	Flower colour (number of samples)			
	White	19	0	0
	Pink	0	18	0
	Red	0	0	14
5.	Leaf shape (number of samples)			
	Oblong	14	7	11
	Ovate	4	7	0
	Obovate	1	3	3
	Elliptic	0	1	0
6.	Leaf apex (number of samples)			
	Long	15	3	0
	Medium	3	10	5
	Short	1	5	9
7.	Leaf base (number of samples)			
	attenuate	14	6	9
	Rounded	0	4	1
	Obtuse	5	9	4

Morphological Characters analysis: strongly indicates that *Lai Durian* originated from natural crossing between *D. zibethinus* and *D. kutejensis*

No.	Observed Morphological Characters	<i>Durio zibethinus</i>		<i>Lai Durian</i>		<i>Durio kutejensis</i>	
8.	Leaf margin (number of samples)						
	Entire	19	18	14			
	Crenate	0	0	0			
9.	Upper leaf color (number of samples)						
	Dark green	2	1	1			
	Green	12	12	6			
	Light green	5	5	7			
10.	Lower leaf color (number of samples)						
	Silvery	2	4	0			
	Brownish silver	7	5	5			
	Brownish	8	1	3			
	Gray	2	8	6			
11.	Branching Architecture (number of samples)						
	High looming	19	3	0			
	Umbrella-shaped	0	14	13			
	Irregular shape	0	1	1			
	Branching Direction (number of samples)						
12.	Upward pointing	10	6	0			
	Horizontal pointing	7	8	6			
	Downward Pointing	2	4	8			
	Branching Angle (number of samples)						
13.	Acute	13	13	10			
	Straight	4	1	3			
	Obtuse/Blunt	2	4	1			
	Total number of samples	19	18	14			

Example of data collection and leaf morphological identification

Kabupaten		KUTAI BARAT
1. No. Sampel	1 C (Nomor Foto: 2801-2817)	
2. Nama varietas (lokal)	Holai / Lai sentawar / Lai durian	
3. Lokasi (Koordinat / GPS)	S 00°08.6'10" E 115°34.641" ±2	
4. Nama Desa / Kampung	Bigung baru, Kec. Linggang bigung	



D. zibethinus

Lai Durian

D. kutejensis

Note:

LA: Leaf Apex

LM: Leaf Margin

LB: Leaf Base

P: Petiole

Lai Durian fruit has positive combination properties originated from its parents (D. zibethinus and D. kutejensis) and more preferred by consumers.

Fruit performances and Nutrition	Durio	Lai Durian	Durio
	Zibethinus (*)	(**)	kutejensis (***)
Sugar	20,18° brix	17,5° brix	10,8° brix
Protein	3,21 %	6,60 %	4,81 %
Lipid	3,18 %	2,23 %	2,05 %
Water content	62,70 %	57,10 %	58,36 %
Carbohydrates	30,98 %	20,00 %	19,87 %
Fibre	3,04 %	2,5 %	1,35 %
Aril thickness	0,79 %	1,01 %	0,90 %
Aril color	White-yellowish	Yellow-golden yellow	Yellow -orange
The percentage of edible part	20,51 %	28,16 %	33,85 %
Shelf life at room temperature	7 days	8 days	8,6 days
Texture	Smooth, Soft and Wet	Smooth, Dense and Dry	Smooth, Dense and Dry
	Sharply fragrant	Not fragrant	Not fragrant
Aroma	Sharply fragrant	Not fragrant	Not fragrant
Sweetness	Sweet	Sweet	Less sweet

Lai Durian Flower and Aril: Intermediate phenotype of its parents



D. zibethinus



Lai Durian



D. kutejensis

Conclusion

1. There were two groups of *Durio spp* classified based on their edibility, i.e. edible and inedible Durian.
2. In general, there were wide range of variation in fruit performance including fruit and flesh colour (from white, yellowish, yellow goldish, orange, red and dark red), shelf life (from 1 to 15 days after ripening), fruit odor (odorless, fragrant, and sharp fragrant), the thickness of flesh (thin, medium and thick), sweetness (from bitter to very sweet), flesh texture, number of seeds (seedless, many seed), and fruit size and shape.
3. The variation was also observed in nutritional value such as sugar, fat, protein, carbohydrate, water, vitamins and mineral content. Because of the open pollinated characteristic, the variation was very high in the species (intra species) and also among species (inter species).
4. The most popular of edible *Durio* species in East Kalimantan is *Durio zibethinus* (Durian, Local Name) and *Durio kutejensis* (Lai, Local Name).

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Thank you