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The Effect of Times Ripening Grater Cassava (*Manihot utilissima*) toward Physical and Chemical Properties of Chips Cassava Produced

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***Abstract*— Research was aimed to know effect of times ripening grated cassava toward physical and chemical properties of chips cassava produced. Ripening is done with various times (0, 6, 12, 18, 24 and 30 h). This Research using design is Completely Randomized Design (CRD) with duplo. Data was analysed statistically with ANOVA and if significantly different were continued with Duncan's New Multiple Range Test (DMRT) at 5% significance level. As a result of this experiment, it was found that, the times of ripening are significantly affect to fat, carbohydrate and fat of chips cassava after fried. Based of this research the best time of ripening is 18h.**

***Keywords*— Time ripening; Physical and chemical; Chips of cassava**

I. INTRODUCTION

Chips of cassava which is commonly called "opak" craker is one of favourite snack especially because its crispy texture. This food is made from mashed cassava which is added with some additional ingredients such as garlic or other seasoning for flavouring agent. After mixing, the dough is steamed and then formed. After that, dried the formed dough and fried.

Cassava (*Manihot uttilisima*) is a plant that has carbohydrate as major component which is 34 g. Other component are water (62.50 g), protein (1.20 g), fat (0.30 g), phosphor (40 mg), calcium (33 mg), vitamin C (30 mg), iron (0.70 mg), vitamin B1 (0,06 mg), and the calories (146 kcal) [1]. [2] reported that raw cassava consist of water content (60%), starch (35%), fiber (2.5%), protein (1%), fat (0.5 %), and ash content (1%).

According to interview report with chips of cassava manufacture at Lareh Sago Halaban, Lima Puluh Kota, West Sumatera-Indonesia, they are usually ripent (ferment) the cassava grater before formed it. It is caused, this process more efficient, beside that they are assumed that the dough is bigger which caused amount of chips cassava is higher. It might be because of microbe activities during fermentation. Cassava grater obtains flavour after fermentation. Microorganism that give biggest influence during feremention on cassava grater is amylolytic microorganism which needs high carbohydrate content for growing up. This microbe will obtain amylase enzyme that can hidrolyze starch to be simple component.

Microbe that obtains amylase enzyme commonly grouped as mold which it can hydrolyze starch to be its monomer. One of amylase enzyme that able to hydrolyze starch to glucose is glucoamylase. Other amylase such as alfa amylase or beta amylase that can obtain maltose and maltoriosa [3]. According to that information, this research is aimed to determine length of ripening (fermentation) that is affected to the physical and chemical chips of cassava characteristic.

II. MATERIAL AND METHODE

A. Material

Samples were obtainable from chips of cassava manufacture where is located at Kecamatan Lareh Sago Halaban Kabupaten Lima Puluh Kota, West Sumatera-Indonesia. Samples were fresh cassava grater which were taken using sterilized spoon.

B. Fermentation Process

Fermentation process has been done in facultative anaerobic circumtances. Length of fermentation has been determined according to research treatment. To obtain an appropriate length of fermentation, fermentation process has been started from the longest time.

C. Analysis

Moisture Content (Gravimetry)

Approximately 2 gram of samples on the porcelain cups were dried in oven with the temperature of 100-105°C until a constant weight reached. Subsequently it were stabilized in desiccator. Water content was calculated on wet basis [4].

Ash Content

Porcelain cups were dried on the furnace which temperature degree was 110°C for 1 hour. Then, the cups were be chilled on desiccator. 2 gram of samples on porcelain cups were charred on the hot plate until no more smoke released. After that, samples were charred using furnace which temperature around 500°C-600°C for 2 hours [5].

Protein Content

Analysis of protein content by kjedal methode [4].

Fat Content (Soxhlet)

Analysis of fat content by soxhlet methode. [5]

Crude Fiber

Crude fiber content analysis was conducted by heat treatment of acids and bases method. The principle of this analysis is washing the sample with acids, bases, boiled water and 95% alcohol to obtain a crude fiber residue [6].

Carbohydrate Content

Carbohydrate contentwas obtained using by different method.

Oil Absorbtion of Cassava Craker

Oil absorption was measured by counting differences of oil content after used and before used [5].

Yield

Yield of cassava grater was measured by dividing weigh of cassava grater before ripening and the weigh after ripening, then multiplied 100 %.

Degree of Cassava Cracker Development

Samples were measured using a micrometer (vernier caliper 0-150 mm x 0.05, Shanghai-China) at five different places. An average value was calculated in mm. [7]

Total Plate Count

Total plate count was determine using agar method. Dilution has been prepared until 10^{-6}. After that, cultivation has been done using casting method. Incubation has been done for 24 hours. After that, colony counted used SPC method [8].

D. Experimental design

This research design used Complete Random Design (CRD) with 3 replications which used SPSS 16.0 software for windows. The Treatments were A= 0 H (control), B= 6 H, C= 12 H, D= 18 H, E= 24 H and F= 30 H. Datas were analysed using ANOVA and continued using Duncan's New Multiple Range Test (DNMRT) at 5% significant level, if the result showed significantly difference

III. Result and Discussion

A. Chemical Properties

Fermentation is a process to decompose an organic substances using microorganism activity (system biology) and enzymes activity that can generate energy. [9] reported, during fermentation process, the microorganisms use organic matter as a substrate to generate energy, to build cell components, and to produce metabolites products. Furthermore, due to microorganisms activities, fermented material will encounter some biochemical changes. During fermentation process of grated cassava, starch is overhauled into simpler components (glucose), alcohols, organic acids, carbondioxide and water. [10], during fermentation process of cassava starch, the starch will be split into alcohols, acids and water.

Fermentation process of grated cassava occurs spontaneously which microorganism is obtained from grated cassava. Starch is decomposed by microorganisms in appropriate environement. [11], microorganisms needs nutrients for growing up, then the microorganisms has a wide variety of enzymes to decompose components of food into simpler compounds. Those microorganisms grouped as amylase enzyme producer is called amylolytic microorganisms. It's suitable with the main components of cassava that is carbohydrate.

Microorganism that grows on the materials containing carbohydrates is faster to grow compared to microorganism that grows on the material containing more protein or fat. [9], [11] and [12] reported, at the beginning microorganisms will decompose carbohydrate, then followed protein decomposition and fat decomposition at the last. There is also some steps to decompose carbohydrate by microorganism, first, carbohydrate will be decomposed becoming sugar, then alcohol, and after that becoming acid. So according to statistic result, lenght of fermentation process significantly affected to the carbohydrate content. Carbohydrate content was increasing while longer fermentation process, this process caused by microorganism activities. Graphic of carbohydrate content is showed on figure 1.

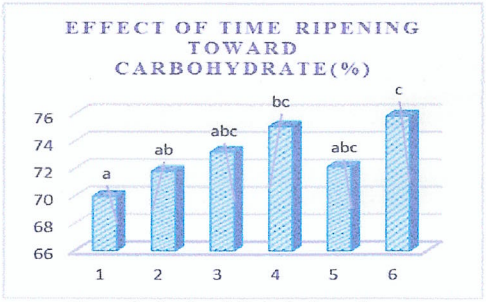

Figure 1. Grafic of Carbohydrate Content

Along with that, longer fermentation process was affected to protein and fat content decreased due to decomposition of protein and fat hydrolysis which were caused by microorganism activities. [13] reported, some food processing (in this case fermenting, steaming and drying) cause decomposition of fat content. Fat content on fermented grated cassava and placebo had siginificant differences indicated fat hydrolysis has been occurred during fermentation process. [11] reported, protein decomposition by microorganisms through an enzyme, protein is decomposed into simpler compounds. Furthermore, the fat will be hydrolyzed into fatty acids and glycerol. Grafic of fat content is showed on figure 2.

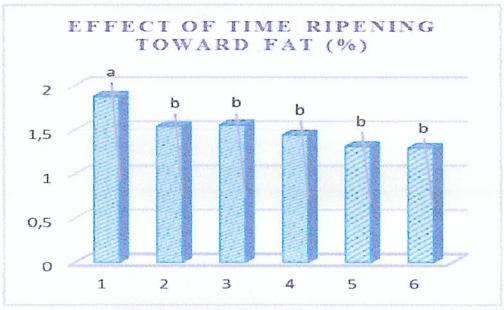

Figure 2. Grafic of Fat Content

Crude fiber content also tend to increase due to fermentation process, eventough, statistically length of fermentation was not significantly affected to the crude fiber content. According to [14] crude fiber content on fermented cassava flour (Mocaf) is higher compared with original cassava flour. Crude fiber is the residue of foodstuffs composed which consist of cellulose and lignin after acid and alkali treated [6]. Furthermore [15] declare, cellulose is bound by lignin which has higher molecular weight, so it only can be decomposed by certain microorganism which also capable to produce only certain enzyme, that microorganism is called cellulolytic microorganisms.

Water content in cassava flour was decreasing while longer fermentation process (up to 18 hours of fermentation process). However, statistically, length of fermentation process was not significantly affected to water content on cassava cracker. Basically, the length of fermentation process will increase the moisture content in the material (before drying) because increasing of starch decomposed which further decomposition process to be alcohols, acids and water. [10] reported, longer the fermentation process will increase water content on cassava which starch will be more decomposed which is also affected to alcohol, acid, and water decomposition.

However, during steaming and drying were occured expenditure or partial removal of water from crackers. Evaporated water was free water contained in the material. Meanwhile decomposition process was undertaken by microorganisms. Those process cause the cell which was opened and the water was leaked out. So that more decomposition occurred on material during fermentation will affet to evaporation process during steaming and drying. [16] increasing of decomposition materil will increase amount of evaporated water during heating. [9] said, the drying process is a process of evaporation which mostly to water content on the materials through heat energy.

Length of fermentation was not significantly affected to ash content on cassava chips produced, although the tendency decreasing of ash content was occurred while longer fermentation process. Ash contained on crackers indicates mineral content (calcium, phosphorus and iron) in cassava. According [17], cassava contains 73.7 mg / 100 minerals g. Chemical properties of cassava chips after ripening show on table 1.

TABLE I
CHEMICAL PROPERTIES OF CHIPS CASSAVA

Treatment	Carbohydrate (%)	Soluble crude (%)	Protein (%)	Fat (%)	Moisture content (%)	Ask content (%)
0 H	69,958 a ± 5,37	2,717 ± 0,09	4,646 ± 0,14	1,874 a ± 0,02	4,819 ± 0,009	0,251 ± 6,15
6 H	71,789 ab ± 3,61	2,895 ± 0,004	4,044 ± 0,07	1,536 b ± 0,002	4,484 ± 0,32	0,247 ± 1,04
12 H	73,199 abc ± 3,05	2,955 ± 0,007	4,059 ± 0,11	1,552 b ± 0,01	4,240 ± 0,45	0,244 ± 0,38
18 H	75,078 bc ± 0,15	2,979 ± 0,002	3,715 ± 0,0001	1,438 b ± 0,004	3,725 ± 0,25	0,241 ± 0,11
24 H	72,140 abc ± 0,39	3,075 ± 0,04	4,129 ± 0,28	1,311 b ± 0,01	5,096 ± 0,12	0,322 ± 0,14
30 H	75,828 c ± 0,19	3,021 ± 0,029	4,072 ± 0,003	1,290 b ± 0,008	4,265 ± 0,01	0,243 ± 0,27

B. Physical Properties

The yields were ranged between 47, 274% s / d 54, 634, longer fermenrtation process was tend to affect toward increasing of yields, but statiscally, it was not significantly affected to the yields. That was occurred because of microorganism activities, starch was more decamped which was affected to gelatinization process during This is because mikroorganism activity during the curing process, the more starch overhauled, gelatinization process that occurs during the kneading and steaming. That process was suitable according to [18] statement, during fermentation process of cassava flour, microorganisms will perforate the starch granules which make starch granule more cohesive. So that process was affected to the chips of cassava texture.

Degree of cassava cracker development was also affected caused by microorganisms. [19] state that, it is affected by gelatinization process. Longer fermentation process increased dgree of cassava cracker development, but statistically the result was not significalty affected. During gelatinization process, the starch granules will be perforated which was affected to greater degree of chips cassava development compared with the undecomposed starch. Degree of development was inversely proportional to the fat content. Higher fat content will affect to lower degree of cassava cracker development. The presence of fat in the dough crackers can disrupt the process of gelatinization because layer of fat on the surface of granules which causes water penetration disrupted. Physical properties of cassava cracker are showed on table 2.

TABLE III
PHYSICAL PROPERTIES

Treatment	Yield (%)	Degree of Chips Cassava Development (%)
0 H	47,274 ± 1,38	34,095 ± 0,45
6 H	50,789 ± 3,05	41,158 ± 2,18
12 H	52,445 ± 1,48	42,058 ± 0,10
18 H	54,634 ± 0,62	49,169 ± 1,67
24 H	53,023 ± 1,77	47,626 ± 10,33
30 H	51,792 ± 0,24	44,707 ± 0,09

Fat content on fried crackers tends to decrease when the longer fermentation process. Increasing of fat cotent on fried crackers caused by oil absorption during frying process. Oil absortion is differences content of fat before and after frying which also affected by gelatinization. Gelatinization process will affect the volume [20]. Similar with fat content on chips of cassava before frying, length of fermentation was also significantly affected to fat content on fried. Oil absorption of cassava crackers are showed on table 3 and the graphic is showed on figure 3.

TABLE III
FAT AND OIL ABSORPTION OF CASSAVA CHIPS AFTER FRIED

Treatment	Fat of Chips Cassava(%)	Oil Absorption After Fried (%)
0 H	26,806 ± a 0,75	24,932 ± 1,07
6 H	23,993 ± a 0,36	22,457 ± 0,41
12 H	23,666 ± ab 2,54	22,114 ± 2,93
18 H	23,044 ± ab 3,13	21,605 ± 2,90
24 H	20,260 ± ab 2,85	18,949 ± 3,26
30 H	20,044 ± b 7,51	18,754 ± 7,01

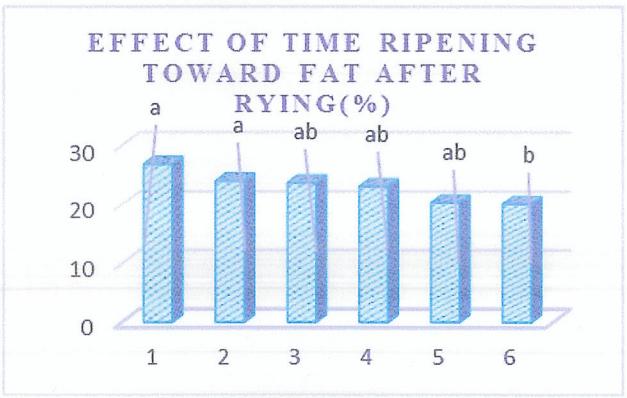

Figure 3. Grafic of Fat Chips of Cassava After Frying

C. Microorganism Analysis

Table 4. shows total plate count on cassava cracker. Data of total plate count on unfermented grated cassava was intial number of microorganisms that was existed in the grated cassava. The initial microorganism can be carried from processing or the raw material itself. Total plate count tends to increase up to 18 hours of fermentation process, which was indicated fermentation process affected to development of microorganisms. Microorganisms that grow are amylolytic group characterized by a milky white colonies surrounded by yellow areas (showed on figure 4). However ALT decreased during fermentation when it had been 24 hours, indicated the development of microorganisms had already on the phase statisioner. [20] state that, the growth of microorganism is consist of four phases , such as ; the lag phase, log phase, statisioner phase , and decreased phase. Then total plate count increased at 30 hours fermentation indicated there was possible growth of contaminants

TABLE IVII
TOTAL PLATE COUNT

Treatment	Total Plate Count (cfu/g)
0 H	$7,3 * 10^3$
6 H	$1,1 * 10^4$
12 H	$1,5 * 10^4$
18 H	$1,6 * 10^4$
24 H	$1,4 * 10^4$
30 H	$2,3 * 10^4$

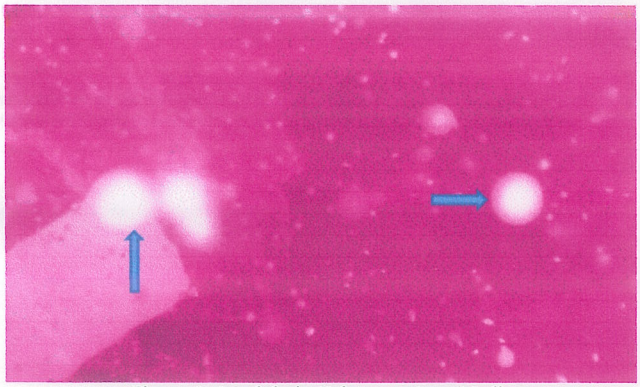

Figure 4. Amylolytic Colony on Agar Media

IV. CONCLUSION

Based on research length of fermentation process of grated cassava significantly affected to the fat content, carbohydrate content, and fat content after after fying. The best treatment of fermentation was 18 hours. The characteristic of cassava cracker was: carbohydrate 75.078%, crude fiber 2,979%, protein 3.715%, fat 1.438%, moisture content 13.725% and the ask content 6.041%. for physical properties were the yield of 54.634%, the degree of cassava cracker development 49.169%, fat content after frying 23, 044%, and oil absorption 21.605%. For total plate count was 1.6×10^4 cfu / g.

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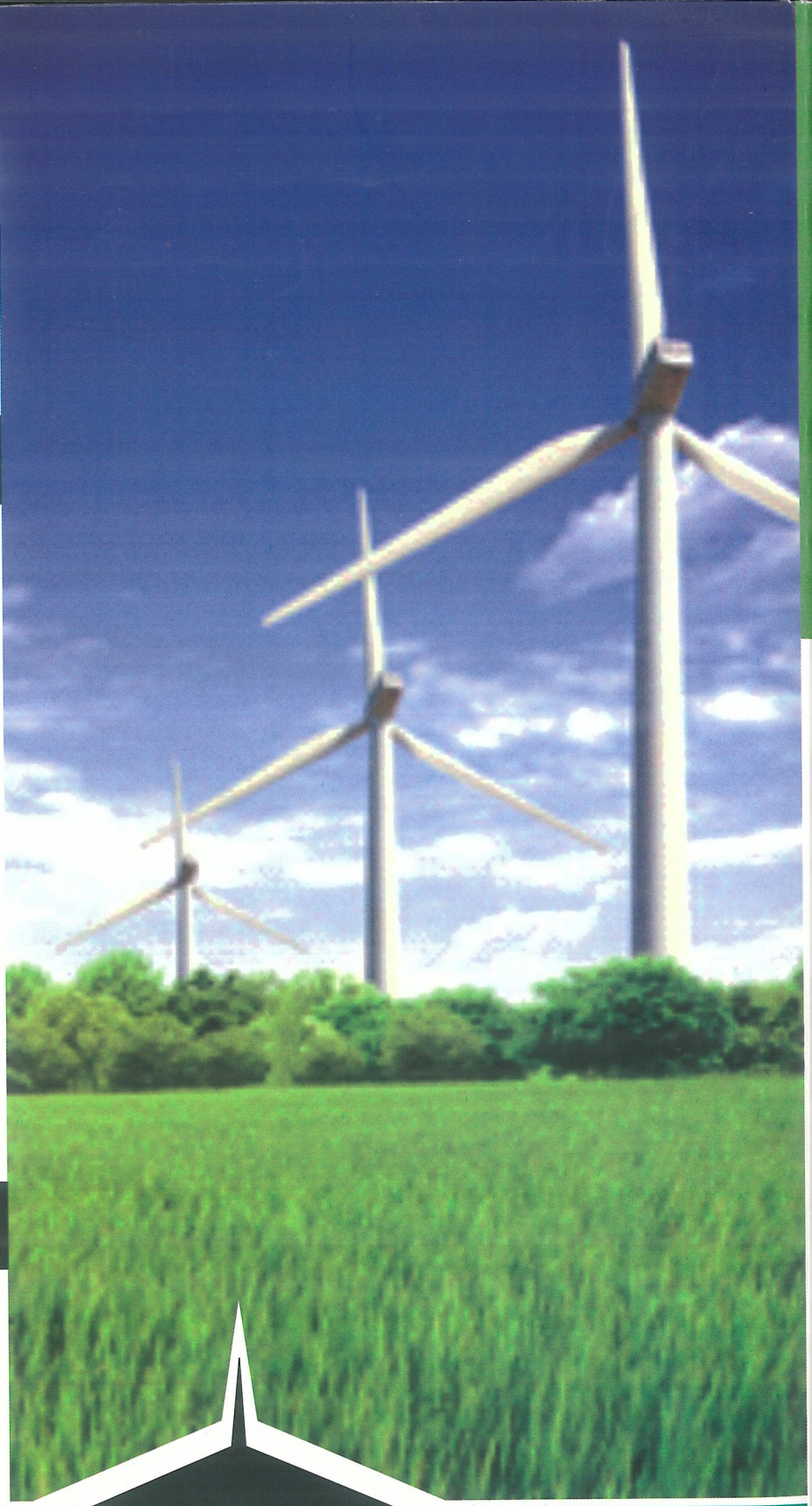

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Dr. Paul Kristiansen-*University of New England-AUSTRALIA*
Prof.Dr. Shu-San Hsiau, *National Central University, TAIWAN*
Prof. Dr. Jiing-Yih Lai,*National Central University, TAIWAN*
Prof. Dr. Dung-An Wang, *National Chung Hsing University, TAIWAN*
Prof. Dr.Daecheol Kim, *Chonbuk National University, KOREA*
Prof.Dr. Nat Vorayos, *Chiangmai University, THAILAND*
Prof. Dr. Hiroshi Umakoshi, *Osaka University, JAPAN*
Prof. Glenn M. Young, *University of California, Davis, USA*
Assoc.Prof. Cary J. Trexler, *University of California, Davis, USA*
Assoc.Prof. Minh Nguyen, *University of Newcastle, AUSTRALIA*
Dr. Daniel Pioch, *Physico-chemistry of Processes and Bioenergy Laboratory, Montpellier, FRANCE*
Prof. Dr. ir. Koen Dewettinck, Ghent *University, BELGIUM*
Ass.Prof. Dr.Charin Techapun, *Chiang Mai University, THAILAND*
Ass.Prof. Dr. Taewee Tongdaeng Karrilla, *Prince of Songkla University, Pattani Campus, THAILAND*
Asst. Prof. Dr. Worasit Tochampa, *Naresuan University, THAILAND*
Dr. Bui Ngoc Hung, *Nong Lam University Ho Chi Minh city, VIETNAM*
Assoc. Prof. Dr. Phan Tai Huan, *Nong Lam University Ho Chi Minh city, VIETNAM*
Assoc.Prof. Dr. Le Quoc Tuan, *Nong Lam University Ho Chi Minh city, VIETNAM*
Dr. Nguyen Ngoc Thuy, *Nong Lam University Ho Chi Minh city, VIETNAM*
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Prof. T R Preston, PhD, *DSc CIPAV, COLOMBIA*
Asst. Prof. Dr. Chanin Umpostira, *Naresuan University-THAILAND*
Prof Steve Déry, *Université Laval Québec, Quebec, CANADA*

SAFE-Network Secretariat

[1] Ir. Aisman, MS-*Andalas University* (Coordinator); [2] Rahmat Hidayat, Politechnic State of Padang- INDONESIA; [3]Tsara Amalia-*Andalas University* ; [4] Hanifah Addinny-*Andalas University*; [5] Reza Kusuma-*Andalas University* ; [5] Nurselvi-*Gajah Mada University* [6] Annisyia Zarina Putri-*Gifu University-JAPAN*

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E-mail: wahyudi.david@bakrie.ac.id

SAFE2015 PROGRAM

ber 16, 2015

ber 17, 2015
g Discussion and Pre-Conference Tour
am University Ho Chi Minh City

arket-NLU Campus (*Bus will be provided by Organizing Committee*)

TION
: **Prof. Dr. Fauzan Azima, *Andalas University-INDONESIA***
AFE-Network Secretariat Staff: [Aisman Rasjinin, Rahmat Hidayat, Nurselvi Syafril, Reza Kusuma, Putri Tatiek Kancaniati]
aff-VIETNAM
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ssion 1
ng Lam University Ho Chi Minh City

oom 2 **ession Chair:** ***r. Khandra Fahmy-*** *ndalas University. IDONESIA*	**Room 3** **Session Chair:** ***Vonny Indah Mutiara-*** *Gifu University. JAPAN*	**Room 4** **Session Chair:** ***Dr. Renny Eka Putri-*** *Andalas University. INDONESIA*	**Room 5** ***Session Chair:*** **Dr. Ing. Thien Trung Le.** *Faculty of Food Science and Technology. Nong Lam University - Ho Chi Minh City. Thu Duc District, Ho Chi Minh City, Vietnam*	**Room 6** ***Session Chair:*** ***Dr. Rahmat Mulia-*** *ICRAF Vietnam*
rof. Kesuma *ayuti*, Fauzan* *zima*, Melvin Marisa* *Department of gricultural Processing echnology, Andalas niversity, Kampuss imau Manis, Padang, ndonesia*	**Prof. Hasanuddin[1],** *[1]Researcher Department of Agrotechnology, Faculty of Agriculture, University of Syiah Kuala Banda Aceh-Indonesia*	**Y. A. Yusof*[1], S. W. Tan, N. L. Chin#[1]** *[1]Department of Process and Food Engineering, Universiti Putra Malaysia (UPM),43400 Serdang, Selangor, Malaysia*	**Hong M.X. Nguyen[(1)], Dong T. Phan[(1)], Andreas L. Lopata[(2)], Peter Smooker[(3)]** *[(1)] Faculty of Food Science and Technology, Nong Lam University, Thu Duc District, Ho Chi minh City, Vietnam,*	**Norman G. De Jesus** *Project leader, Pampanga Agricultural College-ALIAS R&DE CENTER Philippines*

09.10-09.15 AM		Q&A	Q&A	Q&A	Q&A	Q&A
09.15-09.20 AM		FT-02	SA-02	PD-02	FT-15	PMM-02
09.20 -09.25 AM		FT-03	SA-03	PD-03	FT-16	PMM-03
09.25 -09.30 AM		FT-04	SA-04	PD-04	FT-17	PMM-04
09.30 -09.35 AM		FT-05	SA-05	PD-05	FT-18	PMM-05
09.35-09.40 AM		FT-06	SA-06	PD-06	FT-19	PMM-06
09.40-09.45 AM		FT-07	SA-07	PD-07	FT-20	PMM-07
09.45-09.50 AM		FT-08	SA-08	PD-09	FT-21	PMM-08
09.50–09.55 AM		FT-09	SA-09	PD-10	FT-22	PMM-09
09.55-10.00 AM		FT-10	SA-10	PD-11	FT-23	PMM-10
10.00-10.05 AM		FT-11	SA-11	PD-12	FT-24	PMM-11
10.05-10.10 AM		FT-12	SA-12	PD-13	FT-25	PMM-12
10.10-10.15 AM		FT-13	SA-65	PD-53	FT-26	PMM-13
10.15-10.30 AM		Q&A	Q&A	Q&A	Q&A	Q&A
	NETWORKING DISCUSSION					
10.30-10.50 AM		Coffee Break				

Parallel Session II

Venue: Nong Lam University Ho Chi Minh City

Room 2 **Session Chair:** **Asst. Prof. Worasit Tochampa, Ph.D.** *Chair, Department of Agro-industry Faculty of Agriculture, Natural Resources and Environment Naresuan University, Muang, Phitsanulok 65000 THAILAND*	**Room 3** **Session Chair** **Assoc. Prof. Nguyen Van Ngai, Dean,** *Fac. Of Agriculture and Economics, Nong Lam University HCMC*	**Room 4** **Session Chair:** **Dr. Ho Thanh Ba** *Nong Lam University, HCMC, Vietnam*	**Room 5** **Session Chair:** *Yuthana Phimolsiripol, Ph.D.* *Director, Food Innovation and Packaging Center Division of Product Development Technology, Faculty of Agro-Industry, Chiang Mai University 50100*	**Room 6** **Session Chair:** **Prof. Dr. Manh Hoang.** **Institute for** *Sustainability and Innovation- Victoria University, Australia*
Van Anh Le[1], Minh H. Nguyen[1,2], Sophie E. Parks[1,3] and Paul D. Roach[1] *[1] School of Environmental*	**Adel Reyhanitabar,** *University of Tabriz- Islamic Republic of IRAN*	**Henny Purwaningsih*,** Mohammad Khotib, Zainal Alim Mas'ud, & Tun Tedja Irawadi *Department of Chemistry,*	Manami Watanabe[1]; Natsuki Uchida[2]; Keiko Fujita[2]; Tomoyuki Yoshino[2]; **Toshifumi Sakaguchi[3]**	*University* ***Dr.Doc Lap Tran.*** *Department of Agricultural Economics,*

		and Life Sciences, University of Newcastle, Ourimbah, NSW 2258, Australia. [2]*School of Science and Health, University of Western Sydney, Penrith, NSW 2751, Australia.*		*Faculty of Mathematics and Science, Bogor Agricultural University, Bogor, Indonesia. Integrated Laboratory, Bogor Agricultural University, Bogor, Indonesia*	[1]*Department of Environmental Sciences, Prefectural University of Hiroshima-JAPAN* [2]*Department of Life Sciences, Prefectural University of Hiroshima-JAPAN* [3]*Department of Life Sciences and Department of Environmental Sciences,* Prefectural University of *Hiroshima-JAPAN*	*Faculty of Economics, Nong Lam University, Ho Chi Minh City, Vietnam E-mail: tdlap@hcmuaf.edu.vn*
11.00-11.05 AM		FT-28	SA-15	PD-15	FT-39	AE-27
11.05-11.10 AM		FT-29	SA-17	PD-16	FT-40	AE-28
11.10-11.15 AM		FT-30	SA-18	PD-17	FT-41	AE-29
11.15-11.20 AM		FT-31	SA-19	PD-18	FT-42	AE-30
11.20-11.25 AM		FT-32	SA-20	PD-19	FT-43	AE-31
11.25-11.30 AM		FT-33	SA-21	PD-20	FT-44	AE-33
11.30-11.35 AM		FT-34	SA-23	PD-21	FT-45	AE-33
11.35-11.40 AM		FT-36	SA-24	PD-22	FT-46	AE-34
11.40-11.45 AM		FT-37	SA-66	PD-23	FT-47	AE-35
11.45-11.50 AM		FT-52	SA-48	PD-24	FT-48	AE-39
10.50-10.55 AM		FT-73	SA-68	PD-48		AE-41
11.50-12.10		Q&A	Q&A	Q&A	Q&A	Q&A
12.10-13.30	**LUNCH BREAK & PRAYER**					
13.30-19.00	**Ho Chi Minh City TOUR**					

SUB-THEME

(1) Sustainable Agriculture (SA)
(2) Agriculture and Environment (AE)
(3) Agriculture and Energy (E)
(4) Food Technology (FT)
(5) Product Development (PD)
(6) Policy development, Management and Marketing (PMM)

DAY 2: Wednesday, 18 November 2015
VENUE: Rex Hotel HCMC

Time	Activity
7.30-8.30 AM	**Registration**
8.30-9.00AM	**Opening Ceremony** **Venue: Rex Hotel-Ho Chi Minh City**
8.30-8.35	Conference Program Introduction by Local Conference Coordinator, **Dr. Nguyen Ngoc Thuy**
8.35-8.40	Welcome Remark from President of NLU, **Prof.Dr. Nguyen Hay**
8.40-8.45	Welcome Remark from Rector of Andalas University, **Prof. Dr. Werry Darta Taifur, MA**
8.45-8.50	Welcome Remark by ICRAF Country Representative (Vietnam)-**Dr. Delia C. Catacutan.**
8.50-8.55	Presentation of Certificate of Appreciation and Special Gift from **Dr. Novizar Nazir (SAFE-Network)** to NLU, Andalas University, ICRAF, CPI-Indonesia and other sponsors
8.55-9.00	Delivery of **SAFE 2016 official logo** to the Delegate from Sri Lanka represented by **Prof. P.M.C.S De Silva, PhD** by NLU President, **Prof. Dr. Nguyen Hay and Photo Session**
9.00-10.15	**KEY NOTE ADDRESSES** **Venue: Ball Room, Rex Hotel Ho Chi Minh City**
	Fostering Multi-stakeholder collaboration for Sustainable Agriculture, Food and Energy **Session Chair: Dr. Paul Kristiansen,** *University of New England.* AUSTRALIA
9.10-9.25 AM	**Prof. Dr. Bui Chi Buu,** *former Director General, Southern Institute of Agricultural Science, Vietnam.* **Agricultural Transformation for Sustainable Development in Vietnam"**
9.25-9.40 AM	**Prof. Dr. Helmi Syarifuddin,** *SAFE-Network Andalas University* ***Fostering Multi-stakeholder collaboration for Sustainable Agriculture, Food and Energy: SAFE-Network Perspective***
9.40-9.55 AM	**Delia Catacutan, PhD.** *ICRAF Country Representative-Vietnam* ***Role of Agroforestry in Achieving Sustainable Agriculture, Food and Energy***
9.55-10.15	**Q & A** Presentation of Certificate of Appreciation and Special Gift to Session Chair and Keynote Speakers
10.15-10.30	**COFFEE BREAK**

10.30-11.40	**Plenary Session I** Venue: Ball Room, Rex Hotel Ho Chi Minh City
10.30-10.40AM	**Presenter 1: Dr. Agustin Mercado-**ICRAF Philippines ***The Landcare experience in the Philippines: Technical and institutional innovations for conservation farming***
10.40-10.50 AM	**Presenter 2: Prof. Dr. Mohd. Razak- Universiti Malaysia Kelantan-MALAYSIA** *Sustainable Non-Wood Forest Product Development, Universiti Malaysia Kelantan. MALAYSIA*
10.50-11.00 AM	**Presenter 3.** **Prof. Mizanur Rahman Bhuiyan-** Khulna University.Bangladesh *Agroforestry and Soil Conservation in the hilly areas of Bangladesh*
11.00-11.10 AM	**Presenter 4:** **Prof. Gemma Masahiko, *Waseda University-JAPAN*** Food Security for Asia and Pacific
11.10-11.40	Q & A Presentation of Certificate of Appreciation and Special Gift to session chair and invited Speakers
11.40-12.45	**Plenary Session II** Venue: Rex Hotel-Ho Chi Minh City
	Putting sustainability of agriculture, food and energy into practice (PS) **Venue: Ball Room, Rex Hotel Ho Vhi Minh City** **Session Chair: Assoc. Prof. Dr.-Ing. Huan Phan Tai** *Dean, Faculty of Food Science & Technology. NONG LAM UNIVERSITY* *Thu Duc District, Ho Chi Minh City, Vietnam*
11.40-11.50 AM	Presenter 5: **Prof Glenn Young, UC Davis-USA** **Building Safe Vegetable Value Chains in Southeast Asia**
11.50-12.00 AM	Presenter 6: **Prof. Kohei NAKANO, Ph.D,** *The United Graduate School of Agricultural Science, Gifu University-JAPAN* **"Challenges in Effective Utilization of CO_2 in Postharvest Technology for Sustainable Agriculture, Food and Energy"**
12.00-12.10 AM	**Presenter 7** **Nobutaka Ito,** *Faculty of Engineering, Chiang Mai University-THAILAND* **How Much Fee We Can Pay For Sustainable Society Building?**
12.10-12.20 AM	**Presenter 8** **Prof. Kyeong Uk Kim,** *National Seoul University Korea* **The Agricultural Mechanization status in South Korea**
12.20-12.45	Q & A Presentation of Certificate of Appreciation and Special Gift to session chair and invited Speakers
12.45-14.00	Lunch Break, Poster Session & Prayer
14.00-15.35	**Parallel Session 1** Venue: Rex Hotel-Ho Chi Minh City

Paralllel Session	**Room 1** **Session Chair:** **Dr. Lisa Hiwasaki,** ***ICRAF Vietnam***	**Room 2** **Session Chair:** **Assoc. Prof. Dr.** **Nguyen Huy Bich,** *Nong Lam University* *Ho Chi Minh City,* *VIETNAM*	**Room 3** **Session Chair:** *Dr. Rahmat Mulia-ICRAF* *Vietnam*	**Room 4** **Session Chair:** **Prof. P.M.C.S De Silva,** *University of Ruhuna-Sri* *Lanka*	**Room 5** **Session Chair:** ***Prof. Minh Nguyen****, The* *University of Newcastle-* *AUSTRALIA*
14.10-15.35	**Prof. Nurpilihan** **Bafdal-***Pajajaran* *University-INDONESIA*	**Jaya Wahono,** *Clean* *Power Indonesia-* *INDONESIA*	**Prof. LOURDES D. SABI LE** *Planning and Research* *Development* *The University of Manila. 546* *M.V. delos Santos, St.,* *Sampaloc, Manila, Philippines*	**Prof. Takashi Oku** *Department of Life* *Sciences, Prefectural* *University of Hiroshima,* *Shobara, 727-0023,* *Japan. E-*mail: toku@pu- hiroshima.ac.jp	**Prof. Bhesh Bhandari** University of Queensland-AUSTRALIA
14.10-14.15	**AE-02**	**E-01**	**Q&A**	**SA-26**	**Q&A**
14.15-14.20	**AE-03**	**E-02**	**PMM-15**	**SA-27**	**FT-35**
14.20-14.25	**AE-04**	**E-03**	**PMM-16**	**SA-28**	**FT-56**
14.25-14.30	**AE-05**	**E-04**	**PMM-17**	**SA-29**	**FT-60**
14.30-14.35	**AE-06**	**E-06**	**PMM-18**	**SA-30**	**FT-64**
14.35-14.40	**AE-07**	**E-08**	**PMM-19**	**SA-31**	**FT-66**
14,40-14.45	**AE-08**	**E-09**	**PMM-20**	**SA-32**	**FT-68**
14.45-14.50	**AE-09**	**E-10**	**PMM-21**	**SA-33**	**FT-69**
14.50-14.55	**AE-10**	**E-11**	**PMM-22**	**SA-34**	**FT-70**
14.55-15.00	**AE-11**	**E-12**	**PMM-23**	**SA-35**	**FT-71**
15.00-15.05	**AE-12**	**E-13**	**PMM-23**	**SA-36**	**FT-72**
15.05-15.10	**AE-13**	**E-15**	**PMM-24**	**SA-37**	**FT-74**
15.10-15.15	**AE-14**	**E-21**	**PMM-25**	**SA-38**	**FT-75**
15.15-15.20	**AE-42**	**E-22**	**PMM-26**	**SA-67**	**FT-76**
15.20-15.35	**Q & A**	**Q&A**	**Q&A**	**Q&A**	**Q&A**
15.35-15.50	**Coffee Break**				

4.00-5.20 PM Parallel Session 2

Venue: Ball Room, Rex Hotel Ho Chi Minh City

	Room 1 **Session Chair:** **Narumol Matan,** *Wailalak Univerity-* *THAILAND*	**Room 2** **Prof. Dr. Gemma Masahiko,** ***Waseda University-JAPAN***	**Room 3** **Session Chair:** **Prof. Dr. Wan Mochtar** *Wan* *Yusoff-Universiti Kebangsaan*	**Room 4** **Session Chair:** **Prof. Bhesh Bhandari** University of Queensland-AUSTRALIA

			Malaysia	
4.00-4.10 PM Q&A	**Prof. Hanilyn A. Hidalgo.** *College of Economics and Management, Central Bicol State University of Agriculture, Pili, Camarines Sur 4418, Philippines*	**Prof. Melinda Noer.** *Andalas University-INDONESIA*	**Dr. Imtiaz KHAN** *Agriculture University Peshawar-Pakistan* *Faculty of Plant Protection Sciences-Weed Science Department*	**Dr. Daniel PLOCH** *CIRAD Dpt Amis / UMR CIRAD-016 GPEB.Génie des procédés d'Elaboration des bioproduits TA B 64/16. 73, rue Jean-François BRETON.34 398 MONTPELLIER Cedex 5, FRANCE*
4.10-4.15 PM	AE-15	PMM-28	SA-22	PD-26
4.15-4.20 PM	AE-16	PMM-29	SA-40	PD-27
4.20-4.25PM	AE-17	PMM-30	SA-41	PD-28
4.25-4.30 PM	AE-18	PMM-31	SA-42	PD-29
4.30-4.35 PM	AE-19	PMM-32	SA-43	PD-30
4.35-4.40 PM	AE-20	PMM-33	SA-44	PD-31
4.40-4.45PM	AE-21	PMM-34	SA-45	PD-32
4.45-4.50 PM	AE-22	PMM-35	SA-46	PD-33
4.50-4.55 PM	AE-23	PMM-36	SA-47	PD-34
4.55-5.00 PM	AE-24	PMM-40	SA-49	PD-35
5.00-5.05 PM	AE-25	PMM-48	SA-50	PD-36
5.05-5.20 PM	Q&A	Q&A	Q&A	Q&A
5.20 –5.50 PM	**CLOSING CEREMONY** **Venue: Ball Room, Rex Hote-Ho Chi Minh City**			
	Key points/ highlight from the sessions (Dr. Delia Catacutan and Dr. Nguyen Ngoc Thuy) Presentation of Certificate of Appreciation and Special Gift from **Dr. Novizar Nazir (SAFE-Network)** 1. **Prof. Dr. Nguyen Hay** (SAFE2015 Chairman)- Nong Lam University Ho Chi Minh City, VIETNAM 2. **All Session Chairs in Parralel Sessions** 3. **The" backbone" of SAFE2015** **Closing Message: Prof. Dr. Nguyen Hay**, President, Nong Lam University-Ho Chi Minh City			
5.50 - 7.00 PM	**Farewell Dinner (Cruise on boat along the Saigon River)**			

DAY 3: Thursday, November 19, 2015
VENUE: Nong Lam University HCMC-VIETNAM
Celebration of 60th Nong Lam University Anniversary.

FT-04	**Indri Juliyarsi, Deni Novia and Sri Melia** *Animal Science of Faculty, Universitas Andalas, Padang, Indonesia* *E-mail: i.juliyarsi@gmail.com*	INDONESIA	Study : Method of Crispy Skin Drying with Traditional and Solar Tunnel Dryer at Home Industry in Tilatang Kamang Agam Sumatera Barat Indonesia
FT-05	**Maryam[#], Anwar Kasim[*], Santosa[*]** *[#] Agro-Industrial Engineering, Politeknik ATI Padang, Tabing, 25171, Padang, West Sumatra. E-mail: iyam_cb@yahoo.co.id* **Faculty of Agricultural Technology, Andalas University, 25163, Padang, West Sumatra. E-mail: anwar_ks@yahoo.com*	INDONESIA	Utilization Starch of Avocado Seed (*Persea americana* Mill.) as a Raw Material for Dextrin
FT-06	**Radna Ningsih, Lisa Nesti#, Syahril Mengkok#** *# Logistics Management Agroindustry, Politeknik ATI Padang, Tabing, 25171, Padang, West Sumatra. E-mail: radna.ningsih@gmail.com*	INDONESIA	Dominant Factors Affecting The Quality Tuber-Based Snacks Products By Using Quality Control Techniques
FT-07	**Ni Made Ayu Suardani Singapurwa, I Gede Pasek Mangku** *[1]Department of Food Science and Technology, Warmadewa University, Denpasar, Bali. Email : a.suardani@gmail.com; Email : pasek_mangku@yahoo.com*	INDONESIA	Characteristics of "*Pedetan*" *Sardinella* With Packaging of Plastic Film During Storage
FT-08	**Dao Thi Anh Thu, NGUYEN Thi Xuan Van** *Chemical Engineering Department, University of Science and Technology, The University of Danang, 54 Nguyen Luong Bang Str. Danang City, Vietnam.* *E-mail: thudao.vn@gmail.com*	VIETNAM	Studying Of The Viability Of Selected Probioitcs In Soy Milk To Develop A Functional Beverage Product
FT-09	**Wenny Surya Murtius** *Department of Product Agricultural Technology Faculty of Agricultural Technology Andalas University, Padang, Indonesia.* *E-mail: wenny.murtius@gmail.com*	INDONESIA	The Effect of Times Ripening Grater Cassava (*Manihotutilissima*) toward Physical and Chemical Properties of Crackers Produced
FT-10	**Nur Hanani, Z. A.[1,2*], Abdullah, S.1** *[1]Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia* *[2]Halal Products Research Institute, Universiti Putra Malaysia, 43000 UPM Serdang Selangor, Malaysia. E-mail: Hanani@upm.edu.my*	MALAYSIA	Development of Green Banana (*Musa paradisiaca*) as Potential Packaging Films
FT-11	**Warangkana Angkananon, Mudtorlep Nisoa, Phanpen Wattanaarsakit, Visaka Anantawat** *Walailak University-THAILAND. E-mail: nan_pup@hotmail.com* *Plasma Technology for Agricultural Applications Research Laboratory, School of Science, Walailak University, Nakhon Si Thammarat, 80161 Thailand. E-mail: nmudtorl@wu.ac.th. Chulalongkorn University Thailand.* *E-mail: aphanphe@chula.ac.th. anvisaka@gmail.com*	THAILAND	Effects of Drying Process on Characteristics of Gac Fruit Aril Powder
FT-12	**Yanti Melda Sari[1], Syarifah Rohaya[1], Fahrizal[1]** *Agricultural Product Technology Department, Faculty of Agriculture, Syiah Kuala University, Banda Aceh, Indonesia. Email: yantimeldasari@unsyiah.ac.id*	INDONESIA	The Effect Of The Gel Percentage And The Length Of Boil Time To The Making Of Sago Noodles

FT-13	**[1]Kanokwan Puangjinda; [2]Narumol Matan; [3]Mudtorlep Nisoa** *Walailak University-THAILAND. E-mail: [1]kanockwan.rain@gmail.com; [2]nnarumol@yahoo.com; [3]mnisoa@yahoo.com*	THAILAND	Effect of moisture content and popping method on the quality and nutritional value of popped rice (Khai Mod Rin 3)
FT-14	**Hong M.X. Nguyen, Dong T. Phan, Andreas L. Lopata, Peter Smooker** *Faculty of Food Science and Technology, Nong Lam University, Thu Duc District, Ho Chi minh City, Vietnam. E-mail: nmxhong@hcmuaf.edu.vn*	VIETNAM	Formulation of Chitosan-based Biofilm for Application in Instant Food Casing
FT-15	**Nguyen Duc Canh[1], Nguyen Van Hung[2]** *[1]Nong Lam University Ho Chi Minh City-VIETNAM. E-mail: canh.nlu@gmail.com* *[2]International Rice Reasearch Institultion. Philippines. E-mail: hung.nguyen@irri.org*	VIETNAM	Research On Parameters Effecting On Head Brown Rice Recovery And Energy Consumption Of Rubber Roll And Stone Disk Dehusking
FT-16	**Van Tuan Tran, Quang Vinh Le, Van Xuan Nguyen** *1Nong Lam University Ho Chi Minh City-VIETNAM. E-mail: tvtuan2509@yahoo.com; lqvinhnlu@gmail.com; vanxuan310156@gmail.com*	VIETNAM	Research On Cassava Drying, Application And Promotion Of Dryers For Sliced Cassava
FT-17	**Normalina Arpi*, Fahrizal, Satriana** *Department of Agricultural Product Technology, Syiah Kuala University, Banda Aceh 23111, Indonesia. *Email: normalina.arpi@unsyiah.ac.id*	INDONESIA	Extraction And Properties Of Gelatin From Spotted Oceanic Triggerfish (*Canthidermis Maculata*) Skin And Bone
FT-18	**Novi Safriani, Normalina Arpi, Novia Mehra Erfiza** *Agricultural Product Technology Department, Agriculture Faculty, Syiah Kuala University, Banda Aceh 23111, Indonesia. Email: novisafriani@unsyiah.ac.id*	INDONESIA	Antioxidant Activities of *Cyperus rotundus* L. Rhizome and *Areca catechu* L. Seed
FT-19	**Ira Desri Rahmi** *Faculty of Agricultural Technology-Andalas University. Indonesia. E-mail: ira.desri@gmail.com*	INDONESIA	Encapsulation of Coffee Leaf Extract in Various Concentration Using Maltodextrin as a Wall Material
FT-20	**Wittawat Rhatcharhongwang, Visaka Anantawat, Nutjaree Sawjiw, Mudtolep Nisao** *Walailak University-THAILAND. E-mail: [1]wittawat.racha@gmail.com; [2]anvisaka@gmail.com, [3]cnujare@wu.ac.th, [4]nmudtorl@wu.ac.th*	THAILAND	Analysis of Critical Control Point in the Production of Pasteurized Milk. Case Study: Phatthalung Dairy Cooperative Limited
FT-21	**Montesqrit, Khalil and Mardhiatul Ulya** *[1)] Faculty of Animal Science, Andalas University, Padang, West Sumatera Indonesia. Email : Montesqrit@yahoo.com*	INDONESIA	The Influence Of Drying And Time Of Storage Against Content Of Nutrient Of Rice Bran Varieties Anak Daro
FT-22	**Nor Afizah Mustapha[a,b]*, FatinFarhanahBintiRahmat[a], Wan Zunairah Wan Ibadullah[a]** *[a]Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia. Email: nor_afizah@upm.edu.my; wanzunairah@upm.edu.my. [b]Halal Product Research Institute, Universiti Putra Malaysia, Putra Infoport, 43400 UPM Serdang Selangor, Malaysia Email: nor_afizah@upm.edu.my*	MALAYSIA	Development Of Jackfruit Crackers: Effects of Starch Type And Jackfruit Level

FT-09

The Effect of Times Ripening Grater Cassava (*Manihotutilissima*) toward Physical and Chemical Properties of Crackers Produced

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Abstract: This research was aimed to know effect of times ripening grated cassava toward physical and chemical properties of crackers produced. Ripening is done with various times (0 , 6, 12, 18, 24 and 30 h). This Research using design is Completely Randomized Design (CRD) with duplo. Data was analysed statistically with ANOVA and if significantly different were continued with Duncan's New Multiple Range Test (DMRT) at 5% significance level. As a result of this experiment, it was found that,the times of ripening are significantly affect to fat, carbohydrate, yield, degree of crackers development and fat of crackers after fried. Based of this research the best time of ripening 18h.

Keywords : crackers, cassava, *Manihotutilissima,* crackers produced

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FT-10

Development of Green Banana (*Musa paradisiaca*) as Potential Packaging Films

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Abstract : The aim of this study was to develop biodegradable packaging films based on unripe green banana (Musa paradisiaca L.) with different concentration of plasticizers; glycerol, polyethylene glycol (PEG) and sorbitol. Banana films were produced by using casting method and physical properties of these films were determined. Banana films with 10% of PEG showed the lowest water solubility followed by films with glycerol and sorbitol. Banana films with 40% PEG showed the lowest water vapour permeability (WVP) whereas films with 30% glycerol possessed the higher values of mechanical properties compared to films with PEG and sorbitol. Types of plasticizers do not influence the thickness of the films. In general, type of plasticizers used in banana films not influenced the mechanical properties of banana films. However, increasing the plasticizers concentrations had increased the solubility values.

Keywords : Banana; Biodegradable films; Packaging