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INTERNATIONAL SEMINAR ON UNIVERSITY-BASED RESEARCH FOR WETLAND DEVELOPMENT

JOINT PROGRAM BETWEEN LAMBUNG MANGKURAT UNIVERSITY AND GOVERNMENT OF SOUTH KALIMANTAN PROVINCE

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Preface

University is expected as center of excellence as it has numbers of students, faculties and supporting staffs and facilities. Located in swamp-dominated South Kalimantan, Lambung Mangkurat University (UNLAM) has choice swampland study as its main core of excellence (Pola Ilmiah Pokok). This Pola Ilmiah Pokok has been translated into Strategic Plan (RENSTRA) of UNLAM, and detailed in Research Implementation Plan (RIP).

The implementation of RIP in research activity is coordinated by Research Institution (LEMLIT). During this last five years LEMLIT UNLAM has coordinate 922 titles with nearly IDR 30 billion. This then allowed the researcher in UNLAM to carry out more research, including research for constructing swamp environment knowledge. The number of researches carried out in UNLAM during this last five years is above national average. For example, in year 2012 UNLAM has 146 research titles including those funded by the Government of South Kalimantan Province for faculty strengthening research (11 titles) and study program strengthening research (17 titles).

An International Seminar and Workshop was held on 26-27 November, 2012 in Swiss-belt Hotel, Banjarmasin, aiming at (1) evaluating state of the art of researches on wetland development, and (2) designing researches and public service relevance to wetland development. The theme of this seminar is "Wetland development in frame of empowering universities in education, research, and public services". Fifty nine papers have been presented at the seminar, including four key not papers, 20 oral papers and 35 posters. Current prosidings contains twenty four papers, including four key not paper, oral papers and poster

papers. The rest of the papers are planned to be published in Prosidings Book II in the near future.

The success of publishing these proceeding is determined by the Government of South Kalimantan Province through it partial financial support for which we very much appreciate. We are extremely grateful to Ministry of Science and Technology, Republic of Indonesia, for their support. I extend my sincere thanks to invited speakers, who, by short notice, could prepare their paper and present here. I would like to express our thanks to the PEMDA Grantee and all speakers, for submitting and revising their papers in time. Last, but not the least, I would like to thanks all editors, layout and Research Institution staffs for their continuous effort in publishing this proceedings. May the readers find Proceedings Book 1 useful. Wassalamu'alaikum wr. Wb.

Lambung Mangkurat University, June 2013
Head of Research Instituion

Dr. Ahmad Alim Bachri, SE, M.Si

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Dear invited speakers from Indonesia

Dear colleagues from Indonesian government offices, Lambung Mangkurat University's lecturer and post graduate students

Distinguish ladies and gentlemen

Good morning, Assalamu'alaikum warahmatullahi wabarakatuh

First of all let us regard the Almighty Allah, the Lord of the Universe, the Beneficent, the Merciful, the Sustainer, the Omnipotent

Secondly, on behalf of civitas academica I would like welcome you all to our university, Lambung Mangkurat University.

Lambung Mangkurat University (LMU) was established preliminary 1957 year by the independence heroes of Republic Indonesia in South Kalimantan. At a reunion of the heroes in Kandangan, Hulu Sungai Selatan district they form a board named "Dewan Lambung Mangkurat". One of Dewan Lambung Mangkurat work plan was to established a university in Kalimantan. The plan was started by setting up a committee for preparing the establishment of LMU. In mid of 1958 year, the committee could established LMU as private university with four faculties including Faculty of Economics, Faculty of Low, Faculty of Social and Political Science, and Faculty of Islamic Studies. After two years as private university, LMU became in a government university based on the government regulation Number 41, the year of 1960. It also had four faculties, that is Faculty of Economics, Faculty of Low, Faculty of Social and Political Science, and Faculty of Agriculture. The faculty of Islamic Studies was transferred to National Institute of Islam Religion of Yogyakarta and finally became Antasari National Institute of Islam Religion, Banjarmasin. In its development, LMU today has ten faculties. They are Faculty of Teacher Training and Education, Faculty of Low, Faculty of Economics, Faculty of Social and Political Sciences, Faculty of Agriculture, Faculty of Forestry, Faculty of Fishery, Faculty of Faculty of Engineering, Faculty of Medecine, and

Faculty of Mathematic and Natural Sciences. These ten faculties have 13 study program of diploma, 54 study programs of regular bachelor, 6 study programs of extensive bachelor, fourteen study programs of master and one doctorate study program. Number of students of LMU per September, 2012 is … students.

His Excellency the Minister of Science and Technology, Republic of Indonesia, His Excellency the Governor of South Kalimantan Province, invited speakers, distinguish ladies and gentlemen.

The wetland issue has entered LMU since about six teen years ago when the Ministry of Education and Culture set a scientific main excellence of every university in Indonesia. Realizing that LMU is located in a province with huge area of wetlands, LMU has then choice wetlands environment as its scientific main excellence. After six teen years, LMU keeps maintaining it focus on wetland environment though it has not been easy. At the beginning, not all Deans moreover faculties accept the "wetland environment" as LMU's center of excellence. Long discussion has been occurring disputing the issue, though some faculties have been implementing this scientific main excellence in their teaching, research and public services activities. Today International Seminar is one of our effort to give understanding to who has not accepted the "wetland environment" as LMU's scientific main excellence. In my opinion, wetland environment includes low land as well as upper land those affect the lowland. We strongly accept the Ramsar convention on wetland as a basic definition of wetland as the international also does. Apart from Ramsar's definition, we also include up-lands those have changed or have been changed by human to wetlands. These include post mining pond at mining plan, waste water treatment at oil palm mill or coal mining areas, as well as irrigated up-land for paddy field cultivation.

Distinguish ladies and gentlemen

Kalimantan island, universities and companies. Kalimantan is a big island with huge un-renewable resources such as coal, earth gas, iron ore as well as renewable resources like forest product, fishes and oil palm. LMU with all of its potentials including its human resources, intellectual wealth and facilities will keep on participating in managing these resources though educational, research and public service activities. The educational activities are main task of each of ten faculties and one post graduate we have. The research activities are coordinated by Research Institution (Lemlit), while the public service activities are coordinated by the Institution of Public Service, LMU. The tasks, off course, will not be effective and powerful if they are carried out only by LMU itself. Therefore, in this prestigious occasion I would

like to call your collaboration on empowering the education, research and public service in LMU. So far, at regional level we have partnership with Chiba University (Japan), Sang Ji University (South Korea) and University Utara Malaysia. I do hope there will be a collaborative activities between LMU and Chanto University (Vietnam). I would also call collaboration of local governments at district levels, corporate and research center to empowering educational, research and public service activities though wetland development.

Distinguish ladies and gentlemen

Finally, I would like to thank the Ministry of Science and Technology, Republic of Indonesia for his coming and we look forward for his keynote speech. We also thanks the Governor of South Kalimantan for coming and continuous support to LMU though a harmonist relationship, providing research funds, and serving us dinner for tonight at his guest house. I would also express my appreciation to all invited speaker, Prof Dr Towa Tachibana, Dr. Doung Van Ni, Prof. Dr Nordin Kudri from abroad and Mr. I Nyoman Suryadiputra, Dr. Eko Ananto and Dr. Alim Bachri of Indonesia. We do hope your presentations will give contribution to the comprehensive understanding on the wetland issues. The presence of district government representative, colleagues from other universities and research institutes is also highly acknowledged. The last but not the least, I would like to thank all the organizing committee of this seminar due to their hard works, solid cooperation and charity during the preparation of this seminar. Let's pry Allah to the success of this International Seminar on "University-based Researches for Wetland Development".

Thank you very much for your attention.

Assalamu'alaikum Wr Wb.

Muhammad Ruslan, Prof. Dr.

Summary of International Seminar and Workshop on Wetland Development

An International Seminar and Workshop was organized to (1) evaluate state of the art of researches on wetland development, and (2) design researches and public service relevance to wetland development. The International Seminar and Workshop was held in Swiss-belt Hotel, Banjarmasin from 26 November through 27 November, 2012. The theme of this seminar and workshop is "University-based research for wetland development". The International Seminar and Workshop is attended by representative of District Governments, representative of Research Institute, Academia, Businessman, Post graduate student, totaled 234 attendees.

The International Seminar and Workshop have presented Dr Towa Tachibana from Japan, Dr. Doung Van Ni from Vietnam, Prof Dr Rosenani from Malaysia, Mr. I Nyoman Suryadiputra from Wetlands International Indonesia Program and Dr. Eko Ananto from Indonesia, as plenary speakers. Apart from these, 20 papers has been presented orally and.42.papers were presented by poster. The International Seminar and Workshop was officially opened by Ministry of Science and Technology who was represented by Dr. Agus Suyana Hotman, the Special Expert of the Minister.

The summary of the presentation is as follow:

1. Wetlands cover about 3% of globe surface, among which 33-55 mill ha occur in Indonesia. The wetlands consist of various types and have a range of values and benefits. Broadly speaking, these wetlands can be grouped into coastal wetlands, marshes (peat and mangrove), rivers, floodplains, estuaries/river estuaries, lakes and artificial wetlands. The values and benefits of the various types of wetlands include: flood and drought control, coastal belt, transportation, recreation, research and education, sediment traps and water purification, nutrient retention and provision, dilution of pollutants, stabilization of microclimate, global climate control, provision of water to the community, recharging of groundwater, water supply for other wetlands, provision of forest products, wildlife and other food resources, fisheries resources, support for agriculture, energy resources, habitat for biodiversity, unique traditional values /culture, habitat for part or the entire lifecycle of flora and fauna.

2. Wetlands are known as one of the most important terrestrial ecosystems for global environment management. Anthropogenic wetlands such as rice paddies with seasonally alternative flooding and drainage are potentially main source for nitrous oxide (N_2O) emission. In wetland soils, the major biological reaction-involving nitrate is denitrification which account to about 50% of applied N are common in rice paddies. Nitrous oxide (N_2O) gas is presently the greatest threat to the ozone layer and also contributing to climate change as a greenhouse gas, which has heat absorbance capacity that is greater than carbon dioxide (CO_2) and methane (CH_4).
3. Apart from paddy, oil palm (*Elaeis guineensis*) is the crops that can be harvested in tropical wetlands and has gained its importance rapidly. There are two hot issues related to oil palm development. First, oil palm is a relatively new international commercial crop that rapidly expanded its area in the second half of the 20th century. In 2010, the world export value of palm oil (the main product from oil palm) amounted to 29.9 billion US dollars, which is the 3rd largest export among the agricultural produce behind soybeans (39.7 billion USD) and wheat (32.6 billion USD). In 1961, the export value of palm oil is the 44th from the top. Second, production of oil palm surged in South East Asia, in particular, in Malaysia and Indonesia. In 2010, Indonesia and Malaysia accounted for 82% of world production of palm-oil fruits and 61% of the harvested area. One can refer to the current international palm-oil market as the duopoly market of Indonesia and Malaysia.
4. Indonesia and Malaysia are the most producers of palm oil production in addition to rubber, coffee, and sago. There are three major international arguments about the trade of palm oil. First is the alleged impact on deforestation. The big fire in 1997 stimulated the international concern about the expansion of oil palm plantation into forest areas, which led to the establishment of Round Table on Sustainable Palm Oil (RSPO) in 2004. The principles and the guidelines of RSPO are well organized, but may be too idealistic which many small producers find difficult to follow. Second is the rising concern about *TFA: trans-unsaturated fatty acids.* Up to now, this concern gives a boost to palm oil consumption. The last is the concern about the export restriction on palm oil by the two dominant producers: Indonesia and Malaysia. To response these arguments, Indonesia palm oil producers should employ sustainable program for palm cultivation in

order to comply with European Union and United State regulation, especially with regards with greenhouse gas emission savings, deforestation and land clearing.

5. About 9.53 million ha of tidal land in Indonesia were potential for agriculture, but only about 4.18 million ha has been reclaimed for agricultural production. Meanwhile, from the non-tidal swamps land area, only 730 000 ha were already cultivated. However, due to biophysical and socio-economic constraints the utilization is not optimum yet as indicated by lower level of productivity. On the other hand, specific packages of technology developed from research are available which may change the marginal status of tidal swamps land into prospective agricultural producing areas. Agricultural development in swamps land has to be initiated by improvement of land and water management both at macro and micro level, followed by proper cultural practices supported by effective rural institution and farmers participation. Crops management techniques involve the use of improved variety, location specific fertilization, soil ameliorations, effective pests/diseases control and use of farm machineries.
6. University-based research for wetlands development has a success story in Mekong River and can be scale-up further. The activity was a cooperative effort on wetland research and conservation trainings by 18 universities of 7 countries within the Mekong River basin and Malaysia. The background, concept, goals, agreement on academic cooperation, capacity building and training programs carried out so far can be adopted as a model. The implementation of this model at other wetlands will enhance and strengthen the capacity of educators, researchers, technical staffs, facilitators and discussion makers who are willing and able to work in the field of wetland conservation. In the long-term, the network should aim at contributing to management and sustainable development of wetlands.
7. Example of research that can be followed-up for wetland development is Integrating Oil Palm with Rice on Acid Sulfate Soil. The application of integrated oil palm with rice though to keep the crop lands sustainable, while supporting the estate crops like oil palm developed. This notion is in line with the Indonesia Government Regulation No 41/2009 about Sustainable Food Crop, being implemented by the Government of South Kalimantan Province. The manufacturing of waste by producing *biochar* is another

multiplier effect of integrated farming system. *Biochar* application in the rice paddies and soil amendment also has the potential to enhance soil C stock and N retention as well as improving soil fertility.

8. State of the art of wetlands knowledge was believed to be sufficient at this moment, though need to be empowered in the future. Intentions to establish a center and/or a forum on wetlands development were strongly expressed by the attendees.
9. UNLAM has the strategic location for wetlands research centers and such centers can be focused on man-made wetlands from like the ex-mining areas. For initiating the center, it was suggested that UNLAM needs to establish an integrated field laboratory focusing on empowering people surrounding ex-mining areas with the existing technologies UNLAM has. These laboratories can later be promoted to national and international levels.

Banjarmasin, 27 November 2012

Organizing Committee

The Raffinose, Glucose And Fructose In Extract Of Sweet Potato Nagara White From South Borneo

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Abstract

Sweet potato is a functional food as a prebiotic, a producer of sugar and oligosaccharides such as raffinose, glucose, and fructose. This study aimed to observe the effect of the type of solvent on the content of raffinose, glucose and fructose in extracts of sweet potato Nagara white. Sweet potato stored at chilling temperature (± 5°C) in one month. Sweet potato grinded and extracted with different types of solvents, namely ethanol 100%, acetonitrile100%, ethanol: acetonitrile 50:50, ethanol: water 70:30, acetonitrile: water 70:30, ethanol: water 30:70, and acetonitrile: water 30:70 at room temperature, stirring speed of 150 rpm for 2 and 3 days. The amount of raffinose, glucose and fructose determined by HPLC RID (Refractive Index Detector). The content of raffinose, glucose, and fructose in sweet potato were high if sweet potato extracted using ethanol: water 30:70 and 70:30 with extraction 2 days. The content of raffinose is 1.11 to 1.69% (w / v), glucose is 3.52 to 4.14% (w / v), and fructose is 3.80 to 5.46% (w / v). Based on our finding that it is suggested to produce raffinose, glucose, and fructose is high, the sweet potato extracted using ethanol:water 70:30 or 30:70 for 2 days.

Keyword : sweet potato, raffinose, glucose, fructose, extraction

1. Introduction

South Borneo is producer of sweet potatoes such as sweet potato Nagara. Sweet potatoes Nagara are founded in the North and South Daha, district of Hulu Sungai Selatan. The sweet potato Nagara is native plant in the area. There are several types of sweet potatoes Nagara, one of which is a sweet potato Nagara white. The sweet potato Nagara white is sweet potato with white flesh.

The sweet potato can produce sugars and oligosaccharides, such as glucose, frutose, and raffinose. The sugar provides sweet and enhance consumer acceptance. The oligosaccharide is a functional food and a ingredient food can not be digested. Hustiany (2012) states that the sweet potato Nagara white in a fresh condition containing glucose, fructose, sucrose and maltose, and raffinose. When the sweet potato Nagara white is stored at room temperature for one month, it has decreased the amount of glucose and fructose than in fresh condition and will increase the amount of sucrose, maltose and raffinose. If stored at chilling temperature for one month, the sweet potato Nagara white containing sucrose, maltose and raffinose.

The materials contain sugars and oligosaccharides can be isolated with a polar solvent, such as acetonitril:water (65:35, v/v) dan ethanol (Muzquiz *et al.* 1999); ethanol 8-10% (French *et al.* 1959); acetonitril:water (85:15, v/v) (Da Costa Leite *et al.* 2000); acetonitril:water and water (Park *et al.* 2001), and water (Kennedy *et al.*, 1989).

The purpose of this study was to determine the effect of solvent type on the content of raffinose, glucose, and fructose in extracts of sweet potato Nagara white.

2. Methods

The first,the sweet potato Nagara white stored at chilling temperature (± 5 ° C) for one month. The sweet potato Nagara white is dried, crushed, and extracted with different types of solvents, namely ethanol 100%, acetonitrile100%, ethanol: acetonitrile 50:50, ethanol: water 70:30, acetonitrile: water 70:30, ethanol: water 30:70, and acetonitrile: water 30:70 at room temperature, stirring speed of 150 rpm for 2 and 3 days. The sample used for extraction is 50 g/150 ml solvent. After 2 and 3 days, and the extracts filtered through cotton and Whatman No. 40. The solvent was evaporated and the filtrate was diluted to 10 ml, so the concentration being 0.033 g/ml.

The amount of raffinose, glucose and fructose determined by HPLC RID (Refractive Index Detector). The column used was Metacarb Ca Plus with a length of 30 cm and a diameter of 1 cm. Column temperature used was 85^{o}C. The samples injected 10 □l with the mobile phase is H_2O. The flow rate of mobile phase is 1 ml / min. The method used was isocratic. The standard was also injected, namely glucose, fructose, and raffinose.

3. Results and Discussions

The content of raffinose, glucose and fructose found in the extract of sweet potato Nagara white with various solvents (Table 1).

Table 1. The content of raffinose, glucose and fructose in the extract of sweet potato Nagara white with various solvents

Type of Solvent	Extraction (Days)	Consentrations (% w/v)		
		Raffinose	Glucose	Fructose
Ethanol 100%	2	not detection	0.19	0.28
Ethanol 100%	3	0.31	0.16	0.24
Acetonitrile 100%	2	not detection	0.02	0.05
Acetonitrile 100%	3	not detection	0.02	0.05
Ethanol : Acetonitrile 50:50	2	not detection	0.40	0.55
Ethanol : Acetonitrile 50:50	3	not detection	0.31	0.37
Ethanol : Water 70:30	2	1.69	3.52	3.80
Ethanol : Water 70:30	3	1.40	1.06	1.03
Acetonitrile : Water 70:30	2	0.10	0.68	0.70
Acetonitrile : Water 70:30	3	not detection	0.79	0.94

Ethanol : Water 30:70	2	1.11	4.14	5.46
Ethanol : Water 30:70	3	not detection	1.71	1.29
Acetonitrile : Water 30:70	2	0.79	0.90	0.75
Acetonitrile : Water 30:70	3	0.99	0.90	0.78

The use of ethanol, acetonitrile and water itself is already widely used to isolation raffinose, glucose, and fructose as Park *et al.* (2001); Da Costa Leite *et al.* (2000); Murquiz*et al.* (1999); Kennedy *et al.* (1989); and French *et al.* (1959).The extract of sweet potato Nagara white with different types of solvent containing glucose and fructose at different concentrations (Table 1). But not the whole extract of sweet potato Nagara white containing raffinose.

The content of raffinose, glucose and fructose found in many sweet potato extract using ethanol: water, either 70:30 or 30:70 ratio were extracted for 2 days. The raffinose, fructose, and glucose is better to use a higher polarity solvents, such as water and ethanol, though acetonitrile also including the polar solvent. However, if the solvent used is 100% ethanol or acetonitril 100% are not good extract of sweet potato to produce raffinose, glucose and fructose. Neither the ethanol:acetonitrile 50:50 is also not good extract of sweet potato to produce raffinose, glucose and fructose.

The extraction using ethanol:water - either with a lot of ethanol content and a lot of water content - can produce raffinose, glucose and fructose were significant. As for the 100% ethanol is not good for extracting raffinose, glucose and fructose found in sweet potatoes. So, apparently there is an interaction between ethanol and water to be able to bind to raffinose, glucose and fructose in sweet potatoes with good. So, to isolation raffinose, glucose and fructose in sweet potato is better to use ethanol: water.

The extraction for two days showed better results than the extraction for three days. Whereas the hypothesis, the longer the extraction process, the more the raffinose, glucose and fructose were extracted. But instead, the extraction for two days resulted raffinose, glucose and fructose were extracted more than three days. It is thought, on raffinose, glucose and fructose degradated becomes smaller molecules again, such as organic acids and ethanol. The possibility of this degradation occurs are the extraction is done at room temperature and the organic solvent is water and ethanol.

The different things happen when extraction using acetonitrile: water – either with a lot of acetonitril content or a lot of water content - the extraction for 3 days produces more raffinose, glucose and fructose compared to extraction for 2 days. It is thought, asetonitril:water can prevent contamination from microorganisms during extraction at room temperature. As a result the raffinose, glucose, and fructose are not degradated becomes smaller molecules in acetonitrile:water.

4. Conclusions

Based on our finding that it is suggested to produce raffinose, glucose, and fructose is high, the sweet potato extracted using ethanol: water70:30 or 30:70 for 2 days.

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