

Program Book and  
Abstracts Proceedings



**International Conference on  
Appropriate Technology Development  
2015**

October 5–7, 2015  
Aston Tropicana Hotel, Bandung – Indonesia

*Organized by :*



**TIME SCHEDULE**  
**INTERNATIONAL CONFERENCE ON**  
**APPROPRIATE TECHNOLOGY**  
**DEVELOPMENT (ICATDEV) 2015**  
**October 5<sup>th</sup> - 7<sup>th</sup>, 2015**  
**Aston Tropicana Hotel, Bandung – Indonesia**

<b>DAY 1</b>		
<b>OCTOBER 5<sup>th</sup>, 2015</b>		
07:00 - 08:30	REGISTRATION	Orchid (8th floor)
08:30 - 08:45	SAFETY INFORMATION	Royal Palm 123 (8 <sup>th</sup> Floor)
08:45 - 10:00	OPENING SESSION	Royal Palm 123 (8th Floor)
	1. Report by Conference Chair	
	2. Introductory Notes by Deputy of Engineering Sciences LIPI	
	3. Welcoming Address by Chairman of Indonesian Institute of Sciences	
10:00 - 12:00	KEYNOTE SPEECH	Royal Palm 123 (8 <sup>th</sup> Floor)
	1. Keynote Speaker from CERN ( <i>under confirmation</i> )	
	2. Emerging “Internet of Things”: Realizing and Policy Perspective by Dr. Ir. Basuki Yusuf Iskandar- The Ministry of	

	Communication and Information Technology, Indonesia	
	3. Sustainability in Practice by Dr. Alan Owen - Robert Gordon University, UK	
	4. Advanced Functional Materials by Prof. Nico Voelcker - Flinders University, Australia	
12:00 - 13:00	LUNCH & EXHIBITION	Foyer Alamanda 345 (2 <sup>nd</sup> Floor)
13:00 - 14.30	SCIENTIFIC PAPER PRESENTATION 1	Orchid 1&2 (8th floor)
14:30 - 15:00	COFFEE BREAK	
15:00 - 16.20	SCIENTIFIC PAPER PRESENTATION 2	Orchid 1&2 (8th floor)

<b>DAY 2</b>		
<b>OCTOBER 6<sup>th</sup>, 2015</b>		
07:00 - 08:00	REGISTRATION + COFFEE BREAK	Orchid 1&2 (8th floor)
08:30 - 11:00	KEYNOTE SPEECH + Discussion	Orchid 1&2 (8th floor)
	1. Prof. Dr. Suwit Laohasiriwong	
	2. Dr. Akmadi Abbas, M.Eng.Sc	
	Moderator: Carolina, M.Sc	
11:00 - 12:00	SCIENTIFIC PAPER PRESENTATION 3	
12:00 - 13:00	LUNCH & EXHIBITION	Foyer Alamanda 345 (2nd Floor)
13:00 - 14:30	SCIENTIFIC PAPER PRESENTATION 4	Orchid 1&2 (8th floor)
14:30 - 15:00	CLOSING CEREMONY	Orchid 1&2 (8th floor)

<b>DAY 3</b>		
<b>OCTOBER 7<sup>th</sup>, 2015</b>		
08:00 - 17:30	ONE DAY TOUR	

<b>SCIENTIFIC PAPER PRESENTATION 1 (13:00 - 14:30) October 5<sup>th</sup>, 2015</b>	
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<b>Theme : On Farm &amp; Off Farm Economic Activity</b>	<b>Theme: Post Harvest Technology</b>
<b>Moderator: Doddy Andy Darmajana, M.Si</b>	<b>Moderator: Rislima Febriani Sitompul, PhD</b>
<p><b>R. Ismu Tribowo</b> Design of pitcher system irrigation as a substitution of imported drip system irrigation for cultivating horticulture and food crops</p>	<p><b>Akande Gbola R., Adeyemi Remi S., Adeyi Abiola J., Oseni Maruf A.</b> Development of biofuelled detachable fish smoking kiln</p>
<p><b>Adi Mulyanto</b> An appropriate technology of composting for supporting sustainable agriculture</p>	<p><b>Sriharti, Wawan Agustina, Takiyah Salim, Lia Ratnawati</b> Utilization of lignocelluloses from agricultural waste as raw material for producing bioethanol</p>
<p><b>Nurpilihan Bafdal, Sophia Dwiratna NP</b> Runoff Harvesting as One of Appropriate Technology in Integrated Dry Land Farming</p>	<p><b>Kusno Isnugroho, David C Birawidha, Yusup Hendronursito</b> Design of Hammer Crusher To Support Small-Medium Enterprises (SMEs) In Mineral-Based Fertilizer Processing</p>

<p><b>Muhammad Naswir</b> Nanotechnology use of activated carbon coal and palm shells for reducing of parameters peat water</p>	<p><b>Wisnu, C., Bonita A., Diki N. S</b> The Kinetics of Iodine Content Decrease in Fortified Rice during Storage</p>
	<p><b>Raden Cecep Erwan Andriansyah</b> Potential of Suweg Starch Heat Moisture Treatment (HMT) Modification as a Source of Resistant Starch Type III</p>

<b>SCIENTIFIC PAPER PRESENTATION 2 (15:00 - 16:20) October 5<sup>th</sup>, 2015</b>	
<b>Room 1 (Orchid 1)</b>	<b>Room 2 (Orchid 2)</b>
<b>Theme: Agriculture Policy &amp; Appropriate Tech Dissemination</b>	<b>Theme : Sustainable Agriculture</b>
<b>Moderator: Dr. Rachmini Saporita</b>	<b>Moderator: Dr. Savitry Dyah</b>
<p><b>Nurhaidar Rahman, W. Agustina, R. I. Tribowo, C. E. W. Anggara, R. C. Erwan A., A. Wulansari</b> PRELIMINARY STUDY OF ALOE VERA BASED AGRIBUSINESS DEVELOPMENT (Case Study in Sari Kumetap Micro Small Business in Subang Regency)</p>	<p><b>Neni SINTAWARDANI, J. Tri Astuti, Dewi NILAWATI, Ken USHIJIMA</b> Sanitation Condition and Potential Recovery of Nutrients in Urban Area of Sub-District Kiaracondong, Bandung City, Indonesia</p>
<p><b>Eki Karsani Apriliyadi, Diki N. S., Hendarwin M. Astro</b> POTENTIAL DEVELOPMENT OF Arengapinnata, MERR BASED ON LOCAL KNOWLEDGE (CASE STUDY OF REJANG LEBONG)</p>	<p><b>Putri Nurfahmi, Rizal Faozi Malik, Ratih Paniti Sari, Afid Nurkholis</b> Influence of Local Wisdom to Prevent Disappearance of Cebong Lake in Sembungan Village Wonosobo District</p>
<p><b>Febtri Wijayanti, Fithria Novianti, Carolina</b> The Potential Cashew Nutt for Family Income Generating in Southwest Sumba</p>	<p><b>Leuserina Garniati, Radisti Praptiwi, Novieta Herdeani Sari , Yoyon Ahmudiarto , Jito Sugardjito, Alan Owen</b> Interface between Food Security, Energy Sustainability and Water Accessibility</p>

**Eki Karsani Apriliyadi, Diki  
N. S., Hendarwin M Astro**  
DEVELOPMENT OF THE  
MAIN AGROINDUSTRY  
POTENTIAL IN REJANG  
LEBONG DISTRICT, Bengkulu



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<b>Muhamad Kurniadia, Martina Andriani, Mukhamad Angwar, Yuniar Khasanah, Deviy Novitasary Sukamta</b> SARI TEMPE FORMULATION FROM LOCAL SOYBEAN (Glycine max) AND IT'S SENSORIS AND NUTRITIONAL CHARACTERISTICS	<b>Ade Erma Suryani, Lusty Istiqomah, Ahmad Sofyan, Awistaros Angger Sakti, Mohammad Faiz Karimy</b> Carcass Quality, Blood Profile and Organ Histopathology of Sheep Fed Organic Additive Contaning Probiotic and Micromineral Enriched Yeast
<b>M. Kurniadi, A. Nurhikmat, M. Angwar, A. Susanto, Tri Wiyono, A. S. Praharasti</b> The Development Of Traditional Food-Based Military Ration Packed In Cans	<b>Nurhaidar Rahman, Aida Wulansari, R. Ismu Tribowo</b> UTILIZATION of HOUSEHOLD SCALE TISSUE CULTURE TECHNIQUE for ALOEVERA SEED MULTIPLICATION and ITS IRRIGATION MODULUS

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Haryanto, Ignatius Fajar  
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Indriyanti, Qistia Hilal el-  
Huda**

MAKING AND  
CHARACTERIZATION  
EDIBLE FILM SINGLE  
CARRAGEENAN

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<p><b>Oslan Jumadi, Ratna Dewi, Andi Takdir Makkulawu, R. Neni Iriany, Yusminah Hala, Hartono, St. Fatmah Hiola, Kazuyuki Inubushi</b> Influence of urea granulated Zeolite and Nitrification Inhibitors on Growth of Maize (<i>Zea mays</i> L. Var. B8)</p>	<p><b>Ade Chandra Iwansyah, Dewi Desnilasari, Ismi S Hanifah</b> NATURAL ANTIOXIDANT ACTIVITIES OF "TANDUK RUSA" FERN (<i>Platyserium coronarum</i>)</p>
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<p><b>Atit Kanti, I Made Sudiana</b> New Development of Phytase Enzyme through modification of Substrate and Fermentation Technology</p>	<p><b>Miftakhussolikah, Dini Ariani, Tri Wiyono</b> Influence Of Flouring Method On Characteristic Of Tacca Flour: Phytochemical, Chemical And Resistant Starch Analysis</p>
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# ***Design of Pitcher System Irrigation as a Substitution of Imported Drip System Irrigation for Cultivating Horticulture and Food Crops***

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*Abstract*—Irrigation of drip system has been pertained rareness its use in Indonesia. To lessen dependable at imported equipment then a substitution of system irrigation must be made for example is pitcher system irrigation with its technical capability that not fails against imported equipment. The highest modulus of irrigation for pepper plants is occurred on August, where required water as high as 0.32 liters/second/hectare. With 95% of efficiency, then the water irrigation requirement that required from the pitcher is 0.34 liters/second/hectare. Water source is taken from the artesian drill well. The area of the cultivating farm is 2 hectares that consist of 20 units of 1000 m<sup>2</sup> each of farm field. From 1000 m<sup>2</sup> of farm field, 36 of beds were made with high 40 cm, wide 100 cm and length 2000 cm. Distance between beds is 40 cm. Every bed is attached with one lateral pipe. Along the lateral pipe existed distribution hose pipe to fill water into the pitcher. The average of the pitcher's water stream flow is 0.6 liters/hour. The pitcher is put down in the ground limited to the pitcher neck and the water level in the pitcher relative fixed during

irrigation operational that is 1 up till 2 cm below surface of the pitcher neck by utilizing mariote tube principle. The irrigation interval is once in a day that is at morning or evening. The maximum of the duration time of the irrigation water delivery for pepper plant is 103 minute, tomato 103 minute, grape 78 minute, banana 75 minute, pineapple 10 minute, paddy 90 minute and maize 71 minute. The mariote tube can use fiberglass container with its volume of 5.000 litres. For every 1.000 m<sup>2</sup> of farm field can use 1 container unit or more, depend on the cultivated plants. The investment cost of the pitcher system irrigation can save its cost more than 40% compared to the imported drip system irrigation.

*Keywords: design, food crops, horticulture, import substitution, pitcher system irrigation*

## ***An Appropriate Technology of Composting For Supporting Sustainable Agriculture***

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**Abstract**— The conditions of agricultural land in Indonesia are currently classified unhealthy with organic matter content of less than 2%. Healthy soil contains organic materials more than 5%. Soil as a medium for the production of plants must have a healthy condition. To achieve a healthy soil condition it must be done the principle of nutrients recycling. Ideally all the organic material must be returned to the soil, so the soil is able to provide food for the plant. As a result, soil fertility will occur. To accelerate the availability of nutrients in the soil, the organic material should be mineralized through composting process. The uses of compost have several advantages, among others, are able to fertilize the soil and at the same time conserve and nourish the soil ecosystem and avoid the possibility of environmental pollution. To facilitate and ease of composting process, then made equipment that support the production of compost. This paper will convey the equipment that has been produced to support the production of compost made from organic municipal solid wastes such as shredder, turning machine, screener and mixer. The resulting compost is used as a soil conditioner on agricultural land to grow vegetables.

**Keywords:** *healthy soil; composting; shredder; turning machine; screener; mixer*

## ***Runoff Harvesting as One of Appropriate Technology in Integrated Dry Land Farming***

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**Abstract**— Increased productivity of dry land farming in Indonesia is still limited by the lack of water supply, especially during the dry season; while most regions in Indonesia have high rainfall (over 1500 mm per year). The fact indicates most of the rain that falls on the land surface lost as runoff. The runoff management in dry land farming through runoff harvesting makes it possible to exploit this potential to meet the crop water requirements in the dry season. This research aims to increase productivity and carrying capacity of dry land through appropriate runoff harvesting technology as a source of irrigation water in the area of dry land agriculture. The method used in this research is descriptive analysis method and field observations. The result shows that the slope of the land in the catchment area with coconut + seasonal crop patterns positively correlated to runoff occurs, but not so in the land with a single or mix of seasonal crop which is more affected by the condition of the plant cover. The application of runoff harvesting technology on dry land farming is able to irrigate land planted with maize cultivation area at least 44% of the total catchment area. Runoff harvesting can use as one of

alternative appropriate technology for solve the problem  
lack of water in dry land farming.

*Keywords: appropriate technology, runoff harvesting,  
integrated dry land farming, irrigation*

## **Nanotechnology Use of Activated Carbon Coal and Palm Shells for Reducing of Parameters Peat Water**

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*Abstract*— This study aims to look at the differences in the characteristics of activated carbon made from raw materials coal and palm shell, determine the ability of each in lowering the color parameters, iron and organic substances contained in peat water. Each activated carbon made by pyrolysis with temperature 600-800 °C, then activated by the addition of H<sub>3</sub>PO<sub>4</sub> compound. Characterization of activated carbon is done by using XRD instrument and SEM-EDS. Specification of the characteristics of the activated carbon is specified moisture content, ash content, yield, number of iodine and methylene blue. The results showed that the active carbon produced has met the specifications set by the yield of 44% and 30% (standard 30%), the rate of Iod 998 mg / l and 1002 mg / l (standard min 750 mg / l), 225 mg methylene blue / l and 318 mg/l (standard min 120 mg / l). Characterization by XRD showed that activated carbon coal contains carbon, silicate and quartz compounds, and heavy metals Cu and As. Carbon palm shells show spectra that are not shaped (amorphous) is composed of carbon compounds 98.03% and 0.33% oxygen. Activated carbons from coal have different capabilities with activated carbon from palm shells in the lowering of color, iron and organic substances contained in peat water.



Keywords: nanotechnology, activated carbon coal, palm shells, peat water

## ***Development of Bio-Fuelled Detachable Fish Smoking Kiln***

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***Abstract***— The most widely employed traditional method of processing and preserving fish for human consumption in the third world are smoking and drying. However, the traditional smoking and drying methods restrict the cross border trade of preserved fish due to the associated poor quality of the products, low capacity and poor energy efficiency. A detachable smoking kiln that uses solid biofuel as energy source and enables processing of fish into good quality and highly competitive shelf stable smoked dried fish and fish oil was developed. It consists of insulated walls, segmented compartments and a solar powered fan that circulates heat and smoke.

***Keywords:*** *detachable kiln, smoked dried, drying time, fish oil, energy*



## **Utilization of Lignocelluloses from Agricultural Waste as Raw Material for Producing Bioethanol**

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**Abstract**— Indonesia needs to develop bioethanol by reasons of ever increasing energy consumption, increasingly diminishing stock of oil fuels, increasing oil fuel imports. A conversion of lignocelluloses into bioethanol can be devised to substitute gasoline fuel for transportation purposes. The agricultural wastes-derived lignocelluloses materials are available abundantly and not utilized as food stuffs, and thus their utilization as a source of energy will not interfere with food supply. Lignocelluloses are composed of three main components, namely, cellulose, hemicelluloses, and lignin. A conversion of lignocelluloses materials into ethanol consists basically of a pretreatment, saccharification/hydrolysis of cellulose and lignocelluloses into sugar, fermentation of sugar into ethanol, and refinement of ethanol by distillation and dehydration processes. Currently, the production cost of ethanol by using lignocelluloses is still quite high, particularly for the pretreatment. Therefore, a study is required to improve the productive processes from pretreatment to ethanol refinement. The study findings revealed that the biologic pretreatment by using cellulose enzyme and lignocelluloses-producing local microbes was the best

process, being more environmentally friendly and of lower production cost.

*Keywords: agricultural wastes, lignocelluloses, conversion, bioethanol*

## ***Design of Hammer Crusher to Support Small-Medium Enterprises (SMEs) In Mineral-Based Fertilizer Processing***

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**Abstract**—Dolomite and zeolite are industrial minerals that can be used as an alternative to mineral-based fertilizers. The existence of zeolite and dolomite are scattered in various regions in Indonesia. This condition is an opportunity for small and medium industries (SMEs) to undertake the processing of these minerals as raw materials of mineral-based fertilizers. SMEs can perform the processing of these minerals in the preparation stage of the crushing the materials. This research was conducted to design and preliminary test of hammer crusher to support SMEs in mineral-based fertilizer processing. Hammer crusher used is a double-shaft hammer crusher. The theoretical capacity is 1,000 kg/hour of raw material (dolomite and zeolite). The hammer crusher real capacity was 825-900 kg / hour of raw materials at 2,900 rpm, and 685-750 kg / hour of raw at 1,450 rpm. At 1,450 and 2,900 rpm, obtained the efficiency of hammer crusher to process dolomite was 82.11% and 88.54%, for zeolite efficiency was 88.79% and 94.81%.

**Keywords:** *crusher, design, double-shaft, dolomite, hammer, zeolite*

## ***The Kinetics of Iodine Content Decrease in Fortified Rice during Storage***

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**Abstract**—Iodine Deficiency Disorders (IDD) is a major public health problem in several areas of the world, especially in developing countries. Iodine deficiency can cause goitre, cretinism, decrease of intelligence, mental retardation, brain damage, deaf-mutism, and cause miscarriage in pregnant women and stillbirth as well. In this research, the determination of the kinetics of decreased iodine content in fortified rice with microcapsule containing iodine were carried out by Accelerated Self-Life Test (ASLT) and Arrhenius equation methods. The results of research showed that kinetics of iodine content decrease average in fortified rice ( $k$ ) was  $0.0141 \text{ mg kg}^{-1}\text{hour}^{-1}$  and  $1.692 \text{ kcal mol}^{-1}\text{K}^{-1}$  of activation energy ( $E_a$ ). This suggests that iodine (as  $\text{KIO}_3$ ) in encapsulated ingredients of fortified rice was fairly stable during storage, but there was still a decrease in iodine content caused by several factors (i.e. temperature, atmosphere, humidity, oxygen and moisture content). The results showed that the higher

storage temperature causing the value of kinetics (rate constant) decreased of iodine content to be bigger. The longest shelf life of fortified rice was 92 days with storage temperature of 25°C.

*Keywords: Iodine deficiency disorders, reaction kinetics, fortified rice, microencapsulation*

## ***Potential of Suweg Starch Heat Moisture Treatment (HMT) Modification as a Source of Resistant Starch Type III***

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*Abstract*—Suweg starch (*Ammorphophallus campanulatus* var. *Hortensis*) can be modified by a hydrothermal process. Modifications of hydrothermal process has been done is a modification of Heat Moisture Treatment (HMT). HMT starch modification method has the potential to produce a modified starch containing resistant starch type III (Resistant Starch Type III / RS3). HMT modifications carried out at a temperature of 110 and 120 ° C with a moisture content of 20% for 16, 24 and 32 hours. Results modifications HMT obtained content resistant starch modified HMT is a 28.70% increase to 31.55%, 32.29% and 39.92% with a temperature of HMT 110 °C and 43.46%, 46.64% and 53.30% at a temperature of HMT 120 °C during HMT consecutive 16, 24 and 32 hours.

*Keywords: suweg starch, heat moisture treatment, resistant starch, HMT*

## **Preliminary Study of Agribusiness Development Based On Aloe Vera (Case Study in Sari Kumetap Micro Small Business in Subang Regency)**

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**Abstract**— Aloevera not merely can be scccccvcvzold in the form of plants, but also can be processed and produced to make various kinds of food, beverage, herb medicine and cosmetic. The variety of Aloevera being cultivated is *barbadensis* contains substances for human body need, like vitamin of A, B1, B2, B6, B12, E and C. These plants purportedly can also heal many health problems including diabetes and heart diseases. Processed product based on Aloevera developed by UKM (Micro Small Business) Sari Kumetap are relatively so many, like aloe essence, aloe tea, aloe ice, aloe chicken porridge, mixture of aloe herb with multifarious *rimpang* herbs, cosmetic like *lulur* (skin enlightened) and moisturizer. Nevertheless business activity that conducted by the UKM still need to improve its quality and also production quantity by the application of

some technologies including sufficient equipment and packaging technique which is to be conducted through IPTEKDA (Technology implementation for targeted area) program. From existing various *Aloevera* product, through this IPTEKDA activity will be more emphasized at 3 prior products which are *Aloegin*, *Aloe Tea* and *Aloe ice*. Business of *Aloegin* production with production capacities as high as 50 liters *aloegin* can produce 100 bottles @ 500 ml *aloegin* at the price of Rp.60,000.-/bottle will get Rp.3,015,000.- gross profit for every process/month, so this business is quite feasible to be developed. The production capacities of *Aloevera* processing, in the case of tea and aloe ice, is also still following the market absorption. The application of tissue culture technology which produce 500 bottles of plants seed (each bottle contains 5 seed of *Aloevera* plant) with its price as high as Rp.10,000/bottle will get Rp.2,354,000,- gross profit for every process/month, so this business is quite feasible to be developed. The equipment that will be introduced through IPTEKDA - LIPI (Indonesian Institute of Sciences) activity to complete processing equipment and tissue culture of *Aloevera* i.e. Laminar flow, Cold storage, Greenhouse, Gas stove, Oven, Mixer, Shaker, Blender, Sealer, Digital Refractometer, pH meter and Digital weighing-machine. The UKM Sari Kumetap is directed to become center of agro industry business development based on *Aloevera* material that runs commercially (profitable), expand and sustained.

*Keywords: agribusiness, aloevera, UKM Sari Kumetap, tissue culture*



## ***Potential Development of Arengapinnata, Merr Based on Local Knowledge (Case Study of Rejang Lebong)***

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**Abstract**—*Arengapinnata*, MERR is potential commodity for handling food suffering and it easy to adaptation in every agro climate, start from low land until high land 1400 meters above sea level. *Arengapinnata*, MERR has become of the main income for Rejang Lebong Prefecture people. Recently, the local farmers making brown sugar from sweet sap of *Arengapinnata*, MERR, and they has been cultivate in their own land. The local knowledge of brown sugar production has been made by generation to generation and it's become routine activity. This main activity has become of development program collaborated between Center of Appropriate Technology Development and the government of Rejang Lebong Prefecture. The goals of this program are giving added value and income generation for local farmers. To increase the potency of *Arengapinnata*, MERR by using appropriate technology as a vehicle for optimizing local resources.

**Keywords:** *Arengapinnata*, MERR; local knowledge; RejangLebong; appropriate technology

## ***The Potential Cashew Nutt for Family Income Generating in Southwest Sumba***

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**Abstract**— Indonesia is the 5<sup>th</sup> biggest cashew nut producer after India, Vietnam, West Africa, East Africa, and Brazil. The production reached 180.000 tons in 2013, 50.000 tons of it, valued almost US\$70million, and was exported. One of the potential producers of cashew nut is the district of Southwest Sumba. Initially planted in farmers land as reforestation tree in since early 1980s, it covers 14.688 hectares of area and majority of it are in Kodi, North Kodi, Kodi Balaghar, and Tambolaka. Despite the simple technology implementation, cashew nut becomes one of family income source through creation of many small businesses in South West Sumba. The technology utilized limits to shelled cashew handling, stripping, and frying. In proportion, cashew nut sales are 80% in shelled and 20% are processed. Supply chain analysis indicates that income derived from the businesses in the range of US\$3,960 for the sale of cashew with shelled, and US\$8,049 per year for the sale of processed cashew. The IRR's reach 30,21% and the NPV are Rp40,542,341.50 with the assumption of 12% discount factors. From business point of view, the infestation is feasible; however it has no significant contribution to community prosperity. The picture reveals that small business based on cashew nut is not a sufficient to provide prospective income generating for society in East West Sumba. It indicates the need of government

intervention to establish government owned business based on cashew nut production could be the solution to reach equity of community welfare.

*Keywords: appropriate technology, community prosperity, micro business, South West Sumba.*

## **Development of the Main Agroindustry Potential in Rejang Lebong District, Bengkulu**

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**Abstract**— The potential of Rejang Lebong region actually be a wealth of natural resources are exceptional, when processed and developed based on the implementation of appropriate technology will be superior to direct the potential areas that will provide increased welfare of society itself. Tthrough the concept of community empowerment, the pattern of development of the potential of agro-industries / agribusiness is based on the ability of the region to provide the carrying capacity of its potential and wealth. Ability itself seen from two sides of the human resources (HR) and natural resources (SDA). Optimization of natural resources coupled with the optimization of human resources. This activity is aimed at generating income, improved quality of competitive self in the middle of the speed of globalization.

**Keywords:** *agroindustry; development; Rejang Lebong; appropriate technology;*

# **Sanitation Condition and Potential Recovery of Nutrients in Urban Area of Sub-District Kiaracondong, Bandung City, Indonesia**

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*Abstract*—A study was carried out to observe the sanitation conditions in the urban area of Kiaracondong and to estimate the potential for nutrient recovery from human excreta. Interviews about sanitation, covering the frequency of defecation, toilet facilities, water sources, and discharge systems, were conducted directly with 111 households through cooperation with the household association. Samples of fresh feces and urine from respondents were collected, weighed, and characterized. Data on the population of Kiaracondong sub-district was required to calculate the nutrient recovery potential based on the characteristics of the human excreta in the community studied. The data showed that all public toilets in Kiaracondong were installed along canals or rivers without water facilities and poor sanitation conditions. The wastewater from all public toilets and most private toilets were discharged directly to water bodies. The existence of

public toilets is important and useful to the community in Kiaracandong. In total, the potential for the recovery of nutrients in human excreta were 57.32, 2.79, 1.57, and 1.65kg.p-1.y-1, for OM, N, P, and K respectively. For the Kiaracandong area, the potential was estimated to be 7,199, 350, 197 and 207 tons.y-1 for OM, N, P, and K respectively. There were no worm ova detected in the feces and urine samples. However, *E. coli* a pathogen and *Enterobacter agglomerans* and fungus of *Candida sp* were detected in the feces samples. Meanwhile, organisms detected in urine were *E. coli* a pathogen, *Enterobacter agglomerans*, *Serratia liquifaciens*, *Serratia marcescens*, and *Staphylococcus saprophyticus*. Implementing dry composting toilets based on the *Ecosan* concept is an appropriate way to address the sanitation problem. The education and promotion of *Ecosan* to increase the awareness of the community is important.

*Keywords: dry-toilet, human excreta, ecological sanitation, nutrient flow, recycle*

## ***Influence of Local Wisdom to Prevent Disappearance of Cebong Lake in Sembungan Village Wonosobo District***

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**Abstract**—Dieng Plateau which is located in Wonosobo district is has more than 2000 masl region. Lake in Dieng Plateau were formed by volcano activities, include Cebong Lake. This lake is located under Pakuwojo, Saroja and Sikunir foot mount. Sedimentation is eminent problem in Cebong Lake, because it may silting up and repeal the lake. Disappearance of Cebong Lake would threaten any human activities whose trade on its resources especially for farming activities as the main activity in this region. In addition, inhabitants want to preserve Cebong Lake. Therefore, they have to be a wise to environment. Methods used in this research are direct measurement of bathymetry mapping using echo-sounder, interpretation of suspended sediment in Cebong Lake, and interview. Result from this research is the lifespan prediction of Cebong Lake to supply water resources for farmers. In addition, it is concluded that local wisdom re-actualization is important to gain longer life span of the lake and impede its disappearance.

**Keywords:** *local wisdom; Cebong lakes lifespan; bathymetry; sedimentation.*

## ***Interface between Food Security, Energy Sustainability and Water Accessibility***

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**Abstract**— Indonesia, with its vast population, faces challenges of fulfilling the high demands for food and clean water. To meet the demands, it is often unavoidable that extensive use of energy for food and water production interferes with the need to conserve environmental and natural resources. The challenge to meet the food and energy demands without jeopardizing the ecosystem conservation is further made more complex by the need to provide remotely located areas with sufficient power. These problems nevertheless are observed to be able to be mitigated by thinking holistically, using models incorporating the interlinked flow of food, energy and water (FEW nexus). In addition to the nexus, the involvement of the local communities is essential to help provide knowledge and feedback throughout the whole decentralized interface of the system. The local wisdom should prevent a cyclic



friction between energy generation processes and the needs of protected areas.

*Keywords: Appropriate technology, Sustainable energy, F-E-W nexus, local needs*

## ***Sari Tempe Formulation from Local Soybean (*Glycine max*) and Its Sensory and Nutritional Characteristics***

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**Abstract**—Tempe as the fermentation product from soybean has a high nutritional content such as protein, vitamin B and antioxidant. Potential products of tempe from local soybean (*Anjasmoro* variety) is sari tempe. Objective of this study was to determine the best formulation in the manufacture of sari tempe and its influence on sensory and chemical characteristics. The experimental design used for sensory testing was completely randomized design (CRD), which consists of two factors, variation of the ratio of water addition and tempe (1: 3, 1: 5 and 1: 7) and variations in concentrations of CMC (0.05%; 0.10% and 0.15%). Each treatment was carried out two times replicates sample and 3 repetitions analysis. Data were analyzed statistically by one-way ANOVA, if there is a real difference then continued with Duncan Multiple Range Test (DMRT) at  $\alpha = 0.05$ . The results showed that sari tempe from local soybean with the ratio of water addition at 1: 3 and CMC concentration of 0,10%. Ratio of the water addition 1: 3, 1: 5 and 1: 7 affect the color and flavor, while CMC concentration at 0.05%, 0.10% and 0.15% did not affect the viscosity. The

processing of sari tempe effect on the content of folate and vitamin B12.

*Keywords: sari tempe, CMC, sensory characteristics, Vitamin B*

## ***The Development of Traditional Food- Based Military Ration Packed In Cans***

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**Abstract**— Military ration is one kind of foods that has been prescribed dose of nutrition according to their needs. Food for military personnel should remain stable, durable, and safe, practical and does not ignore the comfort aspect. The aim of this study is to make the traditional foods-based military rations packaged in cans and to find out its sterilizing value (Fo). The study was conducted in two stages. The first stage is to formulate the traditional foods and package them in cans. The traditional foods' formulations contain of 4 formulas of *nasi uduk* and 5 formulas of fried rice. The type of can which is used is the Pop-end models with the size of 301x205. The second stage is the process of canning the food, sterilization Fo value measurement, the process of canning, chemical testing, microbiological and sensory testing. The data of the testing result is processed statistically and descriptively. The results shows that the ration in cans with the highest energy content is formula NG-3 (fried rice + chicken + beef sausage) with 479.128 Calories, and formula NG-1 (rice fried + egg + chicken) with 433.894 Calories, the value of Fo sterilization from the NG-3 formula and NG-1 respectively 11.97 and 11.11 minutes. The organoleptic test shows that panelists prefer to NG-1 than NG-3.



*Keywords: Military rations, traditional foods, cans, Fo  
sterilization value*

## ***Yield Risk Assessment in Nutrient Film Technique for Pakcoy (*Brassica rapa* L.) Hydroponic Growing System Using FMEA and AHP Approach: A Case Study***

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**Abstract**—Risk is an intrinsic part of agricultural management system. Crop yield in agricultural production is uncertain both quality and quantity. Several variables affect crops yield, such as: light, nutrient, temperature, humidity, pest and disease, etc. It also occurs in NFT hydroponic growing system. To mitigate yield failure or decreasing quality and quantity in NFT hydroponic growing system, it is needed risk assessment to formulate strategy to mitigate the potential yield risks failure. The purposes of this study were (a) identify potential yield risk in NFT for Pakcoy (*Brassica rapa* L.) hydroponic growing system, and (b) formulate strategy to mitigate production failure or decreasing crop yield based on prioritized the potential yield risk. The methods of this study were failure modes and effect analysis (FMEA) and analytical hierarchy process (AHP). The FMEA was implemented to point out the probable failure modes. Then the AHP methodology was used to prioritize the most potential yield risk factor to formulate strategy in NFT technique yield risk mitigation. The results showed that there were several potential risk factor sources that affected crop yield in NFT hydroponic

growing system such as seedling, nutrient, pest and disease, environment, aeration, and water. The most important potential yield risk factor in NFT system was water. Keep the water circulated the NFT system is key factor to mitigate the yield risk.

*Keywords: yield risk assessments, nutrient film technique, FMEA, AHP, Brassica rapa L.*

## **Carcass Quality, Blood Profile and Organ Histopathology of Sheep Fed Organic Additive Containing Probiotic and Micromineral Enriched Yeast**

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**Abstract**—The aim of the study was to evaluate the effect of combination of probiotics (*Pediococcus acidilactici*) and micro mineral enriched yeast (MEY) administration on internal organ and carcass quality and hematological profile and liver histopathology of local sheep. The experiment was conducted using six local sheep (body weight  $13 \pm 0.8$  kg) were arranged in a complex randomized design with 2 treatment 3 replication and each replication consisted of one sheep. Sheep was randomly placed in individual cages and given one of two treatments were P0 (control, basal diet without ProMEY), P1 (basal diet+ProMEY). Basal diet consisted of forage and concentrate (60:40 in dry matter basis and given twice a day. Concentrate feed was given after animal consumed forages in the morning. Feed additive of ProMEY (15 g/d/head) was added into concentrate. Water were provided ad libitum all over the experimental period. At 10 weeks of feeding trials, one sheep was randomly selected from each treatment and



slaughtered to evaluate the carcass quality. Analysis of hemoglobin (Hb), packed cell volume (PCV), leucocyte, thrombocyte, basophil, neutrophil, and eosinophil, were analyzed by microhematocrit. Histopathology profile was evaluated by lesion degree of organ. The result indicated a significantly different between control treatment (P0) and ProMEY treatment (P1) on performance of liver. In addition, sheep fed by ProMEY administration produced higher number of erythrocytes (26%), hemoglobin (25%), PCV (15%), lymphocyte (11.5%) and monocyte (50%) than control. Histopathological profile result showed that there was no alteration change in liver. It could be concluded that combination of Probiotics and Micromineral Enriched Yeast could improve the health status of sheep.

*Keywords: probiotics, micro mineral, carcass quality, haematological*

## ***Utilization of Household Scale Tissue Culture Technique for Aloe Vera Seed Multivication and Its Irrigation Modulus***

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**Abstract**— The aloevera type that is being developed in Subang regency is from barbadensis type that contain substance for human body need, like vitamin of A, B1, B2, B6, B12, E and C. This plant purportedly can also heal for example diabetes and heart diseases. The development of aloevera agriculture to be conducted by farmers needs quite a lot of seeds. For that purpose a household scale tissue culture technology is to be applied to produce the seed acquired. The principle of tissue culture technique is multiplying the plants by using part of the vegetative plants and artificial media to be conducted in a sterile site. In general, the tissue culture is conducted at laboratory scale. By modification of equipment and materials and optimizing the environment for plants growth, the tissue culture can be conducted in smaller scale (household). The tissue culture technique can produce uniformed seeds i.e. seed's

characteristics similar to the parent plants and a lot of seed may be produced in a short time. It takes time about 1 - 2 months for first shoot growth whereas the conventional way takes about 1 year. It doesn't need wide place and doesn't depend on season, which means that it can be executed during the year. Sterilization method utilizes solution 30% Clorox shows very low level contamination (0 - 5%). In MS media that contain 1 mg/l of BAP, the amount of saplings shoot reaches more than 15 times during 1 month. The shoot's rooting has properly grown in MS media without hormone. A Greenhouse for plants acclimatization of tissue culture will need the use of net of agro-et type with closeness of 70% and attached in 2 layers. The highest of irrigation modulus for aloevera plants occurred in August is as high as 0.18 liters/second/hectare with maximum of irrigation interval is as high as 31 days.

*Keywords: household, irrigation modulus, seed, tissue culture*

## ***Making and Characterization Edible Film Single Carrageenan***

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**Abstract**— Edible film or coating can be eaten a packaging material which can be made from materials such as carrageenan hydrocolloid. The purpose of this study is to make edible film and get a single characterization of edible film made from carrageenan. The main raw material is carrageenan and auxiliary materials used glycerol. The experimental design used randomized block design with two factors, namely the concentration of carrageenan as the first factor and the concentration of glycerol as the second factor. Each factor consists of 3 levels: carrageenan concentrations of 1%, 1.5% and 2%. Moderate level of concentration of glycerol is 0%, 0.5% and 1%. The results showed that the higher the concentration of carrageenan, kaut the greater attractiveness of edible film. The strong pull is 39.9599 MPa, at a concentration of 2% carrageenan. Conversely the higher the concentration of carrageenan elongation getting smaller, although the analysis of variance was not significantly different. For barrier properties or permeability to water vapor, the lowest value at 1.5% carrageenan concentration, ie 48.4252 (g.m<sup>-2</sup>.24 hour<sup>-1</sup> hour), although the analysis of variance of the concentration of carrageenan no significant effect on the value of the

permeability of edible film. The concentration of glycerol did not significantly affect tensile strength and permeability of edible film, but the real impact on the value of elongation. Edible best single film is carrageenan composition: glycerol (2% b/v: 1%v/v) because it has the best elongation and tensile strength.

*Keywords: edible film, carrageenan, mechanical properties.*

## **Pilot Scale Technology for Production Organic Bio-fertilizer Powder Starter to Support Sustainable Agriculture Development**

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**Abstract**— Application of organic bio-fertilizer is rising due to enhancement in nutrient uptake efficiency and society demands for more green technologies for sustainable agriculture development. The aims of this research were to production of organic bio-fertilizer powder starter and develop its technology that can adopted by industries. We improve a technology to produce bio-fertilizer powder starter, including bacterial fermentation in pilot-scale fermentor, cells harvesting with continuous centrifuge, freeze-drying, mixing carrier and packaging. We fermented three bacteria which is have the best potency for plant growth promoting, including *Bacillus* sp. 140B as bio-control, *Brevundimonas* sp. AA2 with the highest growth hormone production, and *Brevundimonas* sp. Piko as phosphate solubilizer. To maintenance and enhance the viability and stability of the cells during freeze-drying process, we added combination of skim milk and *trehalose* as *cryoprotectant* agents. The cryoprotectants have a good protection for the viability of bacteria, were shown by stability of bacterial population. Carrier materials were used to make powder starter, including maltodextrin and maize starch.



*Keywords: biofertilizer; carrier material; cryoprotectant agent; powder starter production*

## ***Influence of urea granulated Zeolite and Nitrification Inhibitors on Growth of Maize (Zea mays L. Var. B8)***

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**Abstract**— The aim of research is to determine the influence of urea granulated zeolite and nitrification inhibitor on the growth maize (*Zea mays* L. Var. B8). The layout of study was using completely randomized design with 3 replications. Treatments were namely urea granule, urea granulated zeolite, urea granulated zeolite neem, urea granulated zeolite dicyandiamide, urea granulated dicyandiamide, urea granulated neem and a control. Fertilization was done in split, 8 days and 29 days after planting with total nitrogen application was 150 kg-N ha<sup>-1</sup>. The parameters growths were include height of plant stem (cm), leaf chlorophyll content (weight of 5 corncobs (gram) and plant dry weight (kg). The data of growth were analyzed by using the F-test analysis to find differences. The results of study show that urea granulated with zeolite



and nitrification inhibitors affected the growth of maize (*Zea mays* L. Var. B8).

*Keywords: Urea, zeolite, neem, dicyandiamide, nitrogen, growth of maize (Zea mays L.)*

## ***Rehabilitation of Degraded Agro-Silvo-Pastures using Innovative Technologies in Arid Regions of Pakistan***

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*Abstract*— Dry lands in southern Pakistan are home to communities living in poverty and depending on livestock rearing for their livelihood. The subsistence agriculture is losing its importance under the effects of climate change i.e. uncertain rainfall and very low productivity. Due to increasing population of livestock, the pressure on silvo-pastures is increasing resulting in degradation of natural resources and loss of soil fertility, a fact that adversely affects the livelihood of communities. The Farm Forestry Support Project (FFSP) of the Interco operation (IC) and Swiss Agency for Development & Cooperation (SDC), initiated rehabilitation work in 2008 in extreme dry region of Karak using the silvo-pastoral system with hillside ditches and sand dune stabilization techniques. The objectives were harvest, conserve and use rain water for recovering vegetation and increase productivity of the area with minimum cost and hence support livelihoods. The activity was carried out with participation of civil society organizations and farmers' associations. The results recorded in 2013 showed a profuse plant growth in terms of trees, shrubs and grasses with a potential to provide timber, fuel wood and fodder for livestock. Maximum harvesting of rainwater and conservation of moisture also resulted in growth of natural grasses and shrubs. Within a short period of 5 years, plant growth in height and diameter of 6 meters

and 20 centimeters respectively was recorded. The average vegetation cover of 45% and increase in soil organic matter and nitrogen content was also recorded. All this happened with a minimum cost of US\$ 82 per hectare. The rejuvenation of wells in few cases was an additional positive affect of the activity. On the other hand, an annual income of US\$ 735 per hectare from *Saccharum spontaneum* planted in sand dunes was a real benefit to farmers against other land-uses in sand dunes.

*Keywords: degraded agro-silvo-pastures, innovative technologies, Pakistan*

## ***New Development of Phytase Enzyme through modification of Substrate and Fermentation Technology***

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**Abstract**— The use of phytase as feed supplement is getting popular. However production system of this enzyme should be optimized to reduce production cost. The objective of this study was to evaluate the ability of 10 fungi isolates i.e. *Aspergillus niger* (5 isolates), and *Neurospora crassa* InaCC F226 to produce phytase, and select best phytase producer for phytase production on coconut oil cake supplemented with rice brand in solid state fermentation. *Aspergillus niger* Str 3 and *Neurospora sitophylla* (4.6 and 3.4 unit) respectively were selected for phytase production owing to its ability to produce phytase in submerge fermentation with glucose as the main carbon sources. These potential isolates were then used for phytase production on coconut oil cake supplemented with rice brand in solid state fermentation. The effect of inoculants type, initial moisture content, and additional carbon sources were evaluated to obtain optimum condition for phytase production. Media contained coconut oil cake supplemented with rice brand at ratio of 20 to 50 % could be used for phytase production. Initial moisture content and

incubation time affect phytase production. Optimum initial moisture content was about 60-70%. The relation of moisture content and phytase production was  $Y = -0.0574x^2 + 7.4119x - 207.59$  with  $R^2 = 0.7797$  for *A. niger* and  $Y = -0.0574x^2 + 7.4119x - 208.56$  with  $R^2 = 0.7207$  for *N. sitophyla*. Additional carbon sources especially starch at concentration of 1-2 % increased phytase production. The effect of starch on phytase production was depicted as  $Y = 2.4089\ln(x) + 37.193$  with  $R^2 = 0.9375$  for *A. niger* Str3. and  $Y = 2.9987\ln(x) + 35.629$  with  $R^2 = 0.9218$  for *N. sitophylla*. This work conclude *A. niger* and *N. sithophyla* were good incoculant for phytase production using formulated media contained coconut oil cake and rice brand in solid state fermentation.

Keywords: *Aspergillus niger* Str3; coconut oil cake; *Neurospora sitophylla*; solid state fermentation

## ***Pineapple Peel as a Potential Source of Dietary Fiber***

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***Abstract***— Pineapple peel which is a waste product processing result of diversification of the pineapple fruit can still be harnessed into a product with added value that can enhance economic value. Potential functional food product of pineapple skin, among others: the fiber concentrates, beverage *dietary fiber*, and *nata de pina*. This product is composed of cellulose that contains a lot of fiber and low calorie, and resistant to digestion and absorption in the small intestine by a process of fermentation in the large intestine.

***Keywords:*** *pineapple peel, functional beverages, value-added pineapple, dietary fiber*

## **Screening of $\alpha$ -glucosidase Inhibitor-Producing Lactic Acid Bacteria from *Ganoderma lucidum* as Functional Food Candidate for Diabetic**

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**Abstract**— *Ganoderma lucidum* has widely known as herbal medicine for diabetes. Recently, *alpha-glucosidase inhibitors* (AGI) have also been reported for their ability to reduce blood sugar level in type 2 diabetes. The enzyme inhibitors can be derived from bacteria that live in *Ganoderma lucidum* as their host. The aims of this study were to isolate and conduct AGI-producing endophytic lactic acid bacteria screening from *Ganoderma lucidum*. Fourteen isolates were identified as lactic acid bacteria. The crude extracts were examined to measure their *alpha-glucosidase* inhibition activity. The results showed that the crude extract from L17 isolate had the highest AGI activity out of 14 isolates. According to *Line-Weaverberg* plot, L17 crude extract was competitive inhibitor and identified as *Lactococcus sp.* In conclusion, L17 isolate from *Ganoderma lucidum* has potential to produce AGI that could be used as functional food alternative for diabetes.

*Keywords: alpha-glucosidase inhibitor, Ganoderma lucidum,  
lactic acid bacteria*



## **Natural Antioxidant Activities of “Tanduk Rusa” Fern (*Platycerium coronarium*)**

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**Abstract**—The aim of the study was to determine the potential antioxidant activity in “*tanduk rusa*” fern (*Platycerium coronarium*) extract. Evaluation of antioxidant activity of the extract of *Platycerium coronarium* were studied using Folin-Ciocalteu assay and DPPH (1,1-diphenyl-2-picrylhydrazyl) scavenging assay respectively. The results of total phenolics showed that extract of *Platycerium coronarium* with decoction for 12 hour (PCD) contained the highest of total phenolics. DPPH assay showed that IC<sub>50</sub> of PCD (507 µg/mL) was lowest. Based on these values, PCD is found to have the highest antioxidant activity. This study provides preliminary information about antioxidant activities of *Platycerium coronarium*.

**Keywords:** *antioxidant, Platycerium coronarium, “tanduk rusa” fern*

## ***From Local Wisdom: Preliminary Antibacterial Activity of “Tanduk Rusa” Fern (*Platycerium coronarium*)***

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**Abstract**— The aim of the study was to determine the potential anti-bacterial activity in “tanduk rusa” fern (*Platycerium coronarium*) extract. Antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* was studied using diffusion method. Antibacterial activity test showed that PCEt can inhibit Gram-positive bacteria *Staphylococcus aureus*, but not the Gram-negative bacterium of *Escherichia coli*. PCEt1 had minimum inhibitory concentration (MIC) of 1-1.25% with the ratio of equity to antibiotics (*Amoxicillin*) was 6:1. This study provides preliminary information about antibacterial activity of *Platycerium coronarium*.

**Keywords:** antimicrobial, *Platycerium coronarium*, “tanduk rusa” fern

## ***Influence Of Flouring Method On Characteristic Of Tacca Flour: Phytochemical, Chemical And Resistant Starch Analysis***

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*Abstract*— *Tacca* (*Tacca leontopetaloides*) is a tuber that has high carbohydrate content, but its potential has not been widely used and studied. *Tacca sp.* grows scatteredly in high-salinity areas such as southern coast of Java. Commonly, *Tacca* flour is utilized as raw material of food product e.g. noodle, and furthermore in recent studies it can be used as pharmaceutical excipient. The goal of this study is to compare the characteristics of *Tacca* flour by differentiating the flouring method. *Tacca* flours were made by slicing (chipped *tacca* flour) and grating method (pressed *tacca* flour). Phytochemical, chemical composition and resistant starch content of both were analyzed and compared each other. The results showed that there were no significant differences of water, fat and carbohydrate content between chipped and pressed *Tacca* flour as well as its phytochemical content. A number of terpenoid TLC spot qualitatively appeared thicker on pressed flour rather than chipped one. Ash, protein, amylose, and resistant

starch content of chipped Tacca flour were higher than that of pressed Tacca flour.

*Keywords: tacca, sodium metabisulfite, starch, flour, noodle, phytochemical*

## **Corn Spaghetti Quality Assessment on Increased Production Capacity**

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**Abstract**— On the production of free gluten pasta products by means of extrusion method, the function of gluten as protein that is responsible in strengthening a dough structure to produce high quality pasta products can be substituted by gelatinized starch. This research was aimed to study the quality characteristics of corn spaghetti as results of increasing the production capacity of extruder. Corn spaghetti was made by extruding the mix of maize and cassava flour using a single screw extruder, powered by 5.5 Kw AC motor and has 3 sections of heating elements with each of them is 1000 Watt. The feeding rate was increased gradually from 6, 12, 18 up to 24 Kg/ day. The spaghetti products coming from different feed rate were examined their physicochemical properties including proximate results, crude fiber, elongation and cooking losses. Results showed that increasing the production capacity of extruder doesn't significantly affect the proximate, elongation and cooking loss of the products.



*Keywords: increasing capacity, quality, corn spaghetti,  
single screw extruder*