ICONPROBIOS

3rd INTERNATIONAL CONFERENCE
ON NATURAL PRODUCT AND BIORESOURCE SCIENCE
Emerging Natural Product Technology Toward
Eco- Sustainable Development

ICE Serpong, Indonesia
23 – 24 October 2019
PREFACE

The Third International Conference on Natural Products and Bioresource Science (ICONPROBIOS) 2019 is a conference organized by Research Division for Natural Product Technology, Indonesian Institute of Sciences (BPTBA-LIPI), which is held in conjunction with the Indonesian Science Expo (ISE) organized by the Indonesian Institute of Sciences (LIPI). The 3rd ICONPROBIOS 2019 was held on October 23 - 24, 2019 at Indonesia Convention Exhibition (ICE) BSD City, Tangerang, Indonesia.

By carrying the theme “Natural Product for Sustainable Agroindustrial Production”, The 3rd ICONPROBIOS 2019 brought together more than 59 participants and presenters from several countries and background such as university lecturer, researcher, and student. The 3rd ICONPROBIOS 2019 provides a forum for exchange of information on natural products related researches within all of the related topics as well as aims to build and strengthen scientific cooperation among the research institutions. The topics covered include biologically active natural products and drugs, marine natural products, bioactive metabolites from microbes, extraction and separation science, food science and technology, food processing and food engineering, food packaging, feed science and technology, ethno-veterinary, bio-resource for biofuels, bio-resource (including waste) recovery and recycling, bio-refinery and biotechnology, bio-resources for bio-based chemicals and products, and bioremediation. We hope all of participants get lots of benefit from this conference thus it will inspire all of us how to enhance natural product application and utilization for sustainable development and environment.

Sincerely,

Satriyo Krido Wahono, Ph.D

The 3rd ICONPROBIOS 2019 Chairman
# Conference Program

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Fermentative quality of silage as affected by protein level in the ensiled material

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Abstract. Ensiling of high-protein forages like alfalfa, indigofera, cassava and moringa, however, are characterized by considerable extent of proteolysis. This study aimed to perform a meta-analysis from various published experiments regarding the effect of protein level on fermentative quality of silage. Papers reported data on protein contents of silages and their fermentative characteristics were collected and integrated in a database. A total of 15 papers and comprised of 155 data points were included. The ensiled materials were peas, wheat, barley, maize, sorghum, alfalfa and mucuna. The ensiling period varied from 20 to 303 days. Data were statistically analyzed by using the mixed model methodology. Studies from different papers were treated as random effects whereas protein level in silage was treated as fixed effect. The model statistics used was p-value. Results revealed that higher protein level led to an increase of DM loss in silage (p<0.01). Increasing protein level elevated pH value of the silage (p<0.05) and tended to increase acetate concentration (p<0.1). Ethanol concentration was elevated by increasing silage protein level (p<0.05). Higher silage protein level increased organic matter digestibility (OMD), lactic acid bacteria (LAB) population, nitrate and ammonia concentrations of the silage (p<0.05). It can be concluded that higher protein level induces proteolysis in the silage and reduces its fermentative quality.
Effects of spinach leaves and high concentrates diets supplemented with micro minerals on in vitro rumen fermentation profiles

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Abstract. The effects of different level spinach leaves Cnidoscolus aconitifolius, and high concentrate diets supplemented with micro minerals on in vitro rumen fermentation profiles were investigated. The basal diets consisted of 30% king grass (Pennisetum purpureoides), and 70% concentrate. The mineral mix consists of FeCl₂.4H₂O; MnCl₂.4H₂O; CuSO₄.5H₂O; ZnSO₄.7H₂O; and CoCl₂.6H₂O. The treatments were Basal Ration (B), B+5% C. aconitifolius leaf (BC), B+2% mineral mix (BM), and B + 5% C. aconitifolius leaf + 2% mineral mix (BCM). The treatment diets were incubated for 48 h. Completely Randomized Design with one-factor consists of four treatments, and three replications were used in this experiment followed by One Way Analysis of Variance for statistical analysis. The gas production, N-ammonia, propionate, dry matter, and organic matter digestibility decreased significantly (P<0.05) by the treatment of mineral mix BM, BCM with the lowest value was recorded on BCM. Rumen protein microbial synthesize and pH was not influenced by the treatments of spinach alone (BC) (P>0.05) but increased significantly (P<0.05) when mixed with treatments mineral BM and BCM with the highest value at BCM. No effect (P>0.05) were observed for protozoa population, methane production, acetate, and butyrate proportion. It was concluded that serving spinach alone to the high concentrate ration has no effect on the fermentation variables but does have an impact when the mineral was supplemented together with the treatment diet.
Antimicrobial activity of Quinine derivatives against human pathogenic bacteria

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Abstract. Nowadays, the antimicrobial resistance is considered one of the greatest concerns facing human health, as many of bacterial strains have become resistant to available antibiotics. Quinine is a natural alkaloid from the bark of the cinchona tree that has been used for years as an antimalarial drug. Various literatures also regarded an antibacterial effect of quinine against both Gram-positive and Gram-negative pathogenic microorganisms. With this vision, a series of some novel quinine derivatives were synthesized and their biological activities against pathogenic bacteria were assessed. This present study therefore attempted to examine the antimicrobial properties of quinine derived compounds and their Minimal Inhibitory of Concentration (MIC) against common pathogenic bacteria strains, e.g. Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, and Bacillus subtilis. The results were evaluated and compared with references drug streptomycin. It was found that quinine derivatives showed moderate antimicrobial activity as compared with quinine itself on tested pathogenic bacterial strains. Ester quinine propionate was found to give the highest antibacterial activity among other derivatives, with a range of inhibition zone from 9 to 23.5 mm to bacteria strains, compared to streptomycin with a range of inhibition zone from 8 to 12 mm. Further studies are needed to assess the bactericidal mechanisms of those derivative compounds.
Sheep growth performance supplemented with agricultural waste wafers

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Abstract. Agricultural waste is a by-product of the production process of agricultural products. Agricultural wastes that are not used properly can pollute the environment. In fact, some types of waste still contain nutrients that can be utilized by livestock. Providing feed supplements by utilizing agricultural waste is one of the cheaper alternatives, so it is easily applied by farmers. Processing agricultural waste into a form of wafers is carried out to preserve and maintain the quality of agricultural waste. This study aimed to evaluate the supplementation of agricultural waste wafers derived from lamtoro (Leucaena leucocecepala) leaves, bean sprouts, and morinda (Morinda citrifolia) leaves on sheep growth performance. This study used 12 sheep which were divided into 4 treatments and 3 groups that were differentiated based on the initial body weight. The treatment given consisted of T0: control feed, T1: control feed + 15% lamtoro leaves wafer, T2: control feed + 15% bean sprouts wafer, T3: control feed + 15% morinda leaves wafer. The sheep were fed forage:concentrate with a ratio of 40:60 for 2 months. The results showed that supplementation of agricultural waste wafers significantly increased nutrient intake, daily body weight gain, and increased income over feed cost (IOFC).
The effect of Turmeric (Curcuma longa L.) powder addition as natural antibiotic on the Quality of milk replacer for lamb during storage

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Abstract. The aim of this study was to determine the effect of turmeric (Curcuma longa L.) powder addition as a natural antibiotic, temperature, storage time on the quality of milk replacer for lamb during storage. Turmeric powder addition equal to 0%; 0,1%; 0,2%; and 0,3% (w/v), room temperature (28°C) and refrigerator temperature (5°C) stored for 5 days were used in this study. The parameters observed were Total Plate Count (TPC), bacterial growth by Methylene Blue Reduction Time (MBRT), resazurin test, organoleptic value (odor and texture), pH value, acid number and protein content in milk replacer. The data of research were analyzed by analysis of variance with completely randomized design with factorial pattern 4x2x2. If there were significant difference on each parameter, Duncan test was performed. Turmeric powder with different levels on E. coli growth showed significant difference (P<0,01), which inhibit the bacterial growth. The result of pH and protein value did not show significant difference (P>0,01) . Meanwhile, TPC, the value of acid number, organoleptic MBRT and resazurin test showed significant difference (P<0,01), decreasing TPC and acid number, increase organoleptik, prolong the time of methylene blue reduction and resazurin. Based on the results of the study, there was no interaction between turmeric powder different-level treatment, temperature and storage time, but the addition of turmeric powder inhibit the bacterial growth and defend the milk replacer quality during storage.
Tannin characteristic from *Hevea brasiliensis* and *Durio zibethinus* with pressure and hot water extraction

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**Abstract**: The aim of this study was selected the best bark, temperature and pressure for extraction phenol and tannin with hot water solvent. The extract was characterised into condensed tannin and hydrolysable tannin with spectrophotometer. Tannin are plant secondary compound that influence feed metabolisme in the rumen and pasca-rumen organ. Tannin have ability to bounding feed protein and other nutrient. Tannin classified into condensed and hydrolysable tannin, condensed tannin is a bypass agent to decrease deamination and other nutrient degradation in the rumen organ, furthermore hydrolysable tannin may divide as phenol and sugar group in the rumen. Phenol group form HT may become antioxidant in the blood and influence rumen ecology. The result for this study is *Hevea brasiliensis* has phenol and tannin content more than *Durio zibethinus* with p<0.01 if using hot water extraction. Temperature significantly influence concentration of phenol and tannin content, at 120°C phenol and tannin extract more than 70°C with p<0.01. Phenol extract significantly effected by pressure, 1 bar get phenol and tannin more than 2 bar with p<0.01. Treatment in this study have interaction, so generally concluded that to get phenol and tannin extract the highest used *Hevea brasiliensis* with temperature 120°C and pressure 1 bar.
Improvement of nitrogen balance (land budget) in South Korea in terms of livestock manure: a review

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Abstract. South Korea’s nitrogen (N) balance is the highest among OECD countries. However, this figure is likely to be overestimated. Besides, there is a lack of scientific logic to persuade stakeholders (i.e., fertilizer company, livestock farmer) when these numbers are used as a basis for the N reduction policy. N balance is the residual value after subtracting the amount of N flowing out of the specific boundary from the amount of N entering the boundary. The boundaries of N balance are divided into farm budget, soil budget, and land budget. OECD uses a land budget for N balance calculation. The N inputs consist of mineral fertilizers, organic fertilizers, livestock manure, crop residues, seed and planting materials, biological N fixation, and atmospheric deposition. The N content in the crops produced corresponds to the N output. The N balance method proposed by the OECD is based on a grazing farming system. This method derives from the agricultural environment in which livestock manure is directly deposited into farmland. However, most of the livestock manure in South Korea is not used directly in farmland but is converted to compost and liquid fertilizer. N loss occurs during composting and liquid fertilizer production, which means that the amount of N loaded on the actual soil can be significantly reduced. Another concern related to N from livestock manure is the source of the N content in the crop. N absorbed by crops is not distinguished from livestock manure N, chemical fertilizer N, or soil N. If policymakers intend to reduce N by limiting mineral fertilizers or livestock manure, the N use efficiency of crops based on N sources will play an important role. Therefore, this paper discusses two uncertainties (N loss rate and crop N uptake) related to N from livestock manure and suggests ways to improve N balance.
The effect of combination treatment of inhibitor solution and Bee Candle Coating during storage of *Citrus microcarpa* L fruit quality

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Abstract. This study aimed to evaluate the proximate, and vitamin C of plant shoots of *Citrus microcarpa* L fruit which the stalk was soaking in AgNO₃ solution. The model of experimental design methods used in the research is a randomized block design (RAK) with two factors. The first factor is concentration of AgNO₃ 10 ppm 8 hours and concentration of coating that is beeswax 0%, 4%, 8%, and 12%. The second factor is long storage that is 0 day, 4 day, 8 day, 12 day, and 16 day. The analysis of this research was used to chemical analysis (levels of vitamin C), physical analysis (weight loss and hardness), and analysis chemical-physic (pH and total dissolved solids). The result of the research showed that concentration of beeswax (b) gives influence for weight loss and vitamin C, but long storage (t) gives influence for weight loss, vitamin C, total dissolved solids, hardness, and pH. Concentration of beeswax 8% is the best concentration for weight loss, total dissolved solids, and pH. But, concentration beeswax of 12% is the best concentration for levels of vitamin C and hardness.
Functional properties of ripe plantain (Musa Spp) flour from different varieties

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Abstract. Ripe plantain has potentially become flour with good sensory and easy to digest. This study was carried out to determine the functional properties of five varieties of ripe plantains flour. This research was conducted using a completely randomized design with a single factor, namely a variety of plantains consisting of five levels: V1 = Kapas (Musa corniculata); V2 = Tanduk (Musa corniculata J.De Leureiro); V3 = Siam (Musa paradisiaca var. Moralis M.); V4 = Kepok (Musa paradisiaca var. Bluggoe); V5 = Raja Bulu (Musa sapientum var. Paradisiaca Baker), and each treatment was repeated 3 times. The result showed that kepok flour has significantly different in moisture content and yield compare with other varieties. The water absorption capacity was not significantly different among the treatments. The oil absorption capacity of ripe kapas was significantly different compared with ripe siam flour and ripe raja bulu flour. The swelling capacity of ripe tanduk flour was significantly different from ripe kepok flour. The solubility of ripe kapas, kepok, and raja bulu flour was significantly different with ripe tanduk and siam flour. The peak time and pasting temperature were not significantly different among the treatment. The peak viscosity of ripe kapas and raja buluh flour was significantly different from others, it was higher than others. The breakdown viscosity of ripe tanduk and raja buluh was significantly different from others, it was higher than others. The setback viscosity of ripe kapas flour was significantly different among the treatments with the highest value. Based on the result could be concluded that different varieties could have different or the same functional properties. The used of ripe plantain flour for food production could be based on the functional properties of the flour.
The analysis of protein, fat, and free fatty acid content changes in fried chicken cooked with repeated cooking oil at street vendors in Malang

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Abstract. This research aimed to study the changes of protein, fat and free fatty acid contents in fried chicken that was cooked with repeated cooking oil on the 1st, 5th, 10th, 15th, and 20th frying from five street vendors in Malang City. The research design used the randomized group design with two factors. The first factor was fried chicken sold by five street vendors, and the second factor was the 1st, 5th, 10th, 15th, and 20th frying frequency. The laboratory test used semi-micro Kjeldahl (protein test), Soxhlet (fat content test), and titration (free fatty acid test) methods. The results showed that: 1) there were decreases of protein contents with the increasing frying frequency, the chickens in the 1st frying had between 19.52–21.68 g per 100 g, the 5th had 18.87–20.98 g, the 10th had 18.15–20.10 g, the 15th had 17.43–19.7 g, and the 20th had 16.60–18.85 g protein; 2) there were increases of fat contents, with the 1st frying resulted in fat contents between 17.71–19.21 g per 100 g, the 5th contained 18.92–20.11 g, the 10th contained 20.47–21.72 g, the 15th contained 20.50–21.72 g, the 20th contained 21.05–22.99 g; 3) there were increases of free fatty acid contents, the chickens in the 1st frying had between 0.56–0.85% free fatty acid, the 5th contained 1.48–2.26%, the 10th contained 2.44–3.30%, the 15th contained 4.41–5.39%, and the 20th contained 5.53–6.66%, all exceeded the SNI standard of maximum 0.3%.
Empal gentong and empal asem with packaged cans: traditional food from Cirebon

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Abstract. There has been research on traditional cuisine from Cirebon, empal gentong and empal asem. This empal is one of a variety of Soto cuisine which uses a mixture of beef, tripe, beef spleen and cow innards. The method used is to compare the results of heat adequacy measurement at 121°C for 60 minutes (starting from ON equipment), then the result in the packing can be done chemical analysis, physics and nutritional value between 2 different variant types of empal Gentong and empal asem. The result of the research obtained by empal Gentong Heat adequacy is 21.24 minutes with a weight of 24.4%, aw 0.882, pH 5.93, water content of 83.9%, Ash 1.53%, 7.82% protein, fat 3.07%, carbohydrate 3.68%, sugar 2.39% with total energy 220 calories. While the result of heat adequacy empal Asem is 20.36 minutes with a weight of 25.9%, aw 0.884, pH 5.42, water content 86.5%, Ash 1.66%, protein 6.89%, fat 0.84, carbohydrate 4.11%, sugar 2.21% with a total energy of 150 calories. Based on Regulation of the Head of the Food and Drug Supervisory Agency - Republic of Indonesia (BPOM RI) Number 24 of 2016 concerning Commercial Sterile Food Requirements, Chapter III Requirements for Sterile Commercial Foods Article 3, paragraph 2 that sterility value (F0) is at least 3.0 minutes calculated against Clostridium botulinum spores. Thus, canned empal gentong and empal asem can be declared safe for consumption by consumers.
Physical and mechanical properties of natural fiber from *Sansevieria trifasciata* and *Agave sisalana*

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**Abstract.** Sansevieria and sisal plants are ornamental plants that are quite popular in Indonesia. Both are plants that are very easy to cultivated, because they can grow in areas with less water and sunlight. Both of these plants contain potential natural fibers are used as raw material requirements for textile industry. The aims of this research was to determine physical and mechanical characteristics of sansevieria and sisal for fibers utilization. The method of fibers extraction used was the mechanical decortication process. The research method used was descriptive method. Parameters measured were length and diameter of fiber, colour, fineness, moisture regain, tensile strength, and stretch strength. The results revealed that sansevieria and sisal fibers have diameter 103,60 μm and 182,50 μm; average length 68,40 cm and 81,60 cm; brightness level (L*) 67,62 and 66,42; yellowness (b*) 20,42 dan 23,80; fineness 6,30 tex and 19,70 tex; moisture regain 11,93 and 12,57; tensile strength per bundle 24,891.60 gf and 35,263.90 gf; stretch strength per bundle 20% and 22,90%. The physical and mechanical characterization showed that sisal fiber had the best characteristics than sansevieria fiber. Fibers from these two plants have a potential textile material characteristics, which are used as needle.
Effectivity of quercetin as antiviral to Dengue Virus-2 strain New Guinea C in Huh 7-it 1 Cell Line

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Abstract. The prevalence of dengue virus infection (DENV), in Indonesia still high compare to other tropical countries in the world. Unfortunately, the specific of antiviral drug to DENV is not available yet. The pure compound such as quercetin revealed a good antiviral to DENV candidat. Quercetin is a plant-derived flavonoid that can be found in wide variety of fruits and vegetables. It has been proven that quercetin able to improve body performance and reduce the risk of infection as well as inhibit DENV replication in Vero cell. However, the research on human cell line is not yet conducted. Therefore, this research aims to determine the effectivity of quercetin as antiviral drug towards DENV-2 strain New Guinea C in human cell line Huh 7 it-1. To determine the value of IC50 and CC50 we used Focus Forming Assay and MTT assay, respectively. The result of CC50 value was 217.113 μg/mL and IC50 value was 18.406 μg/mL, with the SI value of 11.797. From the results imply that quercetin has low toxicity with high effectivity. Thus, quercetin suggested a good candidate of antiviral drug against DENV-2 in future.
Inhibition mechanism of *Psidium guajava* leaf to dengue virus replication in vitro

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Abstract. Dengue hemmorhagic fever is a disease caused by Dengue Virus (DENV) infection that carried by mosquito vector. The incidence of DHF in Indonesia (2013) is 41,25 cases per 100,000 population. However, until now there is no antiviral therapy for DHF. Saptawati L, et al explained the anti-Dengue activity in *Psidium guajava* leaves extract that have potency to inhibits the DENV infection with IC₅₀ 7,2 µg/mL and CC₅₀ 153,18 µg/mL. But, the mechanism still unknown. This research measure the percentage of viral inhibition in the DENV surface protein inhibition and receptor inhibition of 2 times IC₅₀ extract using focus assay methods and followed by measure of cell viability using MTT assay. The results of focus assay for DENV surface protein inhibition is 58,24 ± 17,40% and in DENV receptor inhibition is 8,56 ± 6,29%. Then, the cell viability of attachment and receptor inhibition are 100,71 ± 4,72% and 100,96 ± 3,51%. Based on literatures, the bioactive compounds in the extract that acts as anti-Dengue are quercetin and hyperoside. But, the action of quercetin is not on DENV surface protein or inhibits the DENV receptors and hyperoside acts to inhibits DENV receptor. This novelty suggest maybe there are other compounds in *Psidium guajava* leaves extract that acts as anti-Dengue.
Antidiabetic effect and glucose tolerance of Areca nut (*Areca catechu*) seed ethanol extract on alloxan induced diabetic male rats

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Abstract. Areca catechu fruit (*Areca nut*) is one component to betel chewing. There is an assumption that the antidiabetic effect of chewing betel is sourced from areca nut. This study aims to determine the anti-hyperglycemic effect and glucose tolerance of ethanol extract of areca nut (*Areca catechu*) seed in diabetic rats. Old Areca nut fruit was obtained from a garden in the Depok region, the suburb of Jakarta. Areca nut seeds were made into fine powder then macerated by using 70% ethanol at room temperature based on the Harbone method. Male rats were eligible for the trial, after acclimatization, rats were made diabetic by using alloxan. The rats for this trial were divided into 6 groups, each of groups consisted of 5 rats. Glibenclamide was used as a positive control for anti-diabetes and acarbose was used for glucose tolerance test, as normal control was given distilled water, while for negative control was used 1% CMC Na, namely a solution suspending agent for test preparation. Areca nut seed extract was given with 3 types of doses, namely low, medium and high doses, namely 22.5 mg; 45 mg and 180 mg per 200 gr b.w rats, respectively. For measure blood sugar levels was used a glucometer tool. The result of this study showed, that on 14 days of given test preparation, the statistical results with ANOVA test and Kruskal-wallis test showed that medium doses of areca nut seed extract had the same antidiabetic effect and glucose tolerance with positive control and were significantly different to negative controls. (P≤0.05). While on low and high dose was not significantly different to negative controls (P≥0.05). conclusion of this study, areca nut seed was very potential for anti-diabetes and glucose tolerance.
Adsorption of basic dye methylene blue by brown algae *Sargassum duplicatum*

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Abstract. The ability of raw and dried *Sargassum duplicatum* to remove methylene blue (MB) from aqueous solution was evaluated. Brown algae, *S. duplicatum* before and after MB adsorption was characterised by Fourier transform infrared spectroscopy (FT-IR). Batch experiments were conducted to examine the effects of parameters such as initial pH, biomass dosage, contact time, and initial dye concentration on MB Adsorption. The optimum adsorption was found at around pH 5, adsorbent dosage 1 g/L, and initial concentration of MB at 20 mg/L. Adsorption occurs very fast in first 5 min and reaches the equilibrium at 70 min. The maximum percentage of dye removal was 88.9%. This study suggests that *S. duplicatum* has good potential capacity to remove MB dye and could offer promising opportunity as a low-cost biosorbent.
Protein Isolation of Pterois Volitans Poison with Heating Process for Antibacterial Activity Assay

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Abstract. Pterois volitans is an invasive native predatory species in the Indo-Pacific ocean that disrupt the food chain and damage coral reefs which cause ecosystem imbalances. Venomous spines made lionfish inedible and avoided by a predator, so they multiply rapidly. Phospholipase A2, which is a protein compound, has antibacterial activity contained in Lionfish venom, which is expected to be an antibacterial agent. The process of isolation and purification of the protein phospholipase A2 from the poison of lionfish consists of several stages consisting of venom extraction by sonication; heating; and purification by gradual purification of ammonium sulfate. The protein isolates then analyzed by activity tests using the Marinetti method; determination of concentration by Lowry test; identification of proteins with SDS-Page; and the antibacterial activity test using agar diffusion. The results of phospholipase A2 obtained from the extract of Pterois volitans poison by purification method ammonium sulfate at 80% saturation with a heating time of 35 minutes had a specific enzyme activity of 0.0206 units/µg and can inhibit E. coli bacteria 98.81% and Salmonella sp. inhibit 89.28% with a concentration of 3.77 µg / ml.
Extraction of PLA2 and Antibacterial Activity Test of Lionfish (*Pterois volitans*) Spine Venom

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Abstract. The population of *Pterois volitans* has caused significant damage to other fish populations and coral reef ecosystems. Population control of *P. volitans* consumes a considerable cost so that the utilization of these fish needs to be sought to be useful along with controlling the population. This fish is known to contain the enzyme Phospholipase A2 (PLA2) which can be used as an antibiotic against some bacteria. This study will examine the antibacterial activity of the phospholipase A2 enzyme extracted from *P. volitans* venom to *Escherichia coli*, *Bacillus subtilis*, and *Staphylococcus aureus* bacteria. The method used to isolate the enzyme PLA2 is by using precipitation of ammonium sulfate and precipitation with ethanol. The results of the precipitation tested with the Lowry protein concentration test, the Marinetti PLA2 activity test, and the identification of the SDS-PAGE protein. The agar diffusion disc method is used to test the antibacterial activity. The results obtained from this research are that 80% ammonium sulfate precipitation method has the highest protein and enzyme activity with a ratio of 1.32 times compared to toxic extract. For antibacterial activity test results, an 80% ammonium sulfate sample may inhibit the activity of *S. aureus* bacteria but does not affect *B. subtilis* and *E. coli*. 
Protein Isolation and Identification of Pterois Volitans Spine Venom Coagulant Activity

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Abstract. Pterois volitans, or commonly referred to lionfish, are fish species originating from Indo-Pacific waters but are becoming invasive in other regions such as the Caribbean and Atlantis. Various efforts have been made to reduce the number of lionfish, and one of them is by utilizing the venom on the spine. The venom extraction of P. volitans spines is done mechanically using sonication and centrifugation, and then protein isolation is carried out using salt. Coagulant activity from extract (crude venom) and lionfish venom protein isolate was done by counting PT (prothrombin time) and aPTT (activated partial thromboplastin time) which resulted that the crude venom and protein isolate of lionfish venom can accelerate blood clot (procoagulant) respectively up to 8.5 seconds and 6 seconds. Protein identification was made using LC-MS/MS device. The LC-MS/MS analysis showed that the protein isolate of lionfish venom contains Nomega-nitro-L-arginine methyl ester (L-NAME) compounds known to have procoagulant effects. From a series of tests mentioned, it concluded that P. volitans venom have procoagulant activity and one of the compounds responsible for it is L-NAME.
Radical Scavenging Activity and Total Phenolic Content of Seven Tropical Plants

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Abstract. Seven tropical plants were extracted and evaluated for their radical scavenging activity and Total Phenolic Content (TPC). Total phenolic content were determined by Folin-Ciocalteu reagent equivalent to gallic acid. The plant extract were obtained by sonication using ethanol as the solvent. Four plant extracts were found as active antioxidant in this work. The research revealed that Schleicera oleosa bark extract had the highest DPPH radical scavenging activity with (IC50) with 6.59 ± 0.013 μg/ml, followed by Anacardium occidentale bark extract 8.07 ± 0.12 μg/ml, Anacardium occidentale leaves extract 9.65 ± 0.05 μg/ml, and Muntingia calabura leaves extract 27.12 ± 0.5 μg/ml. Positive correlation between free radical scavenging activities and Total Phenolic Content (TPC) in plant extracts was observed. Schleicera oleosa contained a highest Total Phenolic Content (TPC) 451.071 ± 3.3 mg/gr GAE, followed by Anacardium occidentale bark extract 327.6 ± 2.7 μg/ml, Anacardium occidentale leaves extract 307.08 ± 0.55 μg/ml, and Muntingia calabura leaves extract 288 ± 0.5 μg/ml. The result suggest that these tropical plants can be used as resources for natural antioxidant.
Effect of Drying Temperature and Air Velocity on the Drying Characteristics and Product Quality of *Clinacanthus nutans* in a Heat Pump Dryer

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**Abstract.** Fresh *Clinacanthus nutans* (*C. nutans*) leaves were exposed to drying process using a heat pump drying. This research was carried out to determine the effect of drying temperature (40, 50 and 60°C) and air velocity (2.5, 3.0 and 3.5 ms\textsuperscript{-1}) on the drying characteristics and product quality. Product quality in terms of vitamin C and total colour change (\(\Delta E\)) were investigated before and after processing. Analysis data obtained that higher air temperature and air velocity resulted in a shorter drying time. At higher temperature, more heat was supplied to the *C. nutans* leaves. This increased the drying force for moisture evaporation and led to faster drying rate. The analysis quality revealed that dried *C. nutans* leaves exposed at temperature 50°C (3.5 ms\textsuperscript{-1}) noticeably recorded the highest preservation rate on the product quality with 90.7\% and 94.6\% maintained for vitamin C and total colour change (\(\Delta E\)), respectively. Overall, heat pump dryer method delivered a shorter drying time without compromising the product quality.
Cellulose acetate production from paddy rice straw and oil palm empty fruit bunch: Trichloroacetate catalyst

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Abstract. The utilization of non-wood biomass for fuels and chemicals production is widely studied in recent years. This paper reported the application of trichloroacetate as catalyst in the production of cellulose acetate from paddy (Oriza sativa) rice straw and oil palm (Elaeis guineensis) empty fruit bunch (EFB). Firstly, pretreatment by using H2O in acidic condition was carried out prior to the soda pulping by using NaOH 10%, solid to liquid ratio 1:7. The pretreatment and pulping aim to separate cellulose from lignin and hemicellulose. Furthermore, in order to purify the cellulose, bleaching was applied to the pulps by using NaClO2 0.5% and H2O2 10%. Finally, the paddy rice straw pulp and oil palm EFB pulp were subjected to the acetylation by using acetic anhydride as acetylation agent in CH3COOH condition with catalyst CCl3COOH and H2SO4. The analysis results by using Fourier-transform infrared spectroscopy showed that C=O stretching from cellulose acetate at around 1730 cm⁻¹. Furthermore, the morphological surface and crystallinity of the raw materials and products was analysed by using scanning electron microscopy and X-ray diffraction, respectively. The acetylated cellulose diameter and crystallinity decreased after the acetylation reaction.
Antibacterial activity of biocomposite plastic-based phenolic acid-grafted chitosan and sugar palm starch (*Arenga pinata*)

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Abstract. Antibacterial activity of biocomposite plastics based sugar palm starch (SPS) and phenolic acid-grafted chitosan has been investigated. The various type of active compounds (ferulic acid-grafted chitosan, caffeic acid-grafted chitosan, and coumaric acid-grafted chitosan) was synthesis by free radical method and was evaluated by using FTIR and calculate the degree of substitution by using Folin-Ciocalteu procedure. The biocomposite plastics were made by combined SPS with glycerol, cellulose, zeolite, and active compounds (phenolic acid-grafted chitosan). Morphological structures were analyzed by using SEM, and antibacterial activities were evaluated by using disk diffusion method. It was found that the grafting reaction of phenolic acids was not improved the antibacterial activities. The biocomposite plastics impregnated with grating products were showed no clear zone.
Composting of grass clippings using different commercial microbial activators

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Abstract. A study was conducted on the utilization of biomass organic waste in the form of grass-clippings waste to make compost. The study proposed to determine the effect of different types of activators used on the temperature, duration of composting and the characteristics of the compost produced. The material used for making compost is grass-clipping, mixed with goat manure and rice bran, then inoculated using three types of commercial activators, EM4, Bioactivator Green Phosko (BGP), and Agrisimba. Observation of temperature changes during composting was carried out every day. Compost products were then tested for quality including pH, water content, C-Organic, total nitrogen, C/N ratio, and P2O5 levels. The test results showed that the temperature changes of the sample with BGP and Agrisimba activators were almost the same, but both were different from the sample using EM4 activators. The composting process of all sample treatments lasted for 14 days. The quality of compost produced from the three treatments has met the quality requirements according to the Indonesian National Standard SNI 19-7-30-2004 regarding compost from domestic organic waste.
Nutrient digestibility of broiler chicken fed diets supplemented with probiotics phytase-producing

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Abstract. Phytic acid is an anti-nutrition substance due to its ability to bind minerals such as Mg, Fe, Zn, Mn, Ca, and enzyme proteins resulted in decrease in mineral solubility. Phytic acid levels can be reduced by phytase [myo-inositol hexacryphosphate phosphohidrolase]. Microbial phytase can come from fungi, bacteria, and yeast sources. This research was conducted with the aims to evaluate the effect of probiotics phytase-producing supplementation as feed additive on nutrient digestibility of broiler. This study performed in a completely randomized design for the environmental design, which consist of five treatments. The treatments are negative control (without probiotics phytase-producing), LAB (Lactobacillus plantarum A1-E) phytase-producing, yeast (Candida tropicalis TKD-3) phytase-producing, probiotic consortium (L. plantarum A1-E and C. tropicalis TKD-3) and positive control (commercial probiotic). The observed variables are feed intake, energy intake, excreta weight, energy excretion, nitrogen intake, nitrogen excretion, nitrogen retention, apparent metabolizable energy (AME), true metabolizable energy (TME), apparent metabolizable energy corrected for nitrogen (AMEn) and true metabolizable energy corrected for nitrogen (TMEn). Data were analyzed by using analysis of variance (ANOVA) and followed by Duncan’s multiple range test to distinguish the effect of different treatment mean. The results of variation analysis on AMEn and TMEn show significant different while another parameter showed no significant difference between treatments. The use of C. tropicalis TKD-3 as probiotics phytase-producing on broiler chicken diet will give optimum result in nutrient digestibility, especially apparent metabolic energy corrected nitrogen, and true metabolic energy corrected nitrogen.
In Vitro anthelmintic activity of leaves infusion of Kersen leaf (*Muntingia calabura*) against *Haemonchus contortus* worm

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Abstract. The problem caused by the gastrointestinal parasite has caused economic losses in the centres of ruminant livestock throughout the world. Parasitic resistance to synthetic antiparasitic, led researchers to explore alternative herbs as bio-anthelmintic. This study aims to determine the in vitro effect of *M. calabura* leaf infusion on egg hatchability (EHI) and mortality of adult female *H. contortus* worms (AWM), as a parameter of the antiparasitic properties of the leaves of the plant. The leaf infusion of *M. calabura* at doses of 2%, 4%, and 6% was used for both treatments, and albendazole at a dose of 2 mg/mL was used as a positive control. The negative control was sodium chloride at 0.9%. The EHI assay was conducted two times, before and 24 h after treatment, while AWM was monitored 15 and 30 min, and 1, 2, 3, 4, 5, 6, 7, and 8 h post test. The result showed that *M. calabura* leaves contain secondary metabolites, one of which was CT detected in this study. The leaf infusion of *M. calabura* at a concentration of 6% significantly inhibited EHI and AWM, higher than the negative control (P<0.05). While, it was not significantly different from albendazole 2 mg/ml on EHI test. The results conclude that the leaf infusion of *M. calabura* is fully potential as a bioanthelmintic against *H. contortus* worm.
Cellulase derived from *Chryseobacterium indologenes* LA4K isolated from Indonesian agar-agar industry solid waste

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**Abstract.** Hydrolysis process can be a challenging task to perform because the required enzymes are difficult to find and microbial culture is relatively expensive. However, the process can be made more economical by utilizing enzymes which can be produced using substrates derived from local materials. One example of such materials is the solid waste generated by industries involving agar-agar which is obtained from the red alga *Gracilaria* sp. *Chryseobacterium indologenes* LA4K is an indigenous bacterial variant which is isolated from agar-agar industry solid waste. The cellulolytic enzyme of *C. indologenes* LA4K was processed using a medium of 2.5% agar-agar industry solid waste which was incubated for six days and showed an activity of 0.3726 U/mL. Reaction incubation temperature exerted some influence on the activity of *C. indologenes* LA4K: the process produced the optimum activity of 0.3246 U/mL at the temperature of 40°C, while 30 minutes was determined as the optimum incubation period needed by both enzyme and substrate of *C. indologenes* LA4K to react. The enzyme entirely lost its activity when heated to the temperature of 80°C. The activity of LA4K cellulase increased with an addition of divalent ions (Mg²⁺, Ca²⁺, and Zn²⁺) and monovalent ions (K⁺ and Na⁺). An addition of trivalent ion Fe³⁺ to *C. indologenes* LA4K cellulase acted as an inhibitor to its activity. Addition of ethanol as an organic solvent to the supernatant crude enzyme caused the enzyme to become denatured, thus reducing the cellulase activity of its *C. indologenes* LA4K isolate to 85.47%. The presence of anionic detergent SDS in the crude cellulase of *C. indologenes* LA4K increased its activity to 105%. Addition of nonionic detergents Triton X-100 and Tween 80 to *C. indologenes* LA4K cellulase increased its activity to 130% and 110.9%, respectively.
Comparative evaluation of proximate composition and vitamin C of plant shoots of *Physalis angulata* and *peruviana* in west Java, Indonesia

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Abstract. This study aimed to evaluate the proximate, and vitamin C of plant shoots of *Physalis*. Two species of *Physalis*, namely, *P. angulata* L. and *P. peruviana* L., used as models for a comparative study. Proximate composition, fiber, and vitamin C of all part of plant shoots, i.e., leaf, stem, bud, and fruit of *Physalis* were analyzed. *Physalis angulata* collected from Pagaden subdistrict (latitude: 6030'24" S, longitude: 107048'74"E, elevation: 55 MAMSL) Subang District, West Java Province, and *Physalis peruviana* collected from Pamulihan subdistrict (latitude: 6052'27.06"S, longitude: 107049'24.95"E, elevation: 947 MAMSL), Sumedang district, West Java Province. The results of the study showed that the existence of proximate composition and vitamin C in plant shoot of *P. angulata* and *P. peruviana* relatively evenly spread. The proximate composition and vitamin C of plant shoots of *Physalis angulata* had the same pattern as compared to that of *Physalis peruviana*. The results of paired sample test showed that there were no significant differences in proximate composition and vitamin C between *Physalis angulata* and *Physalis peruviana*. 
Influence of drying temperature on chemical properties of dried cracker

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Abstract. In Indonesia, traditional crunchy crackers are eaten as a snack or as an accompaniment with meals mostly. Effect of drying temperature in the sun drying 12 h and oven method to chemical properties of dried cracker was investigated in the present study. Several conditions in this study i.e. drying temperature at oven method of 50, 60 and 70 °C, dried cracker flavors were garlic, chilli and seaweed, chemical properties of dried cracker were ash, protein, crude fat, carbohydrate and moisture content. Accordingly, this study also investigated sun drying of cracker by considering traditional production methods by home industry and cracker samples were dried efficiently even if it took a longer time. The result showed that drying temperature at oven method significantly affected to ash, crude fat and carbohydrate of dried cracker. The increase of protein at drying temperature 70 °C while increase in a moisture content of cracker at drying temperature 50 °C. The difference flavor of dried cracker significantly affected crude fat content. The lowest protein was shown by seaweed flavor cracker. The highest carbohydrate and moisture content were shown by chilli flavor cracker also confirmed the lowest ash content.
The shelf life of yogurt starter and its derivatives based on the microbiological, physical and sensory aspects

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Abstract. Yogurt quality is affected by the yogurt starter. The aim of this study was to determine the shelf life of yogurt starter and its derivatives based on microbiological and physical and sensory aspects. Yogurt starter is made from commercial dry culture, then lowered to 4th derivative, and stored in the refrigerator for up to 25 days. The result showed that there was stability in the viability of total microorganisms and mold in yogurt starter and its derivatives. The viability of lactic acid bacteria (LAB) decreased from F1 to F4. Decreasing pH and little whey formation occurred during the storage. The yogurt quality made from the starter and its derivatives was acceptable. The shelf life of F1, F2, and F3 starter is 25 days, while F4 is 20 days.
Antioxidant capacity of bamboo shoots (*Deandracalamus asper*) flour produced under fermentation process by lactic acid bacteria

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Abstract. Bamboo shoot is part of the shoots of bamboo plants that can be consumed. Bamboo shoots can be processed by fermentation. The treatment of fermentation has many advantages such as increasing the fiber content and antimicrobial activity. The aim of this study is to determine the effect of fermentation treatment on antioxidant activity, morphological structure of starch, elemental mineral content and spectrum of functional groups of bamboo shoots flour. The treatments carried out in this study were bamboo shoot flour treated with fermentation for 24 and 48 hours spontaneously and using lactic acid bacteria, viz., *Lactobacillus bulgaricus* and *Lactobacillus casei*. Antioxidant activity, total phenol, total flavonoids, SEM, and FTIR were analyzed. The results showed that the antioxidant activity of bamboo shoot flour which experienced 48 hours fermentation had lower antioxidant activity than 24 hours, this was in line with the results of analysis of total phenol and total flavonoids. The morphological form of starch which has been fermented for 48 hours has a smaller granule shape and size and more is broken than 24 hours of fermentation. The elements contained in fermented bamboo shoot flour include carbon, oxygen, potassium and calcium. FTIR results of fermented bamboo shoot flour showed the same spectrum pattern but different absorbance values.
Characterization of fiber fraction, physical and chemical properties of coffee flour (*Coffea sp.*) as functional foodstuff for diabetes mellitus patient

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Abstract. Coffee pulp is solid waste from coffee processing, but unfortunately, it has not been utilized optimally, particularly for foods. Coffee flour contains high dietary fiber and low gluten, so that it is potential as functional foodstuff. Objective of the research was to study characterization of fiber fraction, physical and chemical properties of coffee flour as functional dietary material, which is rich in fiber to reduce blood glucose level for diabetes mellitus patients. The research used Arabica and Robusta coffee pulps. Characterization of fiber fraction was performed on soluble dietary fiber (SDF), insoluble dietary fiber (IDF), and total dietary fiber (TDF). Physical properties were tested in relation with shape and size of flour granule using SEM device. Chemical properties were tested using proximate test, such as: protein level, fat level, water, ashes, and carbohydrates. Results of the research showed that characterization of fiber fraction for Arabica has soluble dietary fiber 4.78% (wb); 4.30% (db) higher 0.63% (wb); 0.55% (db) in comparison with Robusta. However, the insoluble dietary fiber is 69.16% (wb); 62.24% (db) and total dietary fiber is 73.32% (wb); 65.98% (db) for Robusta is higher 10.78% (wb); 9.82% (db) insoluble dietary fiber and 10.15% (wb); 9.26% (db) total dietary fiber in comparison with Arabica. Granule shape of the flour for Arabica and Robusta have uneven surfaces and diverse sizes of granule. Arabica flour granules are smaller, 12.8-49.8 μm, than Robusta, 48.8-66.8 μm. Testing the chemical properties showed fat level was 4.05% (wb); 4.55% (db), water 10.96% (wb) and ash 9.35% (wb); 10.50% (db) for Arabica are higher 0.08% (wb); 0.12%(db) fat, 0.66% (wb) water and 0.81% (wb); 0.99% (db) ash. However, carbohydrate level was 62.78% (wb); 70% (db) and protein 14.41% (wb); 16.06% (db) for Robusta was higher 1.24% (wb); 0.88% (db) carbohydrate and 0.31% (wb); 0.23% (db) protein in comparison with Arabica. Coffee flour of Arabica has better characterization for fiber fraction, physical and chemical properties, in comparison with Robusta, due to it has higher soluble dietary fiber (SDF) and smaller flour granules, which are potential as functional foodstuff for diabetes mellitus patient.
Microbiological and chemical quality of a traditional salted-fermented fish (peda) product of Banten, Indonesia using *Leuconostoc mesenteroides* ssp. *cremonis* BN12 as starter culture

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**Abstract.** Peda is traditional salted fermented fish product of natural fermentation of salted mackerel fish of Indonesia. This study was carried out to evaluate the effect of *Leuconostoc mesenteroides* ssp. *cremonis* BN12 as starter culture on the microbiological and chemical quality of peda. Peda was processed by fermentation either with or without *Leuconostoc mesenteroides* ssp. *cremonis* BN12 2.5; 5.0 and 7.5 percent with addition of 30% (w/w) salt at room temperature for 9 days. The observation were consist of microbiological analysis {total plate count, total lactic acid bacteria (LAB) and total Coliform} and chemical analysis (pH and TVB). The result showed that *Leuconostoc mesenteroides* ssp. *cremonis* BN12 could produce better quality of peda, especially on starter concentration 5%. Total bacterial count $1.19 \times 10^5$ CFU/g, total LAB count $1.01 \times 10^4$ CFU/g, and Coliform $7 \times 10^4$ CFU/g. Moreover, TVB was 45.12 mgN/100g and pH value was 5.79.
Comparative two strain of *Lactobacillus plantarum* as single starter formulation for modified cassava flour (Mocaf) production

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Abstract. Fermentation is a critical step for the production of modified cassava flour (mocaf). It could be done using natural fermentation through indigenous microbial consortia or single starter lactic acid bacteria (LAB). In this study, we employed two strain of *Lactobacillus plantarum*, namely strain FNCC 0027 and strain CV-1 in different starter formulation to achieve standardized mocaf products. The eight-month cassava was obtained from the local market in Gunungkidul, DI. Yogyakarta, Indonesia. We used general mocaf processing, including stripping, slicing, fermenting, rinsing, drying, milling, and sieving. The formulas including A. FNCC 0027 in 5% skim milk media + 0.2 % glucose, B. FNCC 0027 in 5% skim milk media without glucose, and C. CV-1 in 5% skim milk media. Several parameters such as pH, colony-forming unit, the temperature during the process and physicochemical properties of mocaf were measured. The physicochemical parameters of mocaf show water content between 4.29 - 5.21%, ash content 0.09 - 1.28%, fat content 0.15 - 0.29%, protein content 0.61 - 0.66%, crude fiber 0.12 - 0.19%, energy 375.49 - 383.88 Kcal / 100g, pH 6.04 - 6.31, viscosity 12.8 - 13.2 cPoice. The HCN of raw cassava used in this study was 110. 20 ppm and its content dropped after the final process of mocaf up to 91.02, 88.06, and 85.58 % for starter A, B, and C, respectively. Fermentation of cassava using formulation of FNCC 0027 in 5% skims milk media give the lowest content of HCN <10 ppm and fit the requirement of the Indonesian National Standard (SNI) 7622-2011.
Increased shelf life of aloe vera beverage with modified hot-fill Processing in cups for SME scale

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Abstract. Aloe vera beverage is made by soaking aloe vera gel in a sugar solution. This drink has good tastes and health benefits, but aloe vera beverage has a short shelf life for about two days and must be stored in cold temperatures. It causes the marketing area of aloe vera based beverage products to be limited. This study aims to extend shelf life by modifying the process production that easy to practice for SME. Time-temperature-sanitation (TTS) parameter using to improve the process production. The hot-fill processing was chosen because it is suitable with the rules of TTS and easily applied in the SME. Total microbial, Brix, and pH testing were carried out to ensure product quality during storage. Aloe vera beverage process using hot-fill processing can increase the product shelf life of up to 1 month with total microbial 28x10^1 CFU/ml or below food safety standards.
The effects of Turmeric extract addition on physical and sensory characteristic of Arenga-Arrowroot starch noodle

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Abstract. Arenga-arrowroot starch noodle is an alternative carbohydrate source made from 75\% arenga starch and 25\% arrowroot flour. This starch noodle has a bright brown-opaque color character which needs the addition of coloring agents to improve its physical appearance. The aim of this study was to determine the effects of turmeric extract addition on physical and sensory characteristic of the arenga-arrowroot starch noodle. Five variations of concentrations were given to turmeric extract, there are 3\% ; 6\% ; 9\% ; 12\% ; and 15\% w/w. Physical properties which have been analyzed were starch noodle’s color, compression strength, tensile strength, and elongation. Sensory properties which have been analyzed were hedonic scoring for color, odor, taste, overall acceptance and descriptive test for taste parameter. The results showed that addition of turmeric extract give an impact on physical and sensory characteristic of arenga starch – arrowroot flour noodle. Addition of turmeric extract cause the decrease of noodle color brightness. The addition of turmeric extract decreased the compression test, elongation, and tensile strength of arenga starch-arrowroot flour noodle. Turmeric extract addition increased the yellow color. In sensory analysis, addition of turmeric extract in small quantities (3\%, 6\%) has no significant different compared to noodle control based on overall acceptance.
The effect of encapsulation to α-glucosidase inhibition activity and viability of *Pediococcus lolii* L2

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**Abstract.** Alpha-glucosidase is an enzyme that catalyzes the breakdown of α-glycosidic bound in carbohydrates, this cause increasing of blood sugar level. Hyperglycemia condition can bring an adverse impact on people with diabetes mellitus. One of therapy to control blood sugar level is to suppress the activity of α-glucosidase activity. *Pediococcus lolii* L2 is a potential probiotic lactic acid bacteria that produce α-glucosidase inhibitor. We need to maintain the viability and functionality of probiotic when applying to food industries. One of the methods for protecting the cell viability of bacteria and the inhibition activity is microencapsulation using spray dry. This research aimed to know the viability and α-glucosidase inhibition activity of *Pediococcus lolii* L2 after spray dry. Five different materials were used in this research; maltodextrin, arabic gum, sodium alginate (SA), SA + maltodextrin, and SA + arabic gum. The result showed that microencapsulated bacteria have higher viability with >85% of Encapsulation efficiency. Likewise the ability of α-glucosidase inhibition. There is no significant difference of five materials used to encapsulate the cell with the inhibition activity.
A comparative study on engineering properties of three varieties of shallots

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Abstract. Shallot is one of the essential vegetables in Indonesia. Besides being consumed by the household, shallots are also potentially usable for industries. Many researchers have done a study on engineering properties of onions, but not in shallots. The information about the physical and mechanical properties of shallots related to handling and processing is still lacking. Therefore, this study conducted to provide the database on physical and mechanical properties of three different varieties of shallots and to find out the similarities and differences among them. Results of the study showed that physically, each type had a typical characteristic which was different from other varieties. The weight of Tuktuk variety was about three times of Bima Brebes variety and nearly six times of Sumenep variety. The similarity showed in the case of particle and bulk densities. Regarding the texture profile, there was a significant difference in skin strength among the three varieties. Otherwise, there was no significant difference in their elasticities. The varieties of shallots and the type of surface material affected the emptying angle of repose and static friction.
Characteristics and consumer acceptance of product based on Modified Cassava Flour (Mocaf) produced by SME in Gunungkidul

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Abstract. This study aimed to characterization of mocaf and product based on mocaf; also its consumer acceptance. Proximate (water, ash, protein, fat and carbohydrate) were analysed for mocaf flour and product based on mocaf (kembang goyang and kue lipat). Consumer acceptance analyzed using hedonic test for taste, aroma, crispiness, softness and overall using untrained panelist (80 people). Mocaf was produced by Unit Pelaksanaan Produksi Cassava - Badan Keswadayaan masyarakat (UPP BKM) in Rongkop, Gunungkidul and product by Kelompok Wanita Tani (KWT). The results showed that mocaf flour produced accordance with Indonesian standards (SNI), and acceptance for taste, aroma, crispiness, softness and overall of kembang goyang and kue lipat were liked by consumer (> 3).
Antioxidant and antibacterial activity of ethanolic extract from *Ulva sp.*

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Abstract. The study aimed to investigate the antioxidant and antibacterial activity of ethanolic extracts from *Ulva sp.* The antioxidant effects of the extracts were evaluated by DPPH scavenging assay. Agar well diffusion method was performed to determine the antibacterial activity of the extracts against *Escherichia coli*. The chemical constituents of the extracts were analysed by FTIR spectroscopy. The result exhibited that ethanolic extract of *Ulva sp.* 2 possessed higher antioxidant activity compared to ethanolic extract of *Ulva sp.* 1. At concentration of 0.8 mg/mL, the radical scavenging activity from ethanolic extract of *Ulva sp.* 1 and *Ulva sp.* 2 were 22.34±9.71% and 32.67±4.23%, respectively. The ethanolic extract of *Ulva sp.* 2 showed a higher antibacterial activity against *E. coli* compared to ethanolic extract of *Ulva sp.* 1. The FTIR spectroscopy analysed that both ethanolic extracts have the same functional groups as follows O-H alcohols, C-H alkanes, C=C aromatic, and C-O alcohols. It indicated that the ethanolic extracts possibly contained phenolic compounds. From the study, it was concluded that ethanolic extracts of *Ulva sp.* possibly used as antioxidant and antibacterial agent candidate.
The effect of time, pH and solvent composition on cocoa shell polyphenol extraction and its antioxidant activity: Response Surface Method approach

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Abstract. Cocoa is a high source of dietary polyphenols that provide health benefits to the body. Unfortunately, cocoa outer parts (fruit peel, bean shell and sludge cacao) during processing of cocoa are generally disposed of as waste. The aim of this study was to evaluate the optimum condition for polyphenols extraction of cocoa shell. The optimization was designed using Response Surface Method with three independent factors i.e. percent of ethanol, time of ultrasonic irradiation, and pH. Three parameters were observed i.e. total phenolic and flavonoid content, and antioxidant activity. The results shown that the ethanol composition, time of sonication, and pH of the solvent influencing effectiveness of polyphenol extraction with optimum conditions of ethanol content of 66.56%, sonication duration 33.5 minutes, and pH 1.34.
Change of solvent proportion effect on Pilot Plan Scale Extraction of Alginate from *Sargassum sp.*

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**Abstract.** Alginate extraction from Sargassum sp. pilot plant scale has been done. The extraction technique used refers to the modification of laboratory scale extraction techniques using acidic methods. On a scale of 1 kg of raw material, modification of the extraction technique was carried out on the proportion of bleaching material, NaOCl, which was originally 4% (v / v) to 2% (v / v). on a scale of 3 kg of raw material, modifications are made to the volume of water for extraction, which was originally 30 times the weight of the raw material to 20 times the weight of the raw material. on a scale of 10 kg of raw material, modifications are made to the ratio of water binder, IPA, which was originally 8 times the weight of the raw material to 3 times the weight of the raw material. The results of the study show that modification of the solvent carried out at each production scale causes an increase in yield and a decrease in viscosity.
Natural dyes batik with antibacterial activity using ZnO nanoparticles as an antibacterial agents

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Abstract. Batik is a traditional Indonesian cloth that has been recognized by UNESCO as the Intangible Cultural Heritage of Humanity on October 2, 2009. Nowadays batik with natural dyes is preferred because it is unique, natural and environmentally friendly. The disadvantage of natural dyes batik, especially those using cotton cloth, is easily overgrown with bacteria. This paper presents the results of research on the application of ZnO nanoparticles on batik fabrics that produce batik with antibacterial activity. The application of ZnO nanoparticles was carried out with variations on concentration (1% and 2%), temperature (25°C and 80°C), and application stages, i.e before and after the batik process. Colouring was done with natural dyes of Tingi (Ceriops tagal). Characterization of the natural dyes batik was carried out by antibacterial activity testing, colour fastness to washing and colour strength (K/S). The results showed that the ZnO application before and after the batik process increased the colour strength. The ZnO application before the batik process produces a good antibacterial activity at 80°C which can be achieved with the application of ZnO after the batik process at 25°C.
Mineral content, heavy metals, and amino acid profiles of *Halimeda opuntia* seaweed from several waters in Indonesia

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Abstract. *Halimeda Opuntia* is a type of calcareous seaweed which is including in the Chlorophyta division. In Indonesia, this type of seaweed is available abundantly, but the market value and the benefits are still very low. This study aims to study the characteristics of *H. opuntia* seaweed from several waters in Indonesia. This study was to assess the mineral content, heavy metals, and amino acid profiles of *H. Opuntia*. Sampling was carried out in four waters locations in Indonesia, namely the Binuangeun waters, Banten; South Lampung; East Lombok, NTB; and Konawe Selatan, Southeast Sulawesi. Mineral analysis showed that *H. opuntia* contained K minerals (16.5 - 92.4 mg / 100g), Ca (18.6 - 24.4 g / 100g), Mg (35.2 - 510.5 mg / 100g), Fe (30.4 - 470.0 mg / kg), Zn (2.1 - 5.4 mg / kg), Mn (3.6 - 23.5 mg / kg), and P (90.4 - 142.0 mg / kg). Heavy metals analysis showed that Lead (Pb) content in *H. opuntia* seaweed from four water locations was still low <0.04 mg/kg so that Cadmium (Cd) <0.05 mg/kg. Based on the analysis of amino acids, there were 12 amino acids detected, namely Alanine, Glycine, Valine, Leucine, Isoleucine, Proline, Aspartic Acid, Phenylalanine, Glutamine, Lysine, and Tyrosine. Based on mineral content, heavy metals and amino acid profiles, the direction of utilization of this type of seaweed is pharmaceutical ingredients, fertilizers, and feed.
Preliminary study of cocoa powder’s polyphenol extraction by food grade solvent

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Abstract. Cocoa contains polyphenol substances, namely flavan-3-ols, i.e. catechin, epicatechin, and procyanidin. Its polyphenol antioxidant activity is larger than that of other sources, like green tea, apple, etc. Polyphenol of cocoa can be extracted from cocoa powder which is defatted partially by mechanical pressing (mechanical defatting) before, so that there is little of cocoa fat which still presence in cocoa powder by approximately 11% (w/w). However, the fat has characteristic as interference of polyphenol extraction. Generally, the non-food grade non-polar solvent are used to take the fat before extracting polyphenol, i.e. hexane, petroleum ether, and etc. By the research, it was studied about directly extraction of partially defatted cocoa powder’s polyphenol by food grade solvent without defatting process previously. The chosen solvent comprised water, acidified water (citric buffer), ethanol 50%, and ethanol 80%. Besides it, the study was also focused on extraction temperature that varied in room temperature (22°C) and 50°C. The parameter evaluated in this study were total phenolic content (TPC) and antioxidant activity expressed as antiradical power (ARP). The results showed the directly extraction of polyphenol consists of steps, i.e. extraction, centrifugation, first filtering, chilling, and second filtering. The highest of total phenolic content (TPC) was obtained from extraction conducted by ethanol 50% at temperature 50°C and the highest antiradical power was obtained from extraction conducted by ethanol 50% at temperature 22°C.
Alpha-glucosidase inhibitory activities of Bungur (Lagerstroemia loudonii Teijsm. & Binn.) leaves and fruits

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Abstract. Bungur (Lagerstroemia loudonii T. & B.) belongs to the Lythraceae that traditionally was used as antidiabetic, antiinflammatory, antihypertensive and diuretic. Other bungur plants such as Lagerstroemia speciosa have been known for the activity as alpha-glucosidase inhibitor. Based on chemotaxonomy, the distribution of compounds in one family or genus and its activity has similarities, then tested for the activity of alpha-glucosidase of bungur (Lagerstroemia loudonii T. & B.). Bungur leaves and fruits was extracted by reflux using 96% ethanol. The process of fractionation by liquid-liquid extraction. Testing of alpha-glucosidase inhibitor activity was performed in vitro using colorimetric method at 400.4 nm, acarbose used as standard inhibitor. The results of alpha-glucosidase inhibitory activity of leaves and fruits of bungur with IC₅₀ showed the ethanol extracts, n-hexane, ethyl acetate and water fractions respectively 262.20 μg/ml; 97.16 μg/ml; 62.73 μg/ml; 145.30 μg/ml; and 1.50 μg/ml; 3.69 μg/ml; 37.38 μg/ml; 22.59 μg/ml. IC₅₀ standard acarbose was 10.95 μg/ml. The results of this research from bungur leaves and fruits can be developed into herbal preparations to lower blood sugar levels.
Characterisation of physical, mechanical and colour properties of *Muntingia calabura* Fruits

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**Abstract.** Physical, mechanical, and colour properties are necessary parameters in the handling and processing of *Muntingia calabura* fruits. The study aimed to form physical, mechanical and colour database for *Muntingia calabura* fruits. Results of the study found that the polar and equatorial diameter ranged from 14.30± 0.99 mm and 15.51± 0.98 mm, respectively. The weight and the volume were 2.49 ± 0.39 g and 1.12 ± 0.21 cm³, respectively. The particle density, bulk density and porosity ranged 0.97 ± 0.10 g/cm³, 0.57 ± 0.03 gr/cm³ and 40.90 ± 6.59 % respectively. The average skin strength and elasticity of the average moisture content of 80.79 ± 0.50 % were 309.60 ± 80.89 g-forces and 38.83 ± 1.63 mm, respectively. The angle of repose on the surface of the acrylic, aluminium, stainless steel and plywood was 23.45 ± 5.390, 24.20 ± 4.770, 25.66 ± 5.000 and 25.93 ± 7.850 respectively with the static friction of 0.44 ± 0.12, 0.45 ± 0.10, 0.49 ± 0.11, and 0.50 ± 0.17 respectively. The coordinate CIE L*a*b* c* and h* of the average colour of samples was 44.914 ± 5.011, 30.274 ± 4.055, 10.460 ± 2.787, 32.288 ± 2.722 and 0.008 ± 0.004.
Studies on geometrical, physical, mechanical and colour properties of Mangosteen fruits

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Abstract. Geometrical, physical, mechanical and colour properties are important parameters in the handling and processing of mangosteens. This study was carried out to form an essential database for mangosteen. Results of the study found that the polar and equatorial diameter of mangosteens were 53.95 ± 893 mm and 56.56 ± 9.88 mm, respectively, with the geometric mean diameter of 54.79 ± 9.15 mm. The weight, volume, particle and bulk densities were 97.92 ± 45.33 gr and 95.20 ± 47.57 cm3, 1.06 ± 0.16 gr/cm3 and 0.61 ± 0.02 gr/cm3 respectively. The highest skin strength of polar and equatorial diameter occurred in yellowish-green mangosteens; on the other hand, the lowest of that occurred in brownish-red mangosteens. The highest elasticity of polar and equatorial occurred in dark purple mangosteens; otherwise, the lowest of that, occurred in yellowish-green mangosteens. The highest angle of repose and the static friction were 21.58 ± 4.480 and 0.40 ± 0.09 respectively, occurred on the surface of stainless steel. The total colour difference of yellowish-green and brownish red, yellowish-green and dark purple and brownish-red and dark purple mangosteens were 63.34 ± 5.68, 66.79 ± 4.54, and 19.95 ± 6.42 respectively.
Physicochemical properties, antimicrobial and antioxidant activity of Ganoderma transparent soap

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Abstract. The present study was to perform transparent soap formulation enriched with Ganoderma (Ganoderma lucidum) extract and investigate its antibacterial and antioxidant activity. These Ganoderma transparent soaps were made by hot process method. Physicochemical characteristics tested were moisture content, pH, total fatty matter, free fatty acid content and chloride content. Antimicrobial activities of herbal transparent soaps were investigated by agar well diffusion method. Antioxidant activities was analyzed using 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical assay. The results revealed that Ganoderma transparent soap have moisture content 21.8% dwb, pH 9.22, total fatty matter 41.66%, free fatty acid 1.08% and chloride acid 5.57%. Antibacterial assay showed that Ganoderma transparent soaps were more active against the S. aureus than the Gram-negative bacteria and even C. albicans. The antioxidant activity assay showed that the IC$_{50}$ of transparent soap was 100 mg/mL.
A simple method of *Saccharomyces cerevisiae* analysis by applying a High Vacuum Setting of The Scanning Electron Microscopy and without fixatives chemical

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Abstract. A quick and simple method for preparation of a specimen for observing *Saccharomyces cerevisiae* by using high vacuum setting of scanning electron microscopy (SEM). The culture was directly taken from Chloramphenicol Yeast Glucose Agar (CYGA) by using loop needle and coated with a film of gold without using any fixative and only air dehydrating procedures. Using this simple method, the surface of intact structures of *S. cerevisiae* was observed of two magnifications, 5K, and 10 K and over a range of time setting of ion sputter and one current that is ten mA. This preparation procedure could be most useful for the routine examination and identification of *S. cerevisiae* such as for screening and morphological identification. The best result is the ion sputter setting ten mA for 60 second, an image with 5kV acceleration are of higher quality due to deeper electron penetration depth without any phenomenon of charging disturbances. We have a suggestion that the maximum duration of the sample that had air-dried is about three hours because more than its period, the resolution would be not proper. The maximum period for observation in the chamber in the high vacuum condition is about two hours.
Utilization of liquid smoke corn cobs for germination Tomato (*Solanum lycopersicum*) seeds

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Abstract. Corn cobs are agricultural wastes that are often found in Indonesia, which so far are still not widely used as products that have added value. Corn cob contains 41% cellulose, 36% hemicellulose, and 6% lignin, so it can be used for making liquid smoke. Liquid smoke is one of the results of condensation or condensation from the steam produced by combustion directly or indirectly from materials that contain a lot of lignin, cellulose, hemicellulose, and other carbon compounds. The method used for making liquid smoke is the pyrolysis method that is using pyrolisator, by burning and heating above the furnace, which will produce smoke and will then be condensed into liquid smoke. In this study, the performance of liquid smoke devices testing. The liquid smoke produced was carried out chemical and physical characterization and tested for seed germination and tomato growth (*Solanum lycopersicum*). The results of the research on making liquid smoke from corn cobs showed that the yield of liquid smoke was 28.37%, pH value 3.506. The results of the analysis of the chemical characterization of third-grade liquid smoke using GCMS detected approximately 32 chemical components. The results of the physical characterization analysis of liquid smoke showed a very strong odor, brownish red, and there were black sediments in the form of tar. The test results showed that the concentration of liquid smoke (0%, 0.5%, 1%, 1.5%, 2%, 2.5%, 3%, 3.5%, 4%, 4.5% and 5%) significant effect on seed germination and tomato growth (*Solanum lycopersicum*)
The effect of different drying temperature on crystallinity and morphology structure of bacterial cellulose

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Abstract. Coconut waste water is very abundant in Indonesia, because Indonesia is one of the world's largest coconut producers, with a production of 18 million tons per year. Bacterial cellulose (BC) can be produced using coconut water using Acetobacter bacteria. The aim of this study was to investigate the effect of drying temperature on the crystallinity and morphological structure of BC. A. xylinum was grown on coconut water culture medium with addition of sugar (5%), incubation period 7 days at pH 5. The BC were dried using two drying method i.e. oven at 50°C and 100°C, and room temperature drying without using oven. The drying was conducted until it achieved 2-6% moisture content. The three different temperatures showed different colour of physical appearance of BC, and the room temperature of dried BC showed the best result of colour. It also gave the different properties of BC based on Scanning Electron Microscopy (SEM) method for evaluating its surface morphology and X-Ray Diffraction (XRD) method for its crystallinity. Therefore, the present work proposed the most suitable drying method can be performed based on the end products desired.
The evaluation of marine biomass capability for removing Cd and Pb: The effect of pH and salinity

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Abstract. The increase of heavy metals pollution requires a novel approach as an effective and eco-friendly removal strategy. The marine microalgal biomass was a strong candidate; however the study on local marine microalgae from Indonesia to be upgraded as metals biosorbent was limited. Thus, this study was aimed to utilize marine microalgaemicroalgae biomass as biosorbent for Cd and Pb removal in various pH and salinity value. The microalgae biomass was selected from diatoms, i.e. Chaeroceros sp., and Nitzschia sp., and green algae, i.e. Tetraselmis sp. The removal test was carried out at various pH and salinity range with initial metals concentration at 5 ppm and the measurement of metals concentration was utilizing Flame Atomic Absorption Spectrophotometer. The result exhibited the maximum Cd removal at pH 7 using Tetraselmis sp. (83.1%) and maximum Pb removal at pH 4 (85.4%) using Tetraselmis sp. and Chaetoceros sp. The removal of Cd and Pb was indicated a similar trend for the low removal capability at high salinity. Thus, this study revealed the best removal ability of the three marine microalgae was at pH 7 and low salinity.
Cellulose extraction from sugar palm (Arenga pinnata) fibre by alkaline and peroxide treatments

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Abstract. Cellulose is a versatile polymer which can be extracted from various agricultural waste. Sugar palm (Arenga pinnata) fibre (SPF) is one of potential cellulose source. The cellulose extraction from SPF was conducted by alkaline treatment with sodium hydroxide (NaOH) solution (10%) and peroxide treatments with hydrogen peroxide (H2O2) solution (5, 10, 15%). The alkaline treatment was supposed to remove most of hemicellulose and some of lignin. The following peroxide treatment aimed to remove remaining lignin. The results of each step was analyzed its composition, visual appearances, colour and morphological aspect. The results showed that increasing of H2O2 solution concentration tend to increase cellulose content (the highest result 86.99%) and whiteness and reduce the diameter size of fibre which indicate the removal of impurities (hemicellulose and lignin) from fibre. In conclusion, cellulose was successfully extracted from SPF by alkaline treatment followed by peroxide treatments which the best result was in condition of 15% H2O2 solution concentration.
The use of Chitosan as a solid based catalyst for the Chalcones synthesis

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Abstract. In the present work, chitosan was modified through the hydrogel synthesis. Chitosan catalyst was characterized for its physicochemical properties. The catalytic activity of chitosan was evaluated in chalcones synthesis via Claisen-Schmidt condensation reaction. The reaction was conducted by varying the amount of chitosan catalyst (50 mg, 100 mg, 200 mg) and temperature variations (room temperature, 40 \textdegree C, 50 \textdegree C, 60 \textdegree C). The best chalcones results were obtained in the operating conditions of 100 mg and 60 \textdegree C with the yield obtained at 45,50\%. 
Chemical composition of liquid smoke from coconut shell waste produced by SME in Rongkop Gunungkidul

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Abstract. The availability of coconut shell waste in Rongkop, Gunungkidul has the opportunity to be processed into several products, including liquid smoke products., in one month production requires ± 1000 coconuts to be made. Liquid smoke is obtained from smoke condensation in the pyrolysis process. The liquid smoke contains phenol group compounds, acid groups, and carbonyl groups such as those found in natural smoke. All three can simultaneously act as antioxidants and antimicrobials as well as providing a distinctive color and flavor effect of smoke on food products. In this study, the pyrolysis process was implemented with variations in the heating temperature at 200°C; 250°C; 300°C with 8 hours of cooking time, and 1-5 cm of coconut shell size, 5.87% moisture content with 5 kg process capacity. This pyrolysis process produces a dark brown liquid with an average pH value of 3. Each of the pyrolysis liquid fumes is analyzed using Gas Chromatography Mass Spectrometry to determine the chemical components inside. From the results showed, there were 16 chemical components identified at 200°C, the largest component was Acetic acid at 51.6%, 30 chemical components were identified at 250°C, the largest component was Acetic acid 50.88%, 48 chemical components were identified at 300°C, and the largest component Acetic acid at 39.98%.
Alkaline pretreatment of Sugarcane bagasse on pilot scale reactor

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Abstract. Sugarcane bagasse contains residues in the form of fiber, in which at least 50% of the bagasse yield is used as fuel in the boiler, and the remaining 50% is accommodated as waste disposal, accumulation in a long time will cause problems for the industrial environment. Based on its constituent compounds which are cellulose (52%), hemicellulose (20%) and lignin (24%). Sugarcane bagasse is one of the potential raw materials for producing bioethanol based on lignocellulosic biomass. One of the parts in the process of making second generation bioethanol is pretreatment delignification to maximize degradation of lignin in lignocellulose, so that cellulose can be easily accessed at later stages of the process. The aim of this study is to determine the percentage of lignocellulose composition in sugarcane bagasse analyzed using the method Chesson. The highest cellulose yield from this study was at 1.5 hours which was 77.26%, greater than the sugarcane bagasse without pretreatment, with a cellulose content of 43.48%. At 2 to 3.5 hours showed a decrease in cellulose with an average gain of 74.63%, thus increasing the time in the chemical delignification pretreatment process did not affect the increase in cellulose percentage acquisition.