

**INTERNATIONAL CONFERENCE
ON GREEN ENGINEERING FOOD AGRICULTURAL SCIENCE AND TECHNOLOGY**

Venue: Online Platform (Zoom) on 10-11 November 2021

ABSTRACT BOOK

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FOREWORD FROM CHAIRMAN COMMITTEE ICGEFAST 2021

Assalamualaikum Wr. Wb.

First and foremost, praying our grateful and praise to the Almighty God for all His blessings, grace, and mercies that have made us possible to gather here in this conference in excellent condition and health. It is my great pleasure to welcome all of our distinguished forum guest and invited speakers, presenters, and participants of the 1st International Conference on Green Engineering Food Agricultural Sciences and Technology 2021 (ICGEFAST 2021). It is effort by the Politeknik Pertanian Negeri Payakumbuh

1. The ICGEFAST is proudly co-organized with Green Engineering Society and co-hosting with Andalas University, West Sumatera, Indonesia.
2. In this occasion, I would like to inform you that this event consists of two programs including the international seminar that start from today until tomorrow, and paralel sesion will be held on tommorrow. The International seminar presents keynote speakers, from the Politeknik Pertanian Negeri Payakumbuh and Andalas University, Indonesia. And the guest and invited speakers from Malaysia, Philippines, Brunei Darussalam and United Kingdom also will participate in this conference to share their knowledge and expertise.

ICGEFAST 2021 is remotely attended by participants from academician, researchers, students, farmers, private business, governments in Indonesia. Among this number, 75 participants will disseminate their scientific result related to this conference topic, “Post Pandemic Sustainability and Resilience in Agriculture, Food, And Energy“

Last but not least, I would like to express blessed gratitude to our Politeknik for their support to this conference and also, a heartfelt wish to all the committee involved in ICGEFAST 2021, without you, ICGEFAST 2021 will not be a reality.

Representing the organizer, I proudly welcome all of you at ICGEFAST 2021. Wishing all participants, fruitful and memorable experience for these two (2) days.

Thank you.

Wassalamualaikum Wr. Wb.

Dr. Rilma Novita, S.TP., M.P



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SCHEDULE OF ICGEFAST 2021

Wednesday, November 10th, 2021.

Time (GMT+7)	Program	Remarks
09.00 – 09.25	Preparation Opening Ceremony: National Anthem “Indonesia Raya” Hymne of Politeknik Pertanian Negeri Payakumbuh Report by General Chairman of ICGEFAST <i>Ir. Elvin Hasman MP</i> Director Politeknik Pertanian Negeri Payakumbuh	HOST : M. Riza Nurtam, S.Kom, M.Kom MC : Vyna Kartini Karsuni, S.Tr.P
09.25 – 09.30	Pray	Siti Aliyah Duta PPNP
09.30-10.15	Keynote Speaker 1 Sensory Technology and IoT System for Indoor Hydroponic Application <i>Wahyu Caesandra, PhD</i>	Moderator: Meriyan Elza
10.30-11.15	Keynote Speaker 2 Industrial Application of Natural fiber <i>Prof. Dr. Mohd Sapuan Salit</i>	Moderator: Ir. Deni Sorel, M.Si
11.30-12.15	Keynote Speaker 3 Managing Invasive Rice Pests in The Changing Climate <i>Prof.Dr. Ravindra Chandra Joshi</i>	Moderator: Yuliandri, MT
12.15-13.00	Break	
13.00-13.45	Keynote Speaker 4 Food Technology <i>Dr. Rince Alfia Fadri</i>	Moderator: Syarmila Devi, SP, M.Sc.Ag



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14.00-14.45	Keynote Speaker 5 Renewable energy and Energy storage <i>Prof. Dr. Christian Klumpner</i>	Moderator: Syarmila Devi, SP, M.Sc.Ag
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SCHEDULE OF ICGEFAST 2021

Thursday, November 11th, 2021.

Time (GMT+7)	Program	Remarks
08.30 – 09.15	Keynote Speaker 6 Discovery of freshness markers on fresh produces by a targeted metabolomics approach <i>Daimon Syukri, PhD</i>	HOST : M. Riza Nurtam, S.Kom, M.Kom MC : Moderator : Ir. Muflihayati, MP
09.30-12.30	Paralel Sesion	
12.30	Closing	MC



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Thursday, November 11th, 2021. Room A - Crop Production & Protection

Time (GMT+7)	Program	Remarks
Parallel Session		
09.30 – 12.30	Room (@10 minute, 7 minute presenting 3 minute discuss) Room A	Moderator : Syarmila Devi, SP, M.Sc.Ag Host Amrizal, S.Kom, M.Kom



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Thursday, November 11th, 2021. Parallel Session Room B: Renewable Energy & Resources

Time (GMT+7)	Program	Remarks
Parallel Session		
09.30 – 12.30	Room (@ 10 minute, 7 minute presenting 3 minute discuss) Room B	Moderator : Resa Yulita, SS, M.Pd Host : Dr. Edi Syafri



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Thursday, November 11th, 2021. Parallel Session Room C: Food Sciences & Technology

Time (GMT+7)	Program	Remarks
Parallel Session		
09.30 – 12.30	Room (@10 minute, 7 minute presenting 3 minute discuss) Room C	Moderator : Hudia, SS, M.Pd Yuliandri Host : M. Riza Nurtam, S.Kom, M.Kom



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**Thursday, November 11th, 2021. Parallel Session Room D: Farm Power & Machinery +
Land & Water Resources Engineering**

Time (GMT+7)	Program	Remarks
Parallel Session		
09.30 – 12.30	Room (@10 minute, 7 minute presenting 3 minute discuss) Room D	Moderator : Ulva Muchtar Host : Hendra S.Kom, M. Kom



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Thursday, November 11th, 2021. Parallel Session Room E: . Information Technology in Agriculture

Time (GMT+7)	Program	Remarks
Parallel Session		
09.30 – 12.30	Room (@10 minute, 7 minute presenting 3 minute discuss) Room E	Moderator : Andrik Marta, SP, MP Host : Indra laksmana, S.Kom, M.kom



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GUEST SPEAKER ABSTRACT



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A Short Review of Recent Engineering Application of Natural Fibres

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Abstract. Many researchers and industries are investigating the possible use of natural fibres in order to raise environmental consciousness, preserve nature, and benefit social economy. In the composites business, there are several advantageous natural fibre sources in a variety of applications. It is worth noting that the performance of natural fibre-reinforced composites may be customized by natural fibre treatment and hybridization. An equilibrium between environmental consequences and desired performance as well as cost-effectiveness, may be accomplished by developing the composite depending on the product needs. However, some limitations, including its hydrophilic nature, and the tendency to absorb moisture during processing, severely limit natural fibres' potential for use as reinforcements in polymer composites. Thus, the key discoveries provided in the literature are reviewed in this brief overview, with an emphasis on the qualities of natural fibres and their recent progress in several engineering areas.

Keywords: natural fibre; natural fibre composites; biocomposites; engineering application; hybrids



Mitigation Of Acrylamide To Improve The Quality Of Arabica Coffee

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Abstract. This study aims to obtain information on the defect value, moisture content, taste, and acceptability of Arabica coffee as a whole from 20 coffee producers in West Sumatra. In this study, efforts to mitigate acrylamide were also carried out to improve coffee quality. Taste testing involves a trained q grader. The results of the GC-MS analysis detected 25 compounds in Arabica coffee at 200°C for 10 minutes, and 4 of them were detected in large quantities, namely pyridine, caffeine, n-hexadecanoic acid, and butyl 9,12-octadecadienoic acid with an amount between 70 -97 m / z. The results showed that the quality of defective coffee was in the quality level 3 to 5 and the coffee quality was 70% in accordance with SNI (Indonesian National Standard) 01-2907-2008. Types of defects in coffee beans are broken beans, brown beans, black beans, then hollow beans. Excellent Brew coffee taste Complex coffee aroma and taste, good acidity and bean thickness. Research has been carried out to determine the sensory quality profile of Minang domain Arabica coffee, which can be used as a reference for specialty coffee. The results of the analysis of acrylamide in Arabica ground coffee obtained from coffee shops and roasteries ranged from 197.6 g/g sample to 578.8 g/g sample. The acrylamide content in the sample is about 112.4 - 351.6 g/g. The results also stated that the levels of acrylamide peaked at the beginning of the heating process and then decreased. Lighter-colored coffee beans have more acrylamide than darker ones that are roasted longer. The acrylamide content was not detected by roasting the specialty coffee at a temperature of 200°C for 14 minutes and using a temperature of 210°C for 12 minutes.



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Hydroponic Box Design with IOT Monitoring System

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Abstract. Hydroponics is an alternative choice for people who plant various types of plants that can be consumed by themselves every day. In addition, hydroponic is one way to grow crops on a large area of land so that it is very suitable for cultivation in urban areas. However, this system has several shortcomings, namely, hydroponics really requires a controlled environment, especially in monitoring the temperature and humidity. Temperature and humidity need to be monitored and controlled to avoid reducing the quality of the plant withers. Therefore, a Blynk-based nutrition monitoring system (IOT) is needed to save time. The IOT system is built using a NodeMCU ESP8266 microcontroller which support internet access.

Keywords: Hydroponics, Temperature, Humidity, Blynk, NodeMCU 8266.



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Discovery of Freshness Markers on Fresh Produces By A Targeted Metabolomics Approach

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Abstract. The various roles of lipids in cellular senescence are clarifying by advance research in omics. One of them, the targeted metabolomics study is conducting to discover a freshness marker of fruits and vegetables as indicator of early senescence process during storage treatment. Accumulation of small reactive carbonyl compounds that mainly formed due to lipid peroxidation process as well as lipids transformation on cellular membrane degradation can be proposed as freshness marker of fresh produces. The respiratory CO₂ production is also measured by a flow-through method using a gas chromatography as control for freshness condition. The changes metabolites were detected by Gas Chromatography and High-performance liquid chromatography tandem with mass spectrometry detector. The multivariate statistical analyses including principal component analysis with discriminant analysis are conducted in order to find any differential features among various stages of freshness level of fresh produces.

Keywords: comprehensive mass-spectrometric analysis, freshness assessment, lipids, senescence, lipidomics.



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The Long Composting Period Effect of Leaf Shallot Towards Compost Quality

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Abstract. Compost is a solid organic material that undergoes a process of biological change into a final product that can be used as fertilizer. Utilization of leaf shallot waste as raw material for composting is the latest technology that has never been applied by shallot farmers. The aim of the study was to determine the best quality of shallot leaf compost with the long treatment of the composting process. The composting was assisted with *Trichoderma* sp activator, with a density of 10^6 cfu/mL. The treatment design was arranged as follows: K0 = no composting (leaves were simply dried in the sun); K1 = composting for 1 day; K2 = composting for 2 days; K3 = composting for 3 days; K4 = composting for 4 days; K5 = composting for 5 days; K6 = composting for 6 days; K7 = composting for 7 days; K8 = composting for 14 days; K9 = composting for 21 days; and K10 = composting for 28 days. Data were analyzed descriptively. The results showed that the leaf shallot waste with the composting process was dried and assisted by sunlight (natural composting) had a C/N ratio; C-organic and N-total which tend to be better than composting using a solution containing *Trichoderma* sp activator.

Keywords : Shallots, *Trichoderma*, Compost, C-organic, N-total



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Morphological Characterization of Gunung Omeh Citrus (*Citrus nobilis* Lour) in Guguak District-Lima Puluh Kota Rege

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Abstract. The Gunung Omeh citrus (*Citrus nobilis* Lour.) are one of the priority commodities in the agricultural sector of West Sumatra. In the development of Gn. Omeh citrus has been cultivated in several locations in the Lima Puluh Kota Regency, one of which is in the Guguak District. However, from the cultivation techniques and the fruit produced are very diverse phenotypic. The purpose of this study is to classify the spread of Gn. Omeh citrus derived from Guguak districts based on morphological characters. This study was conducted from April to October 2021. The methods using survey methods and descriptive analysis, using a purposive sampling technique at each location in Guguak District and 10 samples of citrus plants were taken. Morphological characters were observed from three characters are stem, leaf and fruit characters. Data analysis was carried out by analysis of genetic diversity. The resulting data were further analyzed by cluster analysis to observe groupings. From the observation of quantitative characters, it shows that there are variations in the 5 locations observed. As for the observation of qualitative characters, for tree growth at 5 locations showed variations with broad criteria, namely upright and spreading growth. Based on the morphological characters on the degree of >75% Gunung Omeh citrus in Guguak District is divided into two groups. Phenotypic diversity is due to genetic diversity caused by cultivation techniques and altitude of planting locations.

Keywords: Morphological, characterization, Gn. Omeh citrus, genetic diversity, Guguak District



Duration Of Soaking Onion Extract On The Germination Of Porang Plants Bulbil (*Amorphophallus Oncophyllus*)

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Abstract. Bubil is one of the porang plant propagation materials. Bubil is a vegetative propagation material that is found at every meeting of the stem. Bulbil takes 3 to 4 months to germinate. The length of time for bulbil germination is a problem in the cultivation of porang plants. One of the efforts made to speed up germination time is to use growth regulator treatment. The purpose of this study was to determine the best time of soaking shallot extract on the germination of the bulbil porang plant. This study used a completely randomized design (CRD) consisting of 4 treatments and 3 replications. The treatments used were B0 = 1 hour, B1 = 2 hours, B2 = 3 hours, and B3 = 4 hours. The research data were analyzed using the Anova table, if the F count is greater than the F table 5%, then a further test is carried out with the Tukey test at a 5% significance level. The observed variables were the time of emergence of the plumules, the height of the seedlings, the number of leaf blades, and the width of the leaf blades. The results of the analysis of the Anova table showed that the duration of soaking the onion extract on the germination of the Bulbil porang plants showed significantly different results with respect to the time of emergence of plumules and plant height, but not significantly different to the number of leaves and leaf width. The four treatments used, soaking for 4 hours gave the best results on the time of emergence of plumules (77 days after sowing) and the height of the seedlings (23.50 cm).

Keywords: onion, germination, porang plant bulbil.



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Effect Of Harvest Interval On Productivity Three Varieties Of Citronela Plants On Ultisol Soil

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Abstract. Various types of essential oils have been produced by Indonesia, one of which is citronella oil which is multi-beneficial because it not only contributes to agricultural development, but also contributes to the development of the community's economy. With many agricultural lands for Ultisol soil types that have not been utilized, a study was conducted on the Effect of Harvest Interval on the Productivity of Three Varieties of Lemongrass on Ultisol Soil, from January 2019 to January 2021, with a randomized block design in factorial using 2 factors, the first factor is harvest interval. with three levels consisting of P1 = harvest interval of once in 4 months, P2 = harvest interval of once in 3 months and P3 = harvest interval of once in 2 months. While the second factor is the variety with three levels consisting of V1 = Citrona 1 variety, V2 = Citrona variety 2 and V3 = Lemongrass 1 repeated three times. Each treatment consisted of 24 clumps . Parameters observed were vegetative growth, intensity of spot disease attack, terna production, oil production, quality analysis and R/C ratio. The results of the research on harvest intervals and three types of varieties used on Ultisol soil, the best is the harvest interval of once every 3 months and the Serai Wangi 1 variety is good for vegetative development, the lowest intensity spot disease attack (24.75 and 19.60%), terna production (68.76 and 59.78 ton^{-ha-th}), oil production (481.42 and 418.08 kg^{-ha-th}), while for oil quality such as Citronella and Graniol content was not affected by the harvest interval and the variety used. For the R/C Ratio in the second year of planting, it has shown a feasibility in the business at harvest intervals of once every 3 months with an R/C Ratio (1.28) on the citronella variety 1.

Keywords: Harvest Interval, Productivity, Variety, Ultisol Soil.



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Adaptation Capability of The Mushrooms *Trichoderma* spp in Practice Land of Politeknik Pertanian Negeri Payakumbuh and Barrier Mechanism on *Xantomonas campestris* pv. *Oryzae*

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Abstract. *Trichoderma* is a multifunctional fungus that is widely known and used as a biological control agent and decomposer because of its ability to compete with pathogenic fungi and possess cellulolytic enzymes that can decompose organic matter. This study was conducted to determine the presence and species of *Trichoderma* on the practice land of the Politeknik Pertanian Negeri Payakumbuh. The descriptive method was used to report *Trichoderma* exploration in two land locations, namely rice fields and dry fields. Exploration is not on land with healthy plants but on land that has been used for >5 years. The results showed that *Trichoderma* was found in both locations with the same percentage of presence of 20%. Macro and microscopically the type found was *Trichoderma harzianum*. These antagonists have been shown to have the ability to suppress *Xantomonas campestris* pv. *oryzae* by covering the colony. **Keywords:** multifunctional, *Trichoderma harzianum*, *Xantomonas campestris* pv. *Oryzae*, colony, microscopically.



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Effect Of Shading On Plant Growth Of 4 Varieties Of Hybrid Corn

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Abstract. Agricultural land in Indonesia continues to decrease every year so that the use of plantation areas can be an alternative in increasing corn production. This study aimed to obtain corn varieties that can grow and produce well in shaded conditions. The experimental design used was a Split Plot Design arranged in a Randomized Block Design consisting of two factors. The first factor on the main plot is the shade (S) i.e., no shade (S1), 25% light interception shade (S2), and 50% light interception shade (S3). The second factor in the sub-plot is the hybrid corn variety (V) consisting of Bima 20 (V1), JH-37 (V2), Nasa 29 (N3), and Pioneer P32 (V4). The results showed that two varieties produce a high yield in 50% light interception conditions, which are JH-37 and Bima 20 with kernel dry weights of 6.04 and 6.43 tons/ha, respectively. On plant growth, shade treatment did not have a significant effect on the plant height, the number of leaves, and the leaf area, but affects the diameter of the stems.

Keywords: Genetics, Hybrid, Land Optimization, Light, Shade.



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Breeding Fungi *Trichoderma sp* from Bamboo Stems (*Schizostachyum brachycladum*) and its Application as an Inoculant for Organic Fertilizer Fermenters with Quality SNI 7763:2018

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Abstract. This research is an applied study in the Al Falah farmer group, West Sumatra, Indonesia, to develop quality organic fertilizer processing technology SNI-7763:2018. Culture fungi *Trichoderma sp* was breeding using bamboo stems (*Schizostachyum brachycladum*) with bran media in an incubator at 39°C and 75% RH. Cow feces were air-dried to reduce the water content from 82% to 60%, mixed with poultry feces (ratio 60:40%), then added 0.3% culture fungi *Trichoderma sp* and stacking at a thickness of 70 cm for 7 days. The fermentation results showed an average fermentation temperature of 58°C, changes in the pH of cow feces from 8.8 to 7.2, and poultry feces from 3.6 to 6.8. Macronutrient content N = 2.82%, P = 2.78%, and K = 3.21%. The content of organic matter is 82.89%, C-organic is 21.20%, C/N is 7.52, and 1.02% of by-products. Based on the results of this test, the organic fertilizer produced by this processing has complied with SNI-7763:2018.

Keywords: Organic fertilizer, *Trichoderma sp*, Bamboo, Incubator, Cow feces.



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The Determinants of Technical Efficiency of Smallholders' Corn Production: Empirical Evidence from Jambi Province

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Abstrac. Agricultural expansion such as corn expansion is often associated with extensification and resulting land acreage loss. Best input practices could increase production and yields and thus potentially reduce land expansion. Corn production in Jambi Province in the last decade tends to decline. This requires attention and assessment to find solutions to existing problems. The objective of study is to estimate technical efficiency and its determinants in smallholders' corn production in Jambi province, Indonesia. In this study, corn data were used in the 2020 Planting Season. A sample of 120 corn farmers was taken randomly by applying stratified random sampling that based on cross-sectional data collected in 2021 by using the stochastic frontier approach. The Cobb-Douglas stochastic frontier production function, incorporating inefficiency effects was employed to analyse the data. The results showed that technical efficiency ranged from 63.46 to 99.54%, with an average of 74 %. Significant factors found to positively affect corn yield were seed quantity, potash fertilizer, labour, and corn variety while nitrogen fertilizer and pesticide were negatively related to the corn yield. Significant determinants of technical efficiency that were positively related to technical inefficiency include educational attainment, training, credit access, and household labour.

Keywords: Technical efficiency, corn production, and stochastic frontier approach.



Growth And Yield of True Shallot Seed Of Different Manure Dosage In West Sumatra

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Abstract. The cultivation of true shallot seed is one of the efforts made to increase the productivity of shallots in Indonesia. However, research on the components of this cultivation technology is still limited, including research on the dose of manure. The purpose of this study was to obtain the right dose of manure in increasing the yield of shallot bulbs from seed. The research was carried out at the Sukarami Experimental Garden, West Sumatra AIAT, Solok Regency, West Sumatra Province (altitude 1,000 m above sea level and soil type Andosol). Using a Randomized Completely Block Design (RCBD), with 6 treatment doses of cow manure (0 t/ha, 5 t/ha, 10 t/ha, 15 t/ha, 20 t/ha, and 25 t/ha), respectively 4 replications each. Cow manure was distributed in a 5x1 m plot. Shallot seeds from the Lokananta variety were planted at a spacing of 10x10 cm, 1 seed/planting hole. The results showed that the dose of manure had a very significant effect on bulb diameter, leaf number per clump, bulb weight per clump, weight per bulb, dry biomass yield, and dry bulb yield. Meanwhile, the shrinkage of biomass (wet biomass yield-dry biomass yield) and shrinkage bulb (wet biomass yield-dry bulb yield) a significant effect. Otherwise, plant height, bulb height, bulb number per clump, leaf number per bulb, and wet biomass yield had no significant effect. A significant positive correlation was found between the dose of manure and all observed variables, except the wet biomass yield. The highest dry bulb yield was obtained at a dose of 25 t/ha of manure. It is recommended to apply manure to the cultivation of true shallot seed as much as 25 t/ha.

Keywords: true shallot seed, cow manure, productivity, cultivation.



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Impact Of Application Of Trichoderma Asperellum And Biochar On Growth, Productivity Of Rice Sri Method And Soil Quality

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Abstract. The continuous use of chemical fertilizers to increase productivity often causes disruption of essential soil nutrients, environmental degradation and adversely affects soil rhizosphere microorganisms. This study aims to determine the efficacy of Trichoderma asperellum and the joint application of biochar in increasing rice productivity using the SRI method and improving the quality of paddy fields. This study consisted of eight treatments: T0BC (Standard application of NPK without Biochar), T1BG (Trichoderma asperellum + NPK), T2BC (Biochar husk + NPK), T3BC (Coconut shell Biochar + NPK), T4BC (Biochar mangrove + NPK), T5BG (Trichoderma asperellum + husk biochar + NPK), T6BC (Trichoderma asperellum + coconut shell biochar + NPK), T7BC (Trichoderma asperellum + mangrove biochar + NPK). Randomized block research design with three replications. The observations analyzed were plant height, number of tillers, leaf area index, number of panicles, number of pithy grains, number of empty grains, yield per pot, yield per hectare and soil nutrient analysis. The results showed that the application of a combination of Trichoderma asperellum and positive biochar increased the observed growth and yields 55.31% higher than the full dose of inorganic fertilizer. Combined application also increased pH, total N, available P and Kdd thereby increasing the nutrient content of paddy fields. Collectively, Trichoderma asperellum and biochar increase soil fertility, nutrient absorption and encourage the growth of Trichoderma asperellum fungi thereby increasing the population in the rhizosphere.

Keywords: Biochar, SRI, Rhizosphere, Trichoderma asperellum.



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Quality Characteristics of Catfish Nugget with The Addition of Purple Sweet Flour (*Ipomea Batatas Var Ayumurasaki*) And Tapioca as Nugget Filling Ingredients

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Abstract: The purpose of the study was to obtain a comparison of purple sweet potato flour (*Ipomea batatas var ayumurasaki*) and tapioca as a filler that can produce catfish nuggets with the best sensory and chemical characteristics in accordance with SNI Fish Nugget 7758-2013. The method used was a single factor Completely Randomized Block Design (RAKL) and 4 replications. The treatment in this study used 6 levels of comparison between purple sweet potato and tapioca flour (w/w), namely P0 (0:100) % w/w, P1 (10:90) % w/w, P2(20:80)% b/b, P3 (30:70)%b/w, P4 (40:60)% and P5 (50:50)% w/w. This research consisted of the process of making fish nuggets, sensory testing, cooking loss testing, antioxidant testing and chemical testing on the best treatment. The data obtained were analyzed statistically using the Barlett and Tukey test and then continued with the ANOVA test and the BNT test at the 5% level. The results of this study showed that the best comparison of purple sweet potato flour and tapioca was in the treatment P4 (40:60) % w/w which had purple color criteria (7.59), slightly fishy aroma (5.41), slightly distinctive taste. fish (6.72), slightly dense texture, somewhat compact (7.91), overall acceptance (7.68), cooking loss value 1.45%, water content (41.57%), ash content (0.27%), protein content (9.23%), fat content (9.58%), carbohydrate content (38.14%) and antioxidants were 761.13 ppm.

Keywords: nuggets, catfish, and purple sweet potato flour.



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Identification of *Aspergillus* spp. in Broiler Chicken Lungs in Ibh Market, Payakumbuh City

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Abstract. Foods derived from animals can be categorized as good for consumption if they do not contain pathogenic microorganisms, such as *Aspergillus* spp. The presence of the fungal microorganism *Aspergillus* spp. can cause aspergillosis. This study aims to isolate and identify *Aspergillus* spp. on the lungs of broiler chickens circulating in Ibh Market, Payakumbuh City, West Sumatera. A total of 30 samples of broiler chicken lungs were taken at random from the Ibh Market. Samples were washed with sterile distilled water containing antibiotics and then implanted on specific Sabouraud's Dextrose Agar (SDA) media and then incubated at room temperature for 3-7 days. Morphological growth of *Aspergillus* spp. observed macroscopically. Colonies suspected of *Aspergillus* spp. examined microscopically. The data obtained were analyzed descriptively. The results showed that *Aspergillus* spp. 66.67% of the lung samples tested were positive for *Aspergillus* spp. Identification of *Aspergillus* spp. In the samples that were found to be positive, there were 2 samples (6.67%) of *Aspergillus flavus*, 12 samples (40%) of *Aspergillus Niger*, and 6 samples (20%) of *Aspergillus fumigatus*. The presence of *Aspergillus* spp. broiler chicken lungs can potentially cause Aspergillosis disease not only in poultry but also can be transmitted to humans since it's zoonotic.

Keywords: *Aspergillus* spp, Broiler Chicken, Lungs, Zoonotic.



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A Systematic Literature [Analysis Soluble and Insoluble Fiber Content of Various Modified Corn Flours Using Fermentation Followed by Pregelatinization]

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Abstract. This study is conducted to determine the effect of engineering the fermentation process combined with praelatinization in producing high-fiber modified cornflour. Modified cornflour was produced from Bisi 18 corn that has been ground and treated with spontaneous and controlled fermentation. The spontaneous fermentation method used as control (A1), the control fermentation method used a single culture of *Lactobacillus fabifermentans* (A2) or *Aspergillus* sp (A3), and mixed culture of *L. fabifermentans* and *Aspergillus* sp with a ratio of 1: 3 (A4). Microaerophilic fermentation was carried out for 24 hours at room temperature. Furthermore, all treatments of fermented corn flour were dried and pregelatinized at 80°C for 15 minutes and dried using a room dryer at ±50°C for 48 hours. This study used a randomized block design with four treatments, each consisting of 3 groups. Observation variables include insoluble dietary fiber, soluble dietary fiber, and total dietary fiber. Data were analyzed using analysis of variance (ANOVA) and continued with Duncan's Multiple Range Test (DMRT) at a significant level of =0.05. The results showed that the fermentation process affected the content of insoluble dietary fiber and soluble dietary fiber of modified cornflour but did not affect the total dietary fiber. The results showed that the best-modified corn flour was produced from the addition of a single culture of *Aspergillus* sp. with a value of 9.36% insoluble dietary fiber, 6.26% soluble dietary fiber, and 15.62% total dietary fiber.

Keywords: *Lactobacillus fabifermentans*, *Aspergillus* sp, Modified Corn Flours, Soluble Dietary Fiber, Insoluble Dietary Fiber.



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High-Performance Liquid Chromatography Photodiode Array Detection Methode For Thiamphenicol And Chloramphenicol In Mare Milk

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Abstract. A simple, rapid, and inexpensive HPLC UV-PDA was conducted to determine the concentration of chloramphenicol in milk and applied to detect the occurrence of CAP residue in mare milk samples. Samples were extracted with acetonitrile and defatted with hexane. The acetonitrile phase then evaporated, and residues were injected into the LC system with a wavelength of 277 nm. An isocratic LC condition with reverse-phase ODS C18 column using methanol: acetonitrile: water (25:25:50) as mobile phase. The retention time of chloramphenicol was approximately 5.436 min. Linearity of the method was observed over the range 10-200 ng/mL with correlation coefficients > 0.99. Recovery at five fortification levels was 88.52-95.69%, with a relative standard deviation of 5.262-11.40. The limit detection and limit quantitations were 1.47 ng/mL and 5.36 ng/mL, respectively. Analysis results of 32 mare milk samples showed that CAP residue was not detected from among all samples.

Keywords: HPLC PDA detector, determination, chloramphenicol, mare milk.



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Modification of *Gelamai Payakumbuh* with Yellow Pumpkin (*Cucurbita Moschata Duch*) and Improved Packaging

Ermianti

Abstract. The study entitled "Modifications of *Gelamai Payakumbuh* With Yellow Pumpkin (*Cucurbita moschata*) and Improved Packaging" is a touch of food in order to empower local roots based on traditional foods Payakumbuh area combined with the proper packaging techniques using various types of packaging materials in order to extend the shelf life of products. The research objective is to diversify the products to be processed pumpkin as a special food *gelamai* Payakumbuh city, determine the proper formulation in the manufacture *gelamai* with the addition of yellow squash, as well as extend the shelf life of processed *gelamai* with treatment and packaging modifications. Research carried out for 6 (six) months, which is housed in the Business *Gelamai* Payakumbuh Erina, Laboratory of Food Microbiology Laboratory of Food Chemistry and Agriculture Polytechnic State Payakumbuh. The design used in this laboratory study was Complete Randomized Design (CRD) are arranged in a factorial with two factors, where each treatment was repeated 3 times. The first factor is modified by the addition of pumpkin *gelamai* waluh 10%, 20%, 30%, and 40%. While the second factor is the treatment of this type of packaging using polypropylene plastic, aluminum foil, dried banana leaves, dried corn leaves, and paper glasin. The results showed that the diversification of products in the manufacture of processed pumpkin *gelamai* can enhance flavor, fat content, and extend the shelf life *gelamai*. The addition of pumpkin in the manufacture *gelamai* can suppress the formation of free fatty acids and the oxidation process during the storage process. The best treatment is modified by the addition of pumpkin *gelamai* 30% who use aluminum foil packaging can extend shelf life *gelamai* for 20 days at room temperature.



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Physicochemical Properties Of Instant Powder Drink From Red Dragon Fruit Peel Extract With Maltodextrin And Cocoa Powder As Filler

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Abstract. Red dragon fruit peels contain a high amount of betacyanin pigment, phenolic compounds, pectin, fiber, and have antioxidant activity. Dragon fruit peel extracts benefit as a raw material combined with cow's milk to make instant powder drinks with spray drying methods. The study aims to determine the characteristics of instant powder with a comparison treatment of maltodextrin and cocoa as a filler. The addition of filler is as much as 15% of the total volume of liquid with the treatment is P1 (15%:0%); P2 (14.5%:0.5%); P3 (14%:1%); P4 (13.5%:1.5%) and P5 (13%:2%) of maltodextrin: cacao comparison. The results showed that the solubility of instant powder is 92.86-97.13%, with a pH value of 5.73-5.96. Moisture content of powder is 3.95% -4.45%; protein and fat content are 8.23%-9.34% and 0.30%-0.84% respectively. The highest of the total phenolic content of instant powder is 60.17 mg GAE/100g of sample.

Keywords; dragon fruit peel, instant powder, maltodextrin, cacao, filler.



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Management Of Rice Field Landscape in Leukon Community On Simeulue Island Through Folklore As Local Wisdom

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Abstract. Rice field landscape is the performance of an area that includes rice plants and its media, water flow, and shape. The rice field landscape needs to have water availability due to the rice requires flooding for its growth. Therefore, it is necessary to manage the good water flow and soil. Various things that affect the protection and management of the wrong rice field landscape need to be considered. One of them is local wisdom in managing rice fields. The Leukon community on Simuelue island has management that contains the values applied in the community's way of life to protect and manage the rice field landscape. The rice field management is also described from the folklore that lives in this community. This study used an ethnographic method to examine the role of folklore as a source of rice field landscape management. Folklore as a source of cultural information for the Leukon community provides a role in managing the rice field landscape. Folklore values provide people's ideas and beliefs.



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Effect of Salt Particle Size and Formulation of Nagara Bean Tempeh Flour With White Oyster Mushroom on Salty And Umami Taste Perception

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Abstract. The prevalence of hypertension in South Kalimantan based on the health development program in 2014 reached 30.8%, which means South Kalimantan is the 2nd prevalent province of hypertension in Indonesia. Excessive consumption of salt (sodium) can cause direct impact on blood pressure. People with high levels of salt consumption have an increase in blood pressure. Efforts to reduce salt consumption must also pay attention to the level of acceptance by consumers, seasoning reformulation could maintain the product taste. One of the seasoning reformulation technologies is reducing the salt particle size and blending with other ingredients as a flavor enhancer. The study aimed to determine the effect of salt (NaCl) size and the addition of the Nagara Bean tempeh flour and oyster mushroom formulations on enhancing the umami taste to reduce salt use. Reducing the salt particle size up to 100 mesh had not given a significant effect yet on strengthening the perception of saltiness and umami. While, the formulation of nagara bean tempeh flour and white oyster mushroom of 100 : 0 can give a strong perception of umami to seasoning powder, and it's no different from 90: 10. Thus the glutamate contained in nagara bean tempeh flour can be an alternative to provide a good umami taste.

Keywords : Nagara bean, oyster mushroom, tempeh, umami, seasoning powder.



Isolates Characterization and Amilolytic Properties of Lactic Acid Bacteria From Traditional Fermented Dadih

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Abstract. The aims of this research was to explored, isolated, selected and characterize of Lactic Acid Bacteria (LAB) that potential as amylolytic bacteria from traditional fermented food “dadih”. Its collectes from Lareh Sago Halaban and Lintau, West Sumatera Province. BAL isolated by streak method to obtain a uniform colonies both color and size. Characterization of selected isolates followed by reaction gram and catalase test. The result showed that isolates has the form of coccus, coccobacil, bacil, with reactions gram positive, catalase negative, negative endospores. The result of further characterization by identification using KIT API 50 CHL identified as *Lactobacillus plantarum* (mH1), *Lactobacillus paracasei* ssp paracasei (mL3), *Lactobacillus plantarum* (mH4), *Lactococcus lactis* subsp lactis (mH6), *Lactobacillus plantarum* (mH7), *Lactobacillus plantarum* (mH8), *Lactobacillus brevis* (mH13), *Lactobacillus paracasei* subsp paracasei (mL14). Based on amylolytic and starch hydrolysis test showed that isolates with higher amylolytic index ≥ 2 are *Lactobacillus paracasei* ssp paracasei mL3, *Lactobacillus plantarum* mH4, *Lactobacillus paracasei* ssp paracasei mL14. *Lactobacillus plantarum* mH8 has lower amylolytic index 0.7. Therefore, these four isolates (mL3, mH4, mL14 and mH8) have the potential to be used as fermenting bacterias for foods rich in carbohydrates.

Keywords: amylolytic bacteria , charaterization, dadih, isolation, lactic acid bacteria



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Artificial Dryer and Sun Drying to enhanced the Quality of Red Chili *Simplicia* Flakes

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Abstrac. *Simplicia* dried red chili should have a color and aroma similar to the original. Long-term drying of red chilies at high temperatures and high humidity can produce undesirable color changes such as dried *simplicia* chilies and blackish brown chili flakes. Overcoming this can be done by using artificial dryers or sun drying combined with the provision of strong wind gusts to reduce temperature and humidity, avoiding substances that cause changes in color and aroma. The purpose of the study was to identify a combination of artificial dryer and sun drying on the color and nutrients of dried red chili *simplicia* flake. The research consisted of several treatments of drying methods, namely red chilies dried in the sun with a fan blowing; red chilies dried in a tray dryer; red chilies dried in a tray dryer with a fan blowing; red chilies dried in an electric oven; and red chilies dried in the sun drying. Each treatment was repeated 3 times. Observations included *simplicia* red chili yield, water content, color (digital) and vitamin C content. Data were analyzed by ANOVA and further test by Duncan's test at 5% level. The results showed that the color quality of red chili flakes that were dried with a tray dryer was better than that of drying with an electric oven and the sun. Drying with a tray dryer and sun drying combined with a fan resulted in good quality red chili flakes with yield of 65.16%, moisture content of 9.5%, color brightness L of 54, a* of 45, b* of 55 and vitamin C of 26, 4 mg/100 g. It can be concluded that drying using a tray drier and sun drying combined with strong wind of fan produces red chili *simplicia* flake with the best quality.

Keywords: *simplicia*, flake, drying, color.



The Effect of Mango Pulp (*Mangifera indica* L. var. Arum Manis) Addition on Moisture Content, pH Value and Total Titratable Acidity of Cow's Milk Kefir

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Abstract. Kefir is a traditional fermented milk product were produced by the inoculation of kefir grains into milk about 1 day at room temperature. Kefir has a highly complex flavor because the kefir grains used in its manufacture have a highly diverse and complex microbiota. Kefir grains consist of lactic acid bacteria and yeast nonpathogen. This study aims to determine the effect of adding mango pulp (*Mangifera indica* L. var. Arum Manis) on moisture content, pH and total titratable acidity (TTA) of cow's milk kefir. This study used an experimental method of Completely Randomized Design (CRD) with 4 treatments and 5 replications. The treatment in this study is the addition levels of mango pulp (*Mangifera indica* L.var. Arum Manis) in cow's milk kefir A (0%), B (12.5%), C (25%), and D (37.5%). The variables measured were moisture content, pH value and total titratable acidity (TTA) of cow's milk kefir. The results of this study indicate that the addition of mango pulp had a significant effect ($P<0.05$) on moisture content, pH value and total titratable acidity (TTA). Based on the research, it can be concluded that the best results were found in treatment D, the addition of mango pulp in cow milk kefir 37.5% with a moisture content of 88.41%, pH value of 4.89 and 0.81% on total titratable acidity (TTA).

Keywords: *moisture content* , *pH* , *total titratable acidity* , *kefir* , *mango pulp*.



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Occurrence of *Bacillus Cereus* in White Pepper from Bogor Area, Indonesia

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Abstract. White pepper is a spice with an earthy heat and mild floral aroma widely produced and consumed in Asia. In Indonesia, it is commonly used to flavor dishes that require a spicy taste. However, spices like white pepper can be contaminated by pathogenic microorganisms like *Bacillus cereus*, a spore-forming bacteria widely found in soil, dust, water and on surfaces of both raw and cooked foods. The bacterium causes the emetic and diarrheal syndromes and has been implicated in various foodborne disease outbreaks in different parts of the world. Currently, data pertaining the occurrence of *Bacillus cereus* in white pepper in Indonesia is not available. This study aimed to isolate and evaluate the occurrence of *Bacillus cereus* in white pepper obtained from local market in Bogor area, Indonesia. The study consisted of sample preparation, isolation and enumeration of *Bacillus cereus* on Mannitol-egg yolk-polymyxin (MYP) agar and confirmation by biochemical tests and Polymerase Chain Reaction to detect the gene encoding for 16S rRNA. Of the twenty samples analyzed, eighteen (90%) were contaminated with *B. cereus* and the highest *Bacillus cereus* concentration was 5.77 log₁₀ CFU/g. The high counts of *B. cereus* may be attributed to the postharvest processing operations that the spice undergoes. All the 15 isolates tested showed a clear band at the expected length of around 1686bp when the PCR products were separated on 2% agarose gel and stained with ethidium bromide, confirming the presence *Bacillus cereus* in white pepper samples.

Keywords: *Bacillus cereus*, Occurrence, Polymerase Chain Reaction, White pepper.



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Sensory Properties of Snack Noodles Made from Canistel Flour and Mocaf with Addition of Guar Gum

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Abstract. Canistel flour contains no gluten protein, and the key to success in making gluten free products is the use of combination of alternative flour and binder. The aims of this research were to analyze the sensory properties snack noodles made from canistel flour, mocaf (modified cassava flour) and guar gum in different concentration. Proportion of composite flour (canistel flour : mocaf) used in this research were (100% : 10%), (90% : 10%), (80% : 20%), and concentration of guar gum were 0.1% and 0.2%. Analysis included yield, moisture content, and sensory test included color, surface texture, aroma, salty taste, umami taste, after-taste, crispiness. Results showed that proportion of composite flour significantly affected on yield, moisture content, and sensory properties included color, surface texture, and crispiness. Concentration of guar gum and the interaction of composite flour proportion and guar gum concentration did not significantly affect all attribute measured. Increasing on proportion of mocaf resulted in higher yield, moisture content, and better sensory properties for color, surface texture, and crispiness. Snack noodles made form composite flour in the proportion of 90% canistel flour and 10% mocaf, and 0.1% guar gum was selected as the best one.

Keywords: egg-fruit; mocaf; modified flour; noodles, snack.



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The Processing Methods and Total Phenol Content Of Some West Sumatera's Traditional Beverages

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Abstract. West Sumatera is recognized for having a variety of traditional beverages that are frequently taken to boost physical stamina. Farmers used these drinks to boost their energy levels after a hard day's labor in the past. The health advantages of these drinks are attributed to the presence of nutrients and secondary metabolites such as phenol compounds, which are present naturally in plants as the drink's raw material. The aims of this study are to investigate how West Sumatra's traditional beverages are prepared and how much total phenol is contained in them. The research began with observations of beverage samples collected from various locations, and then progressed to tests of total phenol in drinks. Five traditional beverage varieties were chosen for this study in Payakumbuh City and Limapuluh Kota Regency based on a number of factors, including how common they are in the community, how freely they are sold, how quickly they are delivered, and how widely they are distributed throughout West Sumatra. Young coconut drink, aia niro (sap drink), sugarcane juice, kahwa leaf drink, and teh talua (egg tea) drink are the five varieties of beverages. The Kahwa leaf drink is made from coffee plant leaves that have been dried by heating, smoking, or roasting. Sugarcane juice is obtained by crushing sugarcane stalks and then filtering the liquid. Aia niro is obtained by extracting the male fruit of palm stems from flower bunches. The Talua tea drink is produced with blended egg yolks, filtered hot tea water, sugar and lime water. The results showed that total phenol content in young coconut drink, aia niro, sugarcane juice, kahwa leaf drink, and teh talua drink were 47.86, 84.94, 422.95, 508.52, and 1489.75 mg gallic acid equivalent/L, respectively.

Keywords: Aia niro, kahwa leaf, sugarcane juice, teh talua, total phenol.



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Innovation Product of Hard Candy with the Addition of Gambier Catechin (Uncaria Gambir Roxb.)

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Abstract. The COVID-19 pandemic has changed the new order of people's lives. Consumer demands for food products are also changing. The public will increase their awareness and consumption of products that have the function of increasing the immune system, including functional food products that contain natural bioactive compounds. Immune system enhancement through food intake is one of the top priorities for consumers around the world. So far, hard candy products are considered as ordinary food products, and even have negative consumer perceptions because they cause dental caries in children. On the other hand, hard candy is a confectionery product that is most favored by people of all ages and social classes. The solution to this problem is to develop hard candy as a functional food with antioxidant and antibacterial properties by adding gambier catechin. The innovation is to create a hard candy product that utilizes the local wisdom of gambier catechin. Based on this, the opportunities and prospects for developing this product are still very large in the future. The basis for developing hard candy products as functional food products is data on product formula optimization. The purpose of this research is to obtain the optimal formulation of hard candy products with the help of the Design Expert application. The optimization of the hard candy formula was obtained at the composition of 1% catechin, 48.75% sucrose, 14% glucose and 36.25% water. The value of antioxidant activity (IC_{50}) is 64.35 ppm and the value of antibacterial activity is 182.5 mm. The results of product analysis according to SNI 3547.1:2008 stated that all parameters were in accordance with the standard, except for the sucrose parameter. This research has produced innovative hard candy products which are high in antioxidant.

Keywords: hard candy, catechin, antioxidant.



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Efficiency Of Functional Drink Therapeutic *Diabetes Mellitus* On Blood Glucose And Plasma *Malondialdehyd (Mda)* Levels In Type 2 *Diabetes Mellitus* Patients

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Abstract. Hyperglycemia condition for a long time in type 2 diabetes mellitus (DM) will cause *glucose auto-oxidation* which can increase *Reactive Oxygen Stress*. Improvement of the balance between the composition of the gut microbiota and host cells in DM patients with the concept of prebiotics and probiotics is one of the therapies that can be used to reduce the risk of ongoing *inflammation*. The purpose of this study was to examine the efficacy of the Therapeutic Diabetes Mellitus functional beverage product from local functional food on blood glucose levels and plasma *Malondialdehyde (MDA)* levels of patients with Type 2 DM. This study used a "pre-post test control design" research design. The research subjects were patients with type 2 DM as many as 46 people who were divided into two groups, namely the intervention group and the control group. Sampling by purposive sampling. The intervention was given in the form of a drink "yogurt bengkoang tape ketan hitam" as much as 200 ml for 2 weeks. The statistical test is used independent t-test. The results showed that there was no difference in the mean blood glucose levels of the samples before and after administration of yobetam in the control group (4.9 ± 39.3) and in the intervention group (-14.1 ± 52.1). There was a difference in the mean levels of *MDA* in the samples before and after yobetam administration in the control group (0.16 ± 0.39) and in the intervention group (0.46 ± 0.37). It is hoped that the functional drink produced can be used as an alternative to oral therapy.

Keywords: Blood Glucose Level, *MDA* Level, Type 2 DM



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Application Of Halal Gelatin From Chicken Leg Skin As A Stabilizer In Ice Cream

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Abstract. Gelatin is the result of the partial hydrolysis of collagen proteins. Food and non-food industries use gelatin a lot. The use of gelatin, especially in the food industry, is as a foaming agent, stabilizer, gelling agent, adhesive, thickener and emulsifier. Chicken leg skin gelatin can be applied in food and non-food products as a supplier of halal products. The chicken cutting process is a sticking point, regardless of whether the chicken is halal for consumption. Applications of gelatin in food products include the production of ice cream as a stabilizer. This study aims to evaluate the application of chicken legs skin gelatin in ice cream. The design of this study is a randomized block design (RAK). In this study there were 3 treatments with 3 repeatedly: without the addition of gelatin, the addition of chicken leg skin gelatin, and the addition of commercial gelatin. Data quality of the ice cream were analyzed using ANOVA followed by Duncan's multiple comparison tests. Data sensory properties of ice cream were tested by nonparametric (Kruskal-Wallis). The results showed that the quality of the ice cream with the addition of chicken legs skin gelatin was no different from the addition of commercial gelatin. Gelatin from chicken legs skin that applied to the manufacture of ice cream has produced ice-cream with good quality and sensory quality which accepted by the panelists.

Keywords: chicken legs skin, gelatin, halal, ice cream, stabilizer



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Development of Medium Capacity Coconut Fibre and Cocopeat Separator Machine

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Abstract. Coconut husk as by-product of coconut is very potential material for many applications. The coconut husk consists of coconut fibre and cocopeat. The improvement made in this research is to design a machine that works for separating coconut fibre and cocopeat.that match the need of local coconut husk industry in Sumatera Barat. This machine is powered by 22 HP engine diesel that rotates at 1100 RPM. This engine is connected to rotary knife through double pulley-belt transmission system. The pulleys have 14:25 ratio with the lower one being installed to the engine and the other to the axis. There were 19 knives put to the axis with angle difference of 60 degree. This rotary knife was perpendicular to the axis to increase the effectiveness during the ripping process. The separation mechanism was done by using lines and holes in the cylindrical tube of the machine. The tube has diameter 596 mm. The capacity derived was 123 kg/hour. Dimension of the machine is 2270 x 900 x 1323.13 mm.

Keywords: Coconut husk, coconut fibre, cocopeat, separator machine.



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Design and Development of Young Areca Nut Slicer Machine

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Abstract. The selling price of thinly sliced young areca nut is higher than round betel and splitted betel nut, but the manual slicing process takes a long time, about 8 minutes/kg, and this process has a high risk. The young betel nut slicing machine was developed to solve the problem of manual slicing. The purpose of the research is to conduct machine design, machine testing (verification test, machine performance test, service test), and economic analysis. The young betel nut slicing machine was made and tested at the Metal Workshop and Agricultural Machine Tool Laboratory of the Payakumbuh State Agricultural Polytechnic from June to September 2021. The machine was made according to structural and functional designs. Verification tests are carried out with the aim of technically matching the data with the results of machine measurements. Parameter measurements were carried out to explain the performance of the young areca slicing machine. The parameters measured are: slicing capacity, slicing quality (average thickness, and percentage of damage), specific power requirements, and power transmission efficiency. Economic analysis is carried out to explain fixed costs, variable costs, basic costs, and the break-even point. The results of the verification of the areca nut slicing machine are: vertical type, specifications 65 x 45 x 75) cm, the driving motor is a 1 HP electric motor with a rotation speed of 1480 RPM which is transmitted through a v-belt connected to a pulley speed reducer and transmitted via a v-belt to slicer shaft. . The results of the slicing capacity performance test are 50 kg/hour, slicing quality (4.2 mm thickness, and 8 percent broken percentage), the specific power requirement is 0.015 kw-hour/kg and the power transmission efficiency is 8.6%. The results of the economic analysis of the areca nut slicing machine are: fixed costs of Rp. 1,965,000/year, variable costs Rp. 11,397/hour, basic cost Rp. 244.3/kg, and the break-even point is 7,222kg/year. The developed areca nut slicing machine can increase the capacity, quality, and effectiveness of slicing young areca nut.

Keywords: *design and development; slicer machine; young areca nut.*



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Design of Red Cracker (Kerupuk Merah) Dough Mixing Machine in The Development of Industry in Lima Puluh Kota Districts

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Abstract. Kerupuk Merah is a kind of red crisp which is made by a flour and the colour is red. It is one kind of snack which use as complementary foods and it can add more taste and aesthetic value on the main meals. In West Sumatra, the located of kerupuk merah industrial centre is in Piladang, Akabiluru region, Lima Puluh Kota district. The total of industrial area of the kerupuk merah increase into 14,19% in 2017 together with the increasing of the demand for the kerupuk merah. However, the problem of the kerupuk merah industry comes from the processing technology which very simple not only in upstream but also downstream in the production process, so the capacity of production and hygiene factors become a major issue in every process of Kerupuk Merah. The capacity of kerupuk merah production is determined by a process of mixing the dough (first process) which is using a rectangular box that made by wood and 3-4 people power as a stirring power with the 500 kg capacity of dough/day or 56-63 kg/hour and only do the mixing dough 1-2 times/week, so this process becomes a tiring job and it takes a long time and reducing the quantity and quality of production. Therefore, the mixing machine was designed to increase the capacity of production, time efficient and more hygienic so directly it can increase the income of kerupuk merah industry. Kerupuk merah dough mixing machine made in length, width and height of each drum stirrer 80 cm, 80 cm and 60 cm. The optimum capacity of drum mixer for each time the mixing process is 150 -200 kg with a speed of 27.2 rpm and the mixing rate of 906.34 kg / h. The mixing machine which have been made is safe for food because it consist of stainless steel. This condition may increase the industrial production capacity of Kerupuk Merah and save stirring's time and also the production of Kerupuk Merah are more hygienic so that employers can develop their business.

Keywords: Kerupuk merah, dough mixer machines, industrial kerupuk merah.



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Semi Automatic Boom Sprayer For Corn Crop Protection

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Abstract. Development of a boom sprayer with a semi-automatic principle to make it easier for farmers to spray pests on corn plants. Semi-automatic boom sprayer can work automatically, making it easier for farmers to spray. The study was conducted with two treatments at the age of 15 days and 30 days. The test is carried out by comparing the performance of the semi-automatic boom sprayer with the knapsack sprayer which is used in general by the public. Observations made consisted of evaluation in the laboratory, evaluation in the field and economic analysis. From the data, it can be concluded that from the results of technical tests on corn plants aged 15 days and 30 days, the capacity of the Semi-Automatic Boom Sprayer can reach 0.318 ha/hour with an operator speed of 0.316 m/s. The tank capacity of the Semi-Automatic Boom Sprayer is larger than the knapsack sprayer. The spraying efficiency of the Semi-Automatic Boom Sprayer is greater than that of the knapsack sprayer, namely 86.033% and 85.269%, respectively.

Keywords: Corn, Semi-Automatic, Boom Sprayer, Knapsack Sprayer.



Modeling The Sediment Load in The Bird Feather-Type Watershed in The Main Rivers of Banyuwangi Regency

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Abstract. The process of transporting sediments carries the impact of an overflowing river. The incident was experienced by 4 major rivers in Banyuwangi Regency, namely rivers of Baru, Setail, Bomo, and Tambong. Watershed in Banyuwangi is a shaped of bird feather with a type of dendritic flow with an elongated drainage form, relatively small discharge and flooding occurs in a relatively long time. In downstream areas used by residents for sand mining, this indicates the high rate of sediment in the watershed. The purpose of the study was to model the sediment load in the bird feather-type watershed in the main rivers of the Banyuwangi Regency. Data from measuring water level, flow velocity, and discharge are correlated with the results of suspended load and bedload analysis to create a rating curve. Modeling of sediment load equations in bird feather type watersheds is raised by regression methods. The result of the bird feather type of sediment load equation in Banyuwangi Regency was obtained by the suspended load model of $q_s \text{ (tons/day)} = 27.0 - 39.0.h \text{ (m)} - 122.V \text{ (m/s)} + 71.1.q \text{ (m}^3\text{/s)}$ with $R\text{-Sq} = 59.4\%$. On the bedload model of $q_b \text{ (tons/day)} = - 0.0758 + 0.0853.h \text{ (m)} + 0.0585.V \text{ (m/s)} + 0.165.q \text{ (m}^3\text{/s)}$, with $R\text{-Sq} = 73.6\%$. Sediment load modeling can be used as a projection of sediment transport as a study of type C excavations in the major rivers of Banyuwangi Regency.
Keywords: Bedload, Bird Feather-Type Watershed, Regression, Sediment Load, Suspended Load.



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Potential Analysis Of Peatland Fire In Ogan Komering Iilir District

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Abstract. Based on data from CIFOR (Center for International Forestry Research), there are 3 million hectares of wetlands in South Sumatra, with an area of 1.73 million hectares of peatland. Around 796,000 hectares of peatland are located in the district of Ogan Komering Iilir. Almost every year peatland fires occur in this area. Therefore, it is necessary to mitigate the disaster of peatland fires by analyzing the potential level of vulnerability to peatland fires in Ogan Komering Iilir Regency. There are five sub-districts that are sampled in this study, namely Kayuagung, Tulung Selapan, Pedamaran Timur, Pangkalan Lampan, and Pedamaran District. The parameters reviewed were based on the type of land cover, the maturity level of the peatlands, and the water level of the peat soil. In addition, the potential for peatland fires is seen from the intensity of rainfall. Because the potential for peatland fires is higher if they occur during the dry season where rainfall intensity is low or during dry months. The results showed the potential for peatland fires based on the characteristics of peatlands in Ogan Komering Iilir Regency has a moderate to high level. While the analysis is based on the intensity of rainfall, the potential for peatland fires from July to November which is a dry month with rainfall intensity < 100mm.

Keywords: *peat soil, Ogan Komering Iilir, fire forest, rainfall.*



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Smart Innovation Multi Soil Layering system (STBM) to purify pollutant indicators in Cattle Farm Wastewater

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Abstract. Cattle Farm Wastewater that smells bad with pollutant indicators exceeds the quality standards allowed by the Indonesian government. Sources of waste water pollutants come from urine, feces and water for washing cow pens. Generally, wastewater is discharged directly into the surrounding environment so that it has polluted the waters. To purify the pollutants, a STBM system was built. There are 2 main components that make up the STBM system, namely Mixed Soil Layer (LTC) which is arranged in a brick pattern and surrounded by a split stone layer and palm fiber (Geotextile) as a permeable layer (LP). In this experiment, a field scale STBM system was built with dimensions (50 cm long x 50 cm wide x 200 cm high). LTC raw material is a mixture of clayey clay, sawdust from coconut trees and iron waste from a lathe with a dry weight ratio of 7.4: 2.4: 0.1 where this local material is native to Indonesia. By using the force of gravity, cattle waste water is discharged into the STBM system with a hydraulic loading rate (HLR) of 1440 L/hour/m². Average removal efficiency of salt (NaCl), Total Dissolved Solid (TDS), salinity (EC), Oils and Greases, Phosphorus (PO₄⁻-P), Nitrate-Nitrogen (NO₃⁻-N), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD₅) and Total Suspended Solids (TSS) were 81, 96, 99, 68, 98, 74, 63, 96 and 82% respectively. The STBM system is also able to remove odors and colors in cattle farm wastewater. This study recommends that the STBM system is good for removing contaminants from cattle farm wastewater in rural and urban areas in Indonesia because it is efficient and able to remove odors, colors, fats, nitrogen, phosphorus and organic matter with simple operations.

Keywords: Wastewater, Cattle farm, STBM, Smart Innovation, Soil.



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Geophysicochemical method for mapping the distribution of land suitability of Gambir Gardens (*Uncaria gambir. Roxb*) in Limapuluh Kota Regency, Indonesia

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Abstract. Aim of the study is to mapping the distribution of land suitability for Gambir Gardens, the Geophysicochemical method combined with FAO procedures and multi-criteria overlay analysis techniques based on soil survey data in the field and analysis in the laboratory is used for the use of soil characterization for sustainable Gambir gardens. Soil survey results from 131 soil samples from 3 soil orders namely Inceptisol, Ultisols and Andisol which developed from 4 geological rocks, namely Basaltic, Andesite Mount Sago, Granite rock and Alluvium. The soil began to form during the Pleistocene (1.8 m.y)-Holocene (11500 y) geological time. The physical and chemical properties of the soil were analyzed in the laboratory using standardized procedures and climate data were obtained from the climatology station. Soil analysis showed that samples No. 1,2,3,4,13,14,34,37,42-45,50-53,56,71,73,75,88,104,106,109,119-122,125 "Marginally Suitable (S3)". Soil sample No. 3-7, 9-10,15,16,19-23,26,27,29,32,35, 39-41, 48-49, 54-55, 57-65, 68-70, 72,74,76, 84-87, 89-95,97,100,102,103,108,111-112,114,117,118,123-124,126-29,131 "Moderate Suitable (S2)". Soil samples No. 46,47,107,110,113,115, 116 "Suitable (S1)" and soil samples No. 12,17,18,24,28,33,36,38,67, 77-83, 96,98,99,101,105,130 "Not Suitable (N)" for community gambir gardens. In Limapuluh Kota Regency, based on an area analysis, it was found that for the community gambir garden, about 167715 ha (50%) of the total area was Moderately Suitable and classified as S2. An area of 117400.5 ha (35%) is classified as Marginally Suitable (S3) and an area of 16771.5 ha (5%) is classified as Suitable (S1) and an area of 33543 ha (10%) is classified as Not Suitable (N) and must be forested. For land due to limiting factors as slope and high soil erosion, by incorporating soil and water conservation technology, namely terraces and mulch into the community's gambir garden, it is able to change the soil to be the same as the S2 criteria (75%). The results of the geophysicochemical method are very helpful in deciding the specifics of mapping the suitability of community's gambir gardens in Indonesia.

Keywords: Geophysicochemistry, erosion, community, Gambir.



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Gas Production by Monoester of Saturated Fatty Acids under Electrical Fault

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Abstract. This paper deals with the gas production by monoester oil intended to be used as insulating oil under electrical discharge of low energy. The monoester contain only saturated fatty acids in its hydrocarbon chain. The electrical fault was realized by implementing an AC high voltage to hemispherical shaped electrode pairs with the gap of 2.5 mm immersed in oil sample. The voltage application was paused at each time the breakdown occur in oil, and re-applied repeatedly up to 50 and 75 times to allow high concentration of gasses produced by the oil sample. The resulted gasses were extracted from the oil sample using headspace method, and then were analyzed using gas chromatography (GC). Fault identification methods, like DGA status, Key Gas, Duval Triangle, and IEC Ratio was performed to predict the fault causing the production of such gasses.

Keywords: DGA, electrical fault, fault interpretation, monoester.



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Performances And Characteristics of Bio-Oil from Pyrolysis Process of Rice Husk

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Abstract. The purpose of this study was to modify the pyrolysis device to produce bio-oil with methyl esters, determine the content of methyl esters with GC/MS analysis and test the performance of biodiesel using a diesel engine. From the research carried out the pyrolysis tube wall has been modified by changing the thickness of the stainless steel material to 1.5 mm, to facilitate the combustion process and heat transfer and reduce the equipment weight. While the tube base still uses 3 mm stainless steel to prevent leakage during the process because of high temperature (300 – 400°C). Wood and coconut shell was used to accelerate the incomplete combustion process and have higher methyl ester compared to using a gas stove. The amount of bio-oil produced is quite high at 35.88% while using a gas stove is around 30%. From the GC/MS results, it was found that the content of methyl ester and ethanol obtained was 60.12% and 1.13%, respectively. The methyl ester obtained was separated from the tar using a rotary evaporator based on the boiling point difference. Methyl ester from this husk can turn on the diesel engine with B10 - B50.

Keyword: rice husk, pyrolysis, methyl ester, bio-oil



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Greenhouse Gas Analysis And Energy Consumption In Field Corn Agriculture Using Life Cycle Assessment

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Abstract. The scope of research is limited to the analysis from land preparation to yielding harvested maize. The purpose of this study was to identify and measure the largest GHG in each process flow of field corn farming in order to design efficient mitigation efforts. The research method used in this research is field research with the object of 5 farmer groups with different field corn farming models. Data analysis refers to the SNI ISO 14040: 2016 Framework, which consists of 4 stages, namely (a) goal and scope definition, (b) life cycle inventory analysis, (c) life cycle impact assessment, and (d) life cycle interpretation. Life cycle inventory uses energy coefficients, emission factors, and the Intergovernmental Panel Climate Change (IPCC) guidelines. The results showed that the sources of emissions in feed maize agriculture consisted of diesel fuel, fertilizers, pesticides, herbicides usage, and land burning. The highest Total Global Warming Potential (GWP 100) per tonne of shelled corn was 52,622.158 Kg CO₂ eq. The most significant GHG emission was in the fertilization step by 98.97%, especially the application of urea fertilizer. The application of more environmentally friendly, organic-based fertilizers is a recommendation for risk mitigation.

Keywords: cradle to gate, feed maize, global warming, greenhouse gas analysis, LCA



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Utilization of Natural Zeolite As Emission Filter In Catalytic Converter Of Diesel Engine

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Abstract. The performance of natural zeolite in the catalytic converter to reduce the emission content of diesel engine is studied in this research. Diesel engines are engines that use high compression ratio to carry out the combustion process, so as to produce high content of carbon monoxide (CO), nitrogen oxides (NO_x) and sulfur oxides (SO₂) in diesel engine exhaust gases. One way to reduce the content of exhaust gas compounds in diesel engines is to use catalytic converter technology. In this study, the catalytic converter used natural zeolite catalyst as emission filter. The catalytic converter is designed in the form of pipe made from iron plate and hollow balls that are used as natural zeolite. Diesel engine emission test was measured using gas analyzer with engine speed variations. The results showed the highest efficiency reduction from the emission content of diesel engine, namely carbon monoxide (CO) 0.98%, nitrogen oxides (NO_x) of 33.16% and sulfur dioxide (SO₂) of 91.38%.

Keywords: Natural Zeolite, Catalytic Converter, Diesel Engine, Emission.



The effect of polarity and molecular dynamic energy of bamboo activated carbon on degumming process of *Calophyllum inophyllum* oil.

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Abstract. Modified Bamboo Activated Carbon (BAC) is added to non-edible *Calophyllum inophyllum* oil in degumming process. The effects of its polarity and molecular dynamic energy on degumming process are evaluated using characterizations and hyperChem software simulation. It is found that BAC acquires positive surface charge, polar characteristic, and mesoporous structures. The addition of BAC in degumming process results sufficient molecular dynamic energy (108.83 kcal/mol at 353K) as simulated by hyperChem, plays role in facilitating successful dephospholipidation. BAC works towards negatively charged oxygen around the hydrophilic phosphate head group of phospholipid molecule. It also interacts with water molecules, facilitates more hydrolysis reaction, triggers bonds disruption within phospholipid molecule, leads to higher probability of phosphate head group detachment off the phospholipid molecule. As a result, there is a large decrease in phosphorus, magnesium and calcium concentrations along with a small improvement in viscosity and calorific value in treated oil.

Keywords: [Polarity](#), [Molecular dynamic](#), [Bamboo activated carbon](#), [Degumming](#), [Calophyllum inophyllum oil](#).



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The Effect Of Pre-treatment From Water Hyacinth (*Eichhornia Crassipes*) And Cow Dung On Biogas Production

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Abstract. The concept of renewable energy biogas technology applies the concept of zero waste and can be an alternative energy for environmental problems. Water hyacinth is a type of weed that grows fast and grows a lot in rivers. Water hyacinth is also considered a pest and waste that has no value, but water hyacinth can be used for biogas production because of its high hemicellulose content. The purpose of this research is to convert water hyacinth which is widely found in rivers to be used as biogas. The variables used were mixing water hyacinth, cow dung and water with several comparisons as the initial treatment. This fermentation process uses a batch system and the biogas produced is measured every day. The parameters used are the volume of biogas produced, the degree of acidity (pH), the ratio of C/N, the color of the flame and the composition test using gas chromatography (GC). The results of this study, the highest biogas volume of 11,233 ml was obtained from the variable water: water hyacinth: cow dung with a ratio of 1: 0.5 : 1 and the lowest biogas volume of 4,370 ml was obtained from the variable water: water hyacinth: cow dung with a ratio of 1: 1 : 0. The pH range after the process is complete is between 6.9 – 7.6. The results of the gas chromatography (GC) analysis showed that the methane content in the biogas was 56% of the area.

Keywords: Biogas, Water hyacinth, Renewable, Pre-treatment, Methane.



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Intelligent Decision Support System Development of Natural Rubber Agroindustry Using Fuzzy Analytic Network Process (ANP) Based on Green Productivity Approach

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Abstract. Recent studies of attribute independent assumptions on Naïve Bayes (NB) typically generate data sets, methods and frameworks that enable researchers to focus on development activities in terms of finding solutions to attribute independent issues, thereby enhancing the quality of NB classification and better utilizing resources. Many data sets deal with the NB attribute independence issues and different frameworks, so the overall picture of the independent assumption of the current NB attribute is not yet complete. This literature review aims to identify and analyze the research trends, data sets, methods and frameworks used in the attribute independence assumption research on NB for data classification between 2010 and 2018. The results of this research identified three frameworks that are highly cited and therefore influential in the software defect prediction field. They are Langley and Sage Framework, Friedman et al. Framework, and Wu et al. Framework.

Keywords: intelligent decision support system, fuzzy ANP, green productivity.



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The Influence Of Media Composition On Root Induction Of Patchouli (*Pogostemon Cablinbenth*)

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Abstract. Patchouli have good prospects for cultivation, acting as a source of foreign exchange and income for farmers. One of the efforts to increase the genetic diversity of patchouli is to collect local germplasm, both in production centers and in other areas. Propagation of superior seeds in a relatively short time can be done through tissue culture. This study aims to determine the composition of the effective media for root induction in patchouli. The research was carried out from January to April 2020 at the Tissue Culture Laboratory, Faculty of Agriculture, Andalas University, Padang. The study used a randomized design with 2 treatment factors, Media and genotype consisting of 12 treatments with 3 replications. The results showed the interaction between the composition of the media and the genotype of Rimbo binuang, namely the administration of 1 ppm IBA on the percentage of root formation (100%), number of roots (11.0 strands) and root length (8.33 cm), but there was no interaction at the time of root induction. The media composition showed a significant difference tith addition activated charcoal (26.33 days), 3 ppm IBA (24 days), 1 ppm IBA (22 days) and 1.5 ppm NAA (24,22 days), respectively.
Keywords : Essential Oil, Invitro, Plant growt regulator, Root induction.



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Fungi Mycorrhizal Arbuscular For Reclamation of Coal Mining Used Land For Determined of Characteristics of Rumen Fluids and Gas Production of Elephant Grass (*Pennisetum purpureum* CV. Taiwan)

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Abstract. This study aims to determine the nutritional value of elephant grass to save critical land and provide forage quality animal feed which is reduced in availability due to conversion. The method used in this study is the experimental method using Randomized Block Design with 5 types of treatments and 4 replications (groups). *Fungi Mycorrhizal Arbuscula* (FMA) cv. *Glomus manihottis* will be inoculated at a dose of 10 grams / clump. The treatments are: A = 100% N, P, and K without FMA, B = 100% N, P, and K + FMA, C = 75% N, P, and K + FMA, D = 50% N, P, and K + FMA and E = 25% N, P, and K + FMA. The results of analysis showed that the treatment was not significantly different ($P > 0.05$) on the characteristics of rumen fluid, gas production and Metabolism Energy (ME). The pH from 6.86 (E) to 6.89 (B), N-NH₃ ranged from 11.20 (A) to 13.60 mg / 100 ml (C) while VFA ranged from 93.3 (A) to 130.30 mM (E), respectively. Gas production from 34.40 (A) - 40.42 (ml / 200 mg DM) (E) and Energy Metabolism (ME) ranged from 8.04 (A) - 8.46 MJ / Kg DM (E), respectively. Therefore, the results of this study it could be concluded that the added of 25% N, P, and K Fertilizer + FMA of *Glomus manihottis* 10 grams is the best for the characteristics of rumen fluids and gas production.

Key words: characteristics of rumen fluids, *fungi mycorrhizal arbuscular*, gas production, ME, N, P and K.



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Effect of Dundubia Manifera Sound Exposure on Ipomoea Aquatica as an Effort to Increase Crop Field

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Abstract. The application of sonic bloom technology to water spinach has been studied. Sonic bloom is a technology that connects the fields of physics and agriculture to increase crop productivity. This technology applies sound waves with a manipulated peak frequency in the range of 3500-5000 Hz on crop fields. In this study, using an experimental method by comparing the results of measurements of water spinach (*Ipomoea Aquatica*) exposed to sound waves from garengpung (*Dundubia Manifera*) 4000 Hz and without sound exposure. As a result, sound waves have a very significant impact on plant growth. Where there was an increase in leaf area of 12.1 cm², a number of leaves 2.44 pieces, stem diameter 1.0688 mm, stem height 1.76 cm, wet weight 8.52 g, and dry weight 0.49 g. These results indicate that overall plants exposed to sound waves showed a better impact than plants that were not exposed to sound waves.

Keywords: Sonic bloom, *Ipomoea Aquatica*, crop field, sound wave.



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A Quality and Palatability of Cat Biscuits Treated with Gambir And Chlorella Powder.

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Abstract. Gambir (*Uncaria gambir* Roxb.) is considered to contain high antioxidants while Chlorella sp is a microorganism that is also known as a natural supplement. Antioxidants are very important in cat food to treat various cat ailments. This study aims to determine the quality and palatability of cat biscuits given gambier and chlorella as a source of natural antioxidants. Gambier powder and Chlorella were added to the cat food formula by giving 0.1% gambier powder (P1), 0.1% Chlorella powder (P2), 0.05% gambier powder and 0.05% Chlorella powder (P3). and commercial food as a comparison (P4). The results showed that the protein content of treated cat biscuits ranged from 27.2% - 27.8%, higher than commercial biscuits (25.7%). The addition of gambier powder and chlorella powder to cat biscuits did not affect the cat's palatability.

Keywords: Gambir, Chlorella sp, cat, palatability.



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Identification of Seeds using Principal Component Analysis

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Abstract. Seeds are varied in several attributes like size, color, form, etc. and that varieties can identify plants species. However, there are some plant species that have similar seed, so that it is important to have additional characteristics to support the identification process. This research is using Principal Component Analysis method to identify plant species by using its seeds. The PCA technique is used to reduce the complexity of the information by reducing data dimensions, and only stores 75% of the information. By reducing the dimension, the data size is reduced and therefore can speed up data processing time. In this research we collect 100 plant seed images with similar look or figure one another namely sapodilla (*Manilkara zapota*), soursop (*Annona muricata*), cucumber (*Cucumis sativus*), star fruit (*Averrhoa carambola*), grape (*Vitis vinifera*), melon (*Cucumis melo*), apple (*Malus domestica*), lime (*Citrus aurantifolia*), watermelon (*Citrullus lanatus*), and chili pepper (*Capsicum annuum L.*). With K-Fold Cross Validation, resulting 10 experiment tables with 83% accuracy. Omission errors are found in soursop, star fruit, grape, apple, lime, and water melon seeds. While most commission error are found in apple seeds as many as 8 times.

Keyword: image seeds. Principal Component Analysis, tropical plants identification.



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Study Of Agricultural Extension Center As A Movement To Reform Agricultural Development Based On Information Technology

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Abstract. Konstratani (Agricultural Development Strategic Command) is Center for agricultural development activities at the sub-district level by optimizing the tasks, functions and roles of the BPP (Agricultural Extension Center) as a data and information center, center for agricultural development movement, agribusiness consulting center, learning center, and partnership network development center. This study aims to analyze the constraint activities in Limapuluh Kota Regency, West Sumatra Province with a sample of 5 BPP with 30 instructors as respondents. The research method was descriptive with a qualitative approach. The research data were obtained by interviewing, observing and filling out questionnaires. The results of the study based on indicators of the development of the Konstratani BPP model showed that the socialization of the Konstratani Program to extension workers, mayors and related agencies was 73%, Information Technology Training Activities and agricultural data/information management and Program Report application training 66% as well as implementation or monitoring of training and mentoring activities by 59%. Based on the findings above, it is necessary to strengthen the capacity of BPP as a database in sustainable agricultural development in order to strengthen production and coordination of agricultural stakeholders such as extension workers, farmers and business actors at the field level through digital applications.

Keywords: Application, farmer group, mentoring, sustainable.



Effect of UV LED intensity on the growth of red lettuce in indoor hydroponics

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Abstract. Tests were carried out by taking the optimum day temperature constant for growing lettuce, and by varying the supply airflow rate, setting the fan speed at 30%, 50%, and 80%. The results of these tests are essential for performing real-time control of the microclimate environment and for managing parameters for optimization of the entire system. In addition, the air velocity test showed adequate velocity reduction and good air mixing. The values obtained are generally acceptable for indoor cultivation and the conditions created are suitable for growing plants in such an environment. Light is an essential need for plants so that plants can carry out the photosynthesis process well, in indoor hydroponics DWC as a UV light source uses LED lights for plants, besides that, some of the advantages of using LED lights include a small light spectrum, little heat production, absorption power consumption. which is low and the wavelengths needed by plants are 660 m and 450 m. This research project aims to create a DWC type hydroponic system, in planting red lettuce in an indoor hydroponics and seeing the effect of growing LED on the growth of red lettuce. DWC type hydroponics uses AB-Mix nutrients which are channeled through inch PVC pipes using pump power. The hydroponic rack used has a height of 1.7 m, a width of 40 cm, and has 3 shelves, where each shelf has 9 nutrient containers. Red lettuce plants in this DWC type are limited by light treatment using para nets with different thicknesses, namely 75%, 50%, and 0%, from the results of this treatment, the yield of red lettuce plants is 300 grams on the top shelf, 400 grams on the middle shelf. and bottom shelf 600 grams. Because at the time of observation, plants with treatment not using agricultural net thrived more than plants treated with agricultural net 50% and 75%.

Keywords: red lettuce, light-emitting diode, artificial light, photosynthesis.



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Modulating ferromagnetic properties of SrS by substitutional doping with transition metals for energy storage applications

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Abstract. Based on first-principles calculations, the effects of substitutional doping with transition-metal (TM) atoms (Ti, V, and Cr) were investigated on the electronic structure, and magnetic properties of the strontium sulfide (SrS). It is found that all the considered TM atoms produce magnetism in the SrS host matrix. The introduced spin magnetic moments are 2.00, 2.86, and 3.97 μ_B , respectively, for Ti, V, and Cr doping. The interaction between the partially occupied d orbitals of the doped TM atoms and the fully occupied p orbitals of the anion atoms plays the major role in creating the ferromagnetism in these compounds. Finally, the improved half-metallic gap of the $Sr_{0.875}Ti_{0.125}S$ makes it ideal for energy storage applications.

Keywords: first principles study, transition metals, substitutional doping, SrS binary, energy storage.



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Exploration And Antioxidant Analysis Of *Moringa Oleifera* Using Dpph Method

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Abstract. *Moringa (Moringa oleifera)* has potential as a superfood and biopharmaceutical because it is rich in nutrients, vitamins and other secondary metabolites. *Moringa* leaves contain antioxidants to neutralize and stabilize free radicals in the body. *Moringa* exploration is important to find trees as a source of superior seeds. This study aimed to obtain the tree of *Moringa* with the highest antioxidant content. Exploration have been carried out from June to July 2021 in four cities/districts in West Sumatra, namely Padang City, Solok City, Pesisir Selatan, and Solok Selatan. Coordinate data were analyzed using Arcgis and the antioxidant activity test using the DPPH method. The results of the exploration obtained 36 *Moringa* trees with different characters. Testing the antioxidant activity of leaf extracts showed that there were 3 parent trees that had high antioxidants, marked by the lowest IC₅₀ values, namely 0.17% in Padang City, 0.17% in Solok City and 0.19% in Solok Selatan.

Keywords: Antioxidant, DPPH, Free Radicals, IC₅₀, West Sumatera.



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The Effect Of Petai Seeds Extract (*Parkia Speciose Hassk*) And Glimpiride On Blood Sugar Levels Of Mice (*Mus Musculus*) Induced By Alloxan

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Abstract. Diabetes mellitus is a metabolic disease characterized by hyperglycemic as the result of the lack of insulin in the body, ineffective insulin function or both. Glimpiride is a third generation of oral hypoglycemic drug (OHO) that has a lower risk of hypoglycemia and weight gain compared to the first generation of sulfonylurea. Petai plant (*Parkia speciose Hassk*) is one of the medicinal plants that has been known efficaciously as antioxidants and anti-diabetic. This study aimed to look at the effect of giving petai seeds (*Parkia speciose Hassk*) to blood glucose levels in mice induced by alloxan. This experimental study used 42 mice divided into 5 groups, they were K- (a standard diet), K+ (alloxan 175 mg/kgBB), control treatment P1 and P2 petai seeds extract with dose 300 mg/kgBB and 400 mg/kgBB, and control treatment P3 Glimpiride 0,0026/20g. This research was conducted at Pharmacology Laboratory of the Faculty of Pharmacy and Biochemistry of the Faculty of Medicine, Andalas University. Measurement of blood sugar levels were measured by the colorimetric method of vitalab micro spectrophotometer (Microlab 300). Kruskal-Wallis test results of mice blood sugar levels by giving petai seed extract dose 300mg/KgBB with a mean decrease in blood sugar levels was $85,48 \pm 5,32$ mg/dl and Glimpiride 0,0026mg/20gBB with a mean decrease in blood sugar levels was $88,73 \pm 9,95$ mg/dl for 7 days didn't show a statistically significant difference in the Post Hoc Test with Mann-Whitney ($p = 0.423$) with a mean difference of reduction is 3,25mg/dl. The conclusion of this study is the petai seed extract has the same effective effect as Glimpiride to reduce blood sugar levels in mice induced by alloxan.

Keywords: alloxan, petai seed extract, glimepiride, blood sugar levels



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Uniformity Test On Generation F4 Candidates For High Yielding Composite Corn Varieties

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Abstract. Composite corn is a very promising alternative for farmers because it can be planted repeatedly and farmers can produce seeds for their own needs, although in general, the production is lower than hybrid corn seeds. The purpose of this study was to produce a new composite maize variety that has a high yield and is adaptive to the agro-climate in West Sumatera. The study was conducted using the mass selection method in the F4 generation to test the uniformity. Based on the results of the study, it was found that the F4 population of composite corn candidates that had medium and uniform age, had high criteria but still had wide diversity, and had high seed yields, even almost equivalent to some hybrid corns, although some characters of yield components were still lacking. have wide diversity. From the results of this study, it has been obtained candidate composite maize varieties with high yielding and adaptive to the agro-climate in West Sumatera.

Keywords: seed yield, diversity, composites, mass selection



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Rapid Odonata Assessment at the Village-surrounding in South Siberut, Mentawai Island Regency, West Sumatra Province

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Abstract. The current knowledge regarding Odonata in Sumatran satellite islands is quite little. The Mentawai Islands, located west offshore of West Sumatra Province, have been explored for its Odonata diversity since 1950's and resulted in around 53 dragonfly species known. There is a need to do continuous and thorough Odonata studies in the islands, since many places in Mentawai were excluded from the previous and historical surveys. Hence, between 12-16 October 2021, an initial Odonata assessment was performed around the Mailepet Village, South Siberut, the Mentawai Islands Regency, West Sumatra Province. This survey used photography technique to document the dragonflies in five types of habitats around the village. These habitats included beach, garden, bushes, river and forest-edge. The data was then analyzed descriptively, where species similarity between habitats was calculated using Jaccard formula. Seventeen dragonfly species were recorded during the survey, consisted of five damselflies (Zygoptera) and twelve true dragonflies (Anisoptera). Garden was observed to have the most species recorded (12 species), followed by beach, garden and river with seven species each; forest-edge only booked three species. Garden and bushes shared the most similarity in this study (58.3%), followed by beach-bushes (55.6%) and beach-garden (46.2%). Either bushes or river habitat retain same species with forest-edge. This study also recorded new distribution for *Libellago sumatrana* (Chlorocyphidae) which previously recorded only from Sipora, another island in Mentawai region located southward from the current study site.

Keywords: Anisoptera, Jaccard, *Libellago sumatrana*, Mailepet Village, Zygoptera



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Into the Database of Bencoolen Odonata: Synthesis of Two Years Dragonfly Survey in Bengkulu Province

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Abstract. Bengkulu, as part of Sumatra, receives less attention for its odonatological aspect during the current advance of life science. Historical records on Odonata were contributed by many foreign researchers from Dutch colonial era, including accounts provided by Lieftinck and Ris. In order to compile Odonata database for Bengkulu, there have been conducted dragonfly surveys from two years ago at some representative sites in this province. Conservation area of Seluma (3°54'35.17" S, 102°41'06.42" E) in the southern Bengkulu was visited in 2019 for two weeks survey, while conservation area of Lemo Nakai (3°26'35.47" S, 102°20'34.42" E) was surveyed in 2020 for the same work duration. Random survey and continuous citizen science are performed at Bengkulu City to further the database from human impacted area. Thirty-five species were recorded from Seluma, thirty-nine were from Lemo Nakai and ten species were observed to exist within the human impacted area in Bengkulu City. In total, there were total 52 dragonfly species recorded within the administrative boundary of Bengkulu Province which more than half of historical Odonata records for this province. Thirty-one species belonged to Anisoptera (true dragonflies) and twenty-one species are grouped into Zygoptera (damselflies). Some noteworthy records are highlighted in this paper, such as the rare *Dysphaea dimidiata* (Euphaeidae), *Anax panybeus* (Aeshnidae) and *Orthetrum schneideri* (Libellulidae); Sumatran endemic *Heliocypha angusta angusta* (Chlorocyphidae) and *Megalogomphus sumatranus* (Gomphidae); as well as the observation of three Aeshnid species within human settlement in Bengkulu City. Further details on prominent Odonata species were also outlined along with their significances.

Keywords: Anisoptera, citizen science, *Megalogomphus sumatranus*, Zygoptera.



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Ethnobotanical Study Of Minangkabau And Aneuk Jamee Tradisional Food: Unique Tradisional Food From Sawahlunto, West Sumatra

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Abstract. Traditional food is consumed by a particular ethnic in a region and processed based on recipes passed down from generation to generation and with the raw materials come from the local area. The city of Sawahlunto with its multi-ethnic community has long had a specific mixture of various cultures, customs and traditions. This fact resulted in a very unique variety of food types and biodiversity materials. Preliminary ethnobotanical research was conducted on two research sites (Talago Gunung and Rantih Village) in Sawahlunto city. Data were obtained through semi-structured interviews with sixteen respondents from both of those villages. The data were analyzed qualitatively and quantitatively. Quantitative analysis such as: Use Value (UV) and Cultural Food Significance Index (CFSI) of each plant used were calculated. Plant materials were Identified and deposited at the Andalas University Herbarium. The results of the study indicated that three main types of traditional foods were detected namely 'Ayam Bungo Jua', 'Udang Kasambi' and 'Gulai Ayam Talanjao'. The plant diversity utilization was different between the three types of traditional foods. Eighteen plants species belonging to 13 families were used in the three types of traditional food. Shallots (*Allium ascalonicum*) is a very important plant in the three traditional foods with the highest of UVs value (UVs=2.06). In another important case, the culturally important plants with the three highest of CFSI values were detected in red chilli (*Capsicum annum*), shallot (*Allium ascalonicum*) and garlic (*Allium sativum*). The detail plant diversity used and their conservation were discussed in this article.

Keywords : Conservation of culture, Ethnobotanical Study, CFSI, UV, Sawahlunto.



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Yield, Dry Production And Revenue Cost Ratio Of Pennisetum Purpureum Cv. Taiwan In Ultisol Soil With Biotechnology Of Bisozyme Mixed Arbuscular Mycorrhizal Fungi

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Abstract. This study was to conducted the effects of *Bisozyme* mixed *Arbuscular Mycorrhizal Fungi* (AMF) cv. *Glomus manihottis* on yield, production and revenue cost ratio (RCR) of (*Pennisetum purpureum*) cv. Taiwan in ultisol soil for first harvesting in West Sumatra, Indonesia. AMF cv. *Glomus manihottis* inoculation, the use of N, P, and K fertilizers is given at a recommended dose of 100%, 75%, 50%, and 25%. Whereas, AMF is inoculated with a dose of 10 grams / grass plant clump. While, the used of *Bisozyme* DT 1000 type and *Bisozyme* MK 1000 type. This research was conducted with Randomized Group Design, 4 (four) groups and 5 (five) variables. The groups were P0 (Manure + Fertilizer N, P, and K), P1 (*Bisozyme*), P2 (AMF cv. *Glomus manihottis*), P3 (*Bisozyme* + AMF cv. *Glomus manihottis*), P4 (*Bisozyme* + AMF cv. *Glomus manihottis* + N, P, and K). The variables are yield, dry production and RCR. The result of statistic analysis showed that treatment was not significant ($P < 0.05$) to yield and dry production while RCR of grass showed very different significantly ($P > 0.05$). The yield, dry production and RCR ranged from 57,50 (P1) - 66,53 (P4) ton/Ha/Year, 12,18 (P1) – 14,93 (P4) ton/Ha/Harvesting and 1.54 (P2) – 6,71 (P0), respectively. From this result it is could be concluded that *Bisozyme* mixed with FMA could be used as organic fertilizer for substitute of fertilizer N, P, and K.

Key words: *arbuscular mycorrhizal fungi*, *bisozyme*, dry production, fertilizer of N, P and K, , RCR, yield



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Analysis of Climate Variability and Farmers' Perceptions on Water Resources Availability in the Lembang-Sumani Watershed Area

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Abstract. Water resources are an essential factor in the agricultural sector. Its sustainable availability, both in quantity and quality, is the key to guaranteeing food security for people in a country during the climate crisis that hit the world. Climate change will affect the pattern of water availability in a watershed area. The increase in rainfall variability and the frequency, intensity of extreme weather cause changes in rainfall spatial and timing patterns, affecting the availability of water for agriculture. For this reason, an integrated water resource management strategy is needed in a watershed under a climate change uncertainty scenario to ensure the sustainability of the availability of water resources for agricultural activities. This study focuses on: (1) analyzing climate variability as one of the determining factors in ensuring the availability of natural resources, especially water resources, for the agricultural sector and (2) farmers' perceptions of climate variability. The method used is a quantitative method using a trend analysis tool, performing statistical analysis with correlation tests between variables and perception analysis using a Likert scale. The results showed that based on the trend significance test, there was an increasing trend in the number of rainfall events more significant than 10 mm/day, an increase in the number of consecutive wet days, and a considerable increase in the amount of annual rainfall (95% confidence level). The increasing trend is higher in the downstream than in the upstream part of the watershed. The study also found a significant effect between the index of rainfall, water availability, and agricultural productivity. Farmers' perception of climate change and its impact on water availability for agriculture shows that farmers are starting to realize climate change. This impact has been felt in the last five years, resulting in a decline in agricultural productivity from year to year.

Keywords: climate change, productivity, water availability



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Sustainability Irrigation Management as Agricultural Community Livelihood System

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Abstract. Irrigation as an integrated system has the opportunity to encourage sustainable socio-economic development of the community. The utilization of irrigation water is limited to irrigation for lowland rice activities, but more broadly, other potential businesses can also be developed. In general, this study aims to analyze irrigation management in the context of the SDGs. Specifically, this research aims to: (1) analyze irrigation management issues, opportunities and its challenges; (2) Analyze the sustainability of irrigation management as a livelihood system for agricultural communities. The method used in this research is the mix-method. The analysis used is RAPFISH which is modified and adapted to the attributes in this study, and a multidimensional scaling model to analyze sustainability measured based on sustainability dimensions. The study results show that the efficiency of irrigation water in Banda Pamujan, currently 90% is intended as a water source for rice farming. Another 10% of irrigation water has been used for fishery needs. In addition to fisheries, other potential businesses such as horticulture businesses can be carried out using a hydroponic system. The sustainability index value of the planet, people, peace, partnership, and prosperity dimensions shows that the planetary dimension index value is 66.3, with indicators of sustainability being entirely sustainable. Meanwhile, for the people dimension, the sustainability index value is 77.5, with the sustainability indicator being very sustainable. In the peace dimension, the sustainability index value is 17.6, where the sustainability indicator is unsustainable. In comparison, the partnership dimension has an index value of 42.0 with less sustainable indicators. The index value of the sustainability dimension of prosperity is at 37.9 where the sustainability indicator is less sustainable.

Keywords: irrigated farming, sustainability, multidimensional scaling



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Somatic Embriogenesis Of Soybean (*Glycine Max (L.) Merrill*

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Abstract. Domestic soybean production needs to be increased in accordance with the needs of the people. One of the efforts that can be done is by assembling superior varieties through plant breeding techniques. The assembly of transgenic soybeans cannot be separated from the success of the regeneration process. In vitro plant regeneration through somatic embryo induction is more effective because it comes from a bipolar embryo from somatic tissue. This study aimed to obtain a regeneration protocol for three soybean varieties: Grobogan, Derap I, and Devon I through somatic embryo induction. This research was conducted at the Wetland Experimental Garden and the Tissue Culture Laboratory, Faculty of Agriculture, Andalas University, Padang from July to November 2020. This study used a Completely Randomized Design (CRD) which was carried out separately in one experiment with 4 treatment levels of 2,4-D concentration : 10 ppm, 20 ppm, 30 ppm and 40 ppm which were repeated 5 times. Data is presented in the form of an average. The results of the study that giving 2,4-D with a concentration of 20 ppm was the best concentration for the number of somatic embryos per explant that produced embryos in Grobogan soybean varieties (2.90 embryos) and 2,4-D 40 ppm was the best concentration for Derap I soybean varieties. (2.12 embryos) and Devon I (4.98 embryos).

Keywords: 2,4-D, embrio somatik, in vitro, kedelai



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Characteristics Of Land For Development Of Sorghum (*Sorghum Bicholor L.*) On Peat Land In West Sumatera, Indonesia

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Abstract. Sorghum is a peat land food crop that has great potential developed in Indonesia. The results proved that sorghum is the most appropriate crop of choice in an effort to increase the productivity of sub optimal land that is acid, empty land or other non-productive land such as mining land that has been done by PT.Semen Tonasa in 2012. While Juniarti in 2009- 2011 has been planting sorghum on the soil of Andisol, Entisol and Regosol in two seasons; winter and summer at Shobara, Hiroshima Prefecture Japan. The planted sorghum can produce biomass that can be utilized as an energy source used for the cultivation of strawberries in greenhouses and the utilization of energy in the household scope of Shobara-Hiroshima. The development of sorghum, the land productivity will be increased and also support the development of sustainable agriculture and the increased of Indonesian food production. Through the research collaboration that has been done with PT. Agro Indah Permata 21 since 2015 has been planting sorghum in Padang Laweh, Koto VII District Sijunjung Regency, and peat land in West Sumatera Indonesia with planting area of proximate 8 T/Ha and has produced production of 10 T/Ha of wheat seeds. The results of planting sorghum that has been done to produce sorghum seed products that have been processed into flour and sugar products from the stem of sorghum. By evaluating land characteristics appropriate for the development of sorghum plants, on Peat land, West Sumatra Indonesia.

Keywords: Characteristics of peat land, Sorghum (*Sorghum bicholor L.*), Sorghum as food crop.



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Dynamic system model for developing an agropolitan area based on laying hens in Limapuluh Kota Regency

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Abstract. The development of an agropolitan area based on laying hens in Limapuluh Kota Regency faces many problems. One method that can be used to solve these complex problems is the systems approach. This study aims to build a model for developing a sustainable agropolitan based on integrated laying hens. The results of the system performance indicate that the current system is in a fairly sustainable position. The dynamics of time will make changes in system performance in the future. There are seven factors that influence the interdependent system, namely carrying capacity, egg prices, farmer income, employment, infrastructure, utilization of livestock waste. Based on the state of each factor, three scenarios were formulated for the development of a sustainable laying hens farming system in Limapuluh Kota Regency, namely: (1) conservative-pessimistic scenario, (2) moderate-optimistic scenario, and (3) progressive-optimistic scenario.

Keywords: dynamic system, agropolitan, key factor, scenario, simulation.



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The Song Of Kokok Balenggek Chicken Based On Qualitative Characteristic In The Community Of Kokok Balenggek Chicken, Padang City, Indonesia

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Abstract. The Kokok Balenggek chicken is one of the original Indonesian chickens originated from West Sumatra. This chicken This chicken is kept as an ornamental chicken because it has a melodious song. Recent study aims to find out the number of crowing level based on qualitative traits as the basis data for selection in the community of Kokok Balenggek Chicken in Padang City. The study used 70 adult males Kokok Balenggek Chicken that already had crowing level and were raised in the community of Kokok Balenggek Chicken, Padang City. The study was conducted by survey method, sampling by purposive sampling. Data analysis was performed descriptive statistical analysis by calculating percentage, average, standard deviation, coefficient of diversity of the Number of Crows and used SPSS ver.16.0 with general linear models. The qualitative traits observed were feather color, feather on the feet, eye color, shank color, ear lobe color and beak color. The average of number crow had non significant effect ($P>0.05$) base on qualitative traits, except on shank color had a significant effect ($P<0,05$). The coefficient variance number of crow base on qualitative straits had high variance ($>15\%$). The black shank can be made as base selection to number of crow.

Keywords: *Kokok Balenggek Chicken, Number of Crow, Selection, Qualitative characteristic*



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Land Resource Engineering Based on Local Wisdom: Development of Nagari-Based Ecotourism as a Customary Village

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Abstract. Land is the source of life and the basis of culture and civilization. Indigenous peoples cannot be separated from the land, which has supported them for generations, hundreds or even thousands of years. As *khalifatu fi al ardh*, human and indigenous peoples manage their land and natural environment based on their local wisdom. In Minangkabau, the customary community unit is the nagari. However, the socio-political and cultural system of the nagari as a unit of indigenous peoples has been degraded and is threatened with extinction. Whereas the State, through the 1945 Constitution, has recognized and guaranteed the continuity of the customary law community unit in the Negara Kesatuan Republik Indonesia. However, Law 6 of 2014 concerning villages (and traditional villages) which is strengthened by Regional Regulation 7 of 2018 concerning Nagari, has opened up opportunities for Nagari to be reconstructed, re-functionalized and revitalized. In fact, not all nagari can be reconstructed, but the selective use of these opportunities is very relevant to the trend of developing nature and environment-based tourism (eco tourism). This paper analyzes and describes these two aspects and encourages the acceleration of the implementation of policies regarding the nagari as a traditional village simultaneously as a tourist village. That way, the development of nagari and eco-tourism will actually be in line with the principles of conservation, local wisdom, community participation and economic benefits for local indigenous peoples.

Keywords: land resource, local wisdoms, ecotourism, nagari, customary village.



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Assessing the Relationships between Plants and Stingless Bees (Hymenoptera: Apidae: Meliponini) within the Settlement Area

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Abstract. Aside from being the source of honey, bee pollen and propolis, the stingless bees also play an important role as a significant pollinator in the world. The quality and quantity of bee products from a bee colony depend on the availability of surrounding plants as the source for nectar, pollen or resin that supply the colony. A study had been conducted from March 2020 to May 2021, aimed to record the visitation of stingless bees to certain vegetation, fruit and flower plants within a settlement area located in adjacent to Universitas Andalas Campus Complex (UACC) in Padang City. Eight colonies of *Heterotrigona itama*, two colonies of *Geniotrigona thoracica* and 10 colonies of *Tetragonula* species were observed in this study; they were either bred or naturally existing within the settlement complex. Their activities and visitation to plants were purposively recorded, with observation was emphasized to the foraging activities of the stingless bee worker on the plants. A total of 60 fruit, flower and ground covering plants were found to be visited by the stingless bees. The observation noticed some patterns regarding stingless bees' timing to visit certain plant and number of foraging individual during the stingless bee-plant feeding interaction. *Lepidotrigona nidriventris*, stingless bee species which identified as unique to UACC, was also recorded foraging on Cosmos flower (*Cosmos bipinnatus*, Asteraceae) within the settlement area. It might sign the previously unsighted existence or extension of this species beyond the UACC area.

Keywords: Foraging, Plant Resources, Settlement, Stingless bee.



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Effect Of Using *Indigofera Zollingeriana* As Substitute Of Concentrate In Elephant Grass (*Pennisetum Purpureum*) Based Ration On Availability Of Macro Minerals (Ca, P, Mg, S) In Kacang Goat

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Abstract. This study aimed to get the best level of *Indigofera zollingeriana* as concentrate substitution in elephant grass-based rations on the availability of macro minerals (Ca, P, Mg and S) in kacang goat. This study used 12 kacang goats with 11 to 12 kg average weights. The method used was experimental method with Completely Randomized Design (CRD) consisting of 3 treatments and 4 replications. The treatments were: P1: 60% elephant grass + 30% concentrates + 10% *Indigofera zollingeriana*; P2: 60% elephant grass + 20% concentrates + 20% *Indigofera zollingeriana*; and P3: 60% elephant grass + 10% concentrates + 30% *Indigofera zollingeriana*. The observed variable was the minerals availability of calcium (Ca), phosphorus (P), magnesium (Mg) and sulfur (S). The statistical analysis used was analysis of variance, and differences between mean was tested by DMRT test (Duncan's Multiple Range Test). The results showed that substitution of concentrates with *Indigofera zollingeriana* had a very significant effect (P0.05) on mineral availability of Mg and S. Based on the results of the study it could be concluded that the concentrate substitution with *Indigofera zollingeriana* up to 30% increased the minerals availability of calcium (Ca) and phosphorus (P), but not affect the minerals availability of magnesium (Mg) and sulfur (S).

Keywords: *Indigofera zollingeriana*, Kacang Goat, Availability of Macro Mineral (Ca,P,Mg,S)



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“Do virtual food advertisements distributed by Indonesian minimarkets campaign for neo-liberalism”: A critical discourse analysis

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Abstract. Virtual food advertisements are designed to promote products and to persuade consumers to make purchases. However, despite these purposes, food advertisements also campaign ideologies of liberalism. Driven in critical discourse analysis, this paper aims to describe how language and images of the food advertisements promote neo-liberalism to the people. Grounded in advertisements published and distributed by national sized minimarkets in Indonesia, four out of fifty virtual advertisements were analyzed. The findings revealed that a number of neo-liberalism shared-values were found. Appeals to celebrities, competition, wealth, and capitalization are promoted and campaigned. the implication of the findings become interesting issues not only in language but also in law education. Suggestion and recommendation for further research are also sought.

Keywords: *critical discourse analysis, food advertisement, neo-liberalism*



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Nondestructive Evaluation of Oil Palm Fresh Fruits Bunch for Yield Prediction Based On Optical Features

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Abstract. Best practices in oil palm cultivation to improve efficiency are challenging. Enormous capital has been invested in superior seeds, water and fire management, as well as fertilization. However, heavy losses frequently occurred at the time of harvesting. Oil palm fruits grow in dense bunches, called fresh fruits bunch (FFB), containing mass number of fruits. The fruits ripen nonuniformly and formidable to observe visually. Therefore, untimely harvest is unexceptional. Previous studies suggest that camera-aided observation produce more accurate results for determination of FFB ripeness than visual inspection. However, these techniques prone to environment change such as sunlight. In this study we propose the use of hybrid-camera which can observe the FFB in multispectral-regime. The prototype was able to better identify changes in FFB physical and thermal characteristics upon maturation and ripening. The new approach enables better optimum harvest window prediction for FFB with R² of 0.8344, while previous study can only obtain R² of 0.7818. The result provides better harvest practice in oil palm industry to improve the overall efficiency of cultivation.

Keywords: Hybrid Camera, Ripeness, Multispectral, FFB Characteristics, Losses



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Nondestructive Evaluation of Oil Palm Fresh Fruits Bunch for Yield Prediction Based On Thermal Features

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Abstract. Oil Palm is widely cultivated in Indonesia due to its superior economical value. Currently, oil palm plantations have many challenges, particularly the time of harvesting. Many losses occurred during this process and therefore, they need best harvesting practice to obtain good results. While the quality of oil palm fresh fruits bunch (FFB) (i.e. ripeness) can be determined after harvest, a pre-harvest assessment technique is not present at the moment. In this study, we observe FFBs at four different fruit ages, e.g. 120, 140, 160 and 180 days after anthesis (DAA). A non-destructive evaluation was performed by measuring the FFBs surface temperature using a thermal camera. In addition, the influence of ambient temperature and other environment parameters were observed. Afterwards, the FFBs harvested, and its chemical compositions measured. A model developed to correlate the FFB surface temperature with its ripeness. Results showed that, regression model of the ratio of FFB oil content and moisture content with surface temperature has coefficient of determination of 0.6732. Moreover, when FFB surface temperature was correlated with its carotene content using multiple-regression, the model R² was obtained at 0.8122. In addition, FFB surface temperature can be used to predicted the FFB age with R² of 0.8344. This suggests a strong correlation between FFB surface temperature and its age. Furthermore, the ratio of FFB oil content and moisture content with its ripeness, and surface temperature, open the opportunity for a more accurate pre-harvest nondestructive evaluation technique to determine optimum harvest window (OHW) prediction of the bunch. The result delivers a solution of better harvesting practice in oil palm industry.

Keywords: Oil Palm, Optimum Harvest, Ripeness, Quality, Model



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Systematic Review of Early Detection and Classification of Plant Diseases Using Deep Learning

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Abstract. Deep learning (DL) addresses the brilliant period of AI (ML) and is slowly turning into the main technique in numerous fields. Right now, it assumes a significant part in the early location and order of plant infections. The utilization of ML innovation in this space is accepted to have prompted a huge expansion in usefulness in the hydroponics area, particularly the new rise of ML, which appears to expand the degree of precision. As of late, numerous ML designs have been executed, which are joined by significant representation strategies for characterizing indications and arranging plant diseases. This audit explores and examines the most recent techniques utilized for preparing, updating, and highlight extraction more than three years in 2020. This audit talks about and breaks down the profound design and most noteworthy precision of plant diseases location and plant the executives because of significant enhancements in profound learning models and the accessibility of plant informational collections. The impact of dataset diversity and choosing a suitable backbone model for the target class is much more important than the number of sample images in the dataset itself. Most of the models that are widely used recently are the YOLO-v3 and R-CNN family architectures which allow detection of small objects and improve the semantics of segmentation feature extraction and multi-object detection.

Keywords: plant diseases, deep learning; machine learning, feature extraction, multi-object detection.



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Consumer Decision Analysis in The Utilization Of E-Marketing For Agricultural Product Purchases

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Abstract. Advances in information technology, especially the internet, have affected all economic activities in Indonesia, including business activities and trade in agricultural products. This study aims to analyze the factors that influence consumer decisions in the use of e-marketing to purchase agricultural products. Data collection was carried out by surveying 200 consumers of agricultural products spread across all regencies/cities in West Sumatra. Data were analyzed using logit regression. The results showed that the use of e-marketing was significantly influenced by the millennial age group and consumer beliefs from buyer testimonials, while gender, income, education level, number of family members and domicile location had no significant effect. This study recommends the need for a strategy for the expansion of the millennial group as an important digital marketing target as well as a testimonial strategy to influence purchasing decisions.

Keywords: *e-marketing*, agricultural product, purchasing decision.



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Effect Of Degradation Sugarcane Bagasse in Anammox Process

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Abstract. This study aimed to determine the effect of chemical oxygen demand (COD) on nitrogen removal by anammox process using sugarcane bagasse as the carrier. The experiment was carried out with three up-flow reactors based on inoculum and carrier, which were operated continuously at room temperature. Run 1 contains sugarcane bagasse, Run 2 contains sugarcane bagasse and anammox bacteria from Lake Koto Baru, and Run 3 with anammox bacteria without a carrier. The reactor was operated continuously for 47 days with ammonium and nitrite concentrations of ± 150 mg-N/L and a hydraulic retention time (HRT) of 6 hours. Influent and effluent samples were collected twice a week and then analyzed concentration ammonium, nitrite, nitrate, and chemical oxygen demand (COD) using spectrophotometer Uv-Vis based on standard methods. The performance of nitrogen removal was calculated with parameters nitrogen loading rate (NLR), nitrogen removal rate (NRR), ammonium conversion efficiency (ACE), and nitrogen removal efficiency (NRE). The maximum nitrogen removal was obtained in Run 2, where anammox bacteria growth on sugarcane bagasse with NRR, ACE, and NRE were 0.599 kg-N/m³.d, 57.5%, and 49.9% at NLR 1.30 kg-N/m³.d. The concentration of COD did not inhibit the anammox process where the ratio COD:NO₂⁻-N was 0.53.

Keywords: Anammox; sugarcane bagasse; COD; *nitrogen removal*.



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Characteristics of the KUB Chicken Market in Fulfilling the Needs of Traditional and Religious Ceremonies in Bali Province

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Abstract. Kampung Unggul Balitnak (KUB) chicken is a superior native chicken with higher meat and egg productivity than ordinary native chickens. The purpose of rearing is not only to meet the nutritional needs of the community but also to be used as a means of various religious activities, especially in the Bali province. The need for KUB chickens with various feather color specifications has implications for scarcity and selling prices. The purpose of this study was to map the characteristics of the KUB chicken market to meet the needs of chickens with various colors for a traditional and religious ceremony in Bali province. This research was conducted in July-October 2021 in eight districts and one municipality in Bali province. Respondents in this study were 179 consisting of 90 household consumers and 90 traders who were determined using the multi-stage sampling method. The results showed that KUB chickens with the highest number of requests by household consumers were brumbun (76,40%), white (10,11%), black (8,99%), biing (1,12), and other colors (1,12%). Purchase decisions by the majority of consumers are determined based on consideration of color specifications (65,17%) and types of chickens (33,71%). Meanwhile, location, price, and service are not the main considerations for consumers in making purchases. The high demand for brumbun color KUB chickens has an impact on the scarcity and difficulty of traders to meet the demand with a value of more than 45%. In conclusion, demand for KUB chickens is still high and the availability is quite limited so that efforts to increase their population are needed in Bali province.

Keywords: KUB chicken; market characteristics; business growth



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Factors Affecting Souvenir Purchase Behavior in Kapalo Banda Taram Tourism

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Abstract. The creative industry sector such as souvenirs are one of the prevalent elements to revive the tourism from adversity after the COVID-19 pandemic. This study seeks to (1) identify the potential of local raw material souvenirs at the Kapalo Banda Taram Tourism and (2) analyze the product attributes that influence on tourists' decisions to purchase souvenirs. Collecting data using in-depth interviews with key informants and distributing online questionnaires to respondents via google form. Data analysis was carried out descriptively and regression analysis using Stata 14 software.

The results were analyzed using descriptive and the findings show that there are several potential local natural resources that can be used as souvenir raw materials at Kapalo Banda Taram, namely Gamai-Gamai, bamboo, pine wood waste and corn plant waste. The types of souvenirs that have been made from these raw materials are room dividers from Gamai-Gamai, cup sets made of bamboo and various necklaces made of pine twigs. Tourism managers need to maintain the sustainability of these internal resources so that the availability of raw materials is guaranteed. Based on regression analysis of 168 respondents, it is known that the souvenir attribute variables that affecting tourists' decisions to purchase souvenirs at Kapalo Banda Tourism are the variables usable, according to needs, portable, innovative products and hand made. This study reveals that for consumers, the logo and quality attributes have not been considered in buying souvenirs. Willingness to pay of respondents in buying souvenirs shows the average price that consumers want is in the range of IDR 25,000 – 50,000. The products of mugs and cups made of bamboo are the most popular souvenirs for the respondents. This research is important information for the tourism manager of Kapalo Banda Taram in the plan to develop souvenir products that are of interest to potential consumers, so that the products produced are in accordance with the needs of tourists.

Keywords: Kapalo Banda Taram, Tourism, Souvenirs and Economy Creative



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Identification, Characterization, and Conservation of Germplasm of Sweet Potato (*Ipomoea batatas* (L.) in The Production Center of West Sumatera

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Abstract. Sweet potato (*Ipomoea batatas* L.) is an important food crop in West Sumatra. This commodity has the potential to be developed in connection with suitable land conditions and the development of various snack food industries made from sweet potato. West Sumatra as one of the sweet potato production centers in Indonesia has a very high diversity of germplasm, but information on the diversity of sweet potato germplasm is not yet available, while this information is very important for the development and assembly of new high yielding sweet potato varieties.

In this study, 109 sweet potato accessions were characterized from 4 sweet potato production centers in West Sumatra. To find out more about the differences in each sweet potato accession, molecular identification and characterization were carried out. The second year of research is a follow-up study that aims to obtain information about the genetic diversity of sweet potato in the production center area of West Sumatra molecularly using the RAPD technique, to obtain information and collections of local varieties of sweet potato that have potential as superior varieties and genetic sources of several traits/ important characters, and obtain a database of kinship/genetic similarity of sweet potato varieties.

The results showed that from 80 varieties of morphological characterization results obtained 79 varieties that have genetic differences. Based on the dendrogram, the accessions varied with a coefficient between 0.15 - 0.20 and were grouped into 7 groups with a range of 2 accessions to 38 accessions.

Keywords: *characterization; germplasm; RAPD; sweet potato*



Morphology and Elemental Analysis of *Oryza Sativa* L ‘Anak daro’ rice grown in Payakumbuh by Energy Dispersive X-Ray (Edx) Technique

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Abstract: *Oryza* ‘Anak daro’ is a local Solok rice variety and very popular especially in the making of nasi Padang. It is now widely planted in West Sumatra to make sure enough production to cater for the increasing demand. Previous studies have shown that ‘Anak Daro’ had high amylose content and hard cooked rice texture when cold. The gelatinization temperature is higher than 74°C. The 2-acetyl-1-pyrroline volatile component is the highest among the Solok varieties (Seti Dwi Indasari et al., 2019). It is also interesting that the ‘Anak Daro’ seed can still germinate at high temperature of 400°C (Afrima Ari et al., 2019). TGA study on the seed may be necessary to verify the behaviour at high temperatures. In this study the rice was planted in Payakumbuh Polytechnic rice field by following the conventional technique of rice planting. The internal morphology of the transversal cross section of the rice showed the formation of sugar crystallites packed in unit blocks linked with each other from the outer layer toward the centre of the rice grain. The shape of the crystallites varies from spherical with size between 3 and 5 microns and polyhedron as well. The shape and packing of the crystallites due to amylose and amylopectin contents most probably determine the hard texture of the rice. The elemental contents of the rice by Energy Dispersive X-ray technique showed the presence of carbon (49.5%), oxygen (37.0%), phosphorus (7.6%), kalium (2.5%) and magnesium (3.0%) reflecting the soil and fertilizer contribution to the plant system. A more sensitive technique such as X-Ray fluorescence (XRF), Neutron activation analysis (NAA) and chemical analysis for trace metals determination is needed for future work since it can provide the health status or quality of the ‘Anak Daro’ rice.

Keyword: anak daro rice, edx analysis, beras solok



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Total Phenolic and Organoleptic Profile of Kahwa Daun Beverages (A Traditional Beverage in West Sumatera, Indonesia) Using Some Steeping Methods

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Abstract. This research was conducted to determine Total Phenolic Content (TPC) and organoleptic profile of kahwa daun beverages, one of the community's traditional beverage of West Sumatera, which was made by different steeping method. TPC was determined by using spectrophotometry UV-Visible. Beverages were made from 1 g kahwa daun (herbal tea) in 100 ml of water with 3 steeping methods which were brewing (pouring herbal tea with hot water and left in 5 minutes), hot maceration (herbal tea is added to boiling water and left in 5 minutes), and boiling (boiling herbal tea and left in 5 minutes). The TPC of kahwa daun beverages were 14.16-32.08 mg/g which were calculated as gallic acid equivalent. The lowest TPC is shown by brewing method and the highest one is shown by boiling method. There is a significant difference between brewing with another method ($P < 0.05$), but no significant difference between hot maceration and boiling method. Traditionally, kahwa daun beverages are made by boiling method. But, it can be recommended that the beverage is made by hot maceration method because of its similarity on TPC. Organoleptic profile was done using the hedonic test. It was done by 30 panelists. The highest score of taste is shown in the sample that was made by boiling. The score of color, aroma, and appearance are the highest in the sample which is made by the hot maceration method. Statistically, there is no significant difference in taste and aroma for kahwa daun beverage which were made by 3 methods, but there are significant differences in the color, aroma, taste, and appearance between tea and kahwa daun beverages.

Keywords : total phenolic content; organoleptic; qahwa; steeping; beverage



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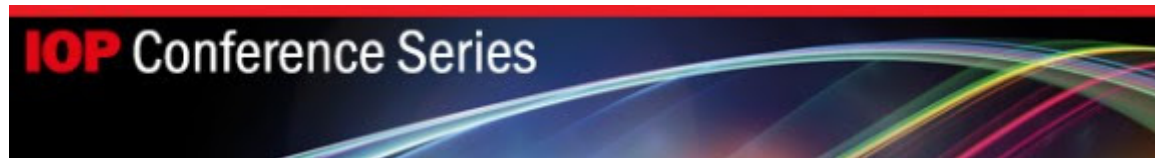
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The Effects of Salt Particle Size and The Formulation of Nagara Bean Tempeh Flour with White Oyster Mushroom on Salty and Umami Taste Perception

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Abstract. The prevalence of hypertension in South Kalimantan based on the health development program in 2018 reached 44.1%, which means South Kalimantan is the province with the highest prevalence of hypertension in Indonesia. Excessive consumption of salt (sodium) can cause a direct impact on blood pressure: people with high levels of salt consumption have an increase in blood pressure. Efforts to reduce salt consumption must also pay attention to the level of acceptance by consumers. Seasoning reformulation should maintain the product taste. Among various seasoning reformulation technologies are reducing salt particle size and blending salt with other ingredients as a flavor enhancer. This study aimed to determine the roles of salt (NaCl) size and the addition of the Nagara bean tempeh flour and oyster mushroom formulation in enhancing the umami taste to reduce salt use. Reducing the salt particle size down to 100 mesh had not given any significant effect yet on the strengthening of the perception of salty and umami taste. On the other hand, the formulation of Nagara bean tempeh flour and white oyster mushroom in a ratio of 100:0 could give a strong perception of umami taste to the seasoning powder, which was no different from the formulation in a ratio of 90:10. In conclusion, the glutamate component contained in Nagara bean tempeh flour can be an alternative source of good umami taste.

Keywords: Nagara bean; oyster mushroom; tempeh; umami; seasoning powder.

1. Introduction

According to the statement of the World Health Organization (WHO) in 2018, 1.13 billion people in the world had hypertension, meaning that 1 in 3 people in the world was diagnosed with hypertension. The prevalence of hypertension in the population older than 18 years old was 34.1%, and the highest proportion was found in South Kalimantan (44.1%) [1]. Previous studies stated that high sodium consumption affected the incidence of hypertension [2][3] and that the consumption of salty foods was correlated with the incidence of hypertension, with the risk of suffering from hypertension being higher [4]. Reduction of dietary sodium reduced not only blood pressure and the incidence of hypertension, but also morbidity and mortality from cardiovascular disease [2].

The challenge faced by the food industry in reducing salt use lies in the fact that salt is readily usable and that it has functional value in flavor and texture development [5][6]. Efforts to reduce salt consumption must also pay attention to the level of acceptance by consumers. Seasoning reformulation with reduced salt must maintain the taste of the product. Among seasoning reformulation technologies are reducing the salt size and blending salt with other ingredients as a flavor enhancer.



Vegetable ingredients that contain glutamic acid can be used as flavor enhancers. The glutamic acid contained provides an enhanced taste and thus will reduce the use of MSG and salt. Glutamic acid plays a role in producing a distinctive umami taste and becomes a raw material for flavor enhancers. According to [7], umami is a distinctive taste that is influenced by glutamate and nucleotide compounds such as inosinate and guanylate in many food products that play a role in the palatability and acceptance of a food product. The characteristics of umami play a role in increasing the flavor in food by providing meaty and savory flavors.

[8] formulated a flavor enhancer as a substitute for MSG by using natural ingredients from several mushrooms, including oyster mushrooms, shiitake, and straw mushrooms. The results showed that mushrooms can serve as ingredients for natural flavoring because apart from being tasty and delicious, they are also safe for health. Oyster mushroom has the most prominent aroma and appearance and is the most promising because it is relatively cheaper than other mushrooms. Oyster mushroom is a consumption mushroom of the wood mushroom type which has a more complete nutritional content when compared to other vegetable commodities. It contains high proteins, vitamins, minerals, and fibers [9]. According to [8], oyster mushroom can be used as a flavor enhancer. This is due to the presence of glutamic acid in oyster mushroom at 21.70 mg/g.

Likewise, Nagara beans have high protein content and fairly complete amino acid composition. Nagara beans are a type of cowpea that grows endemic in the Hulu Sungai Selatan district of South Kalimantan. According to [10], Nagara beans in a tempeh fermentation process demonstrate umami characteristics, which come from the presence of glutamic acid in them at 2.183%.

Research on the impact of reducing sodium chloride in a product on the sensory characteristics of the product and its acceptance by consumers is still scant. Some research suggests that a simple reduction in sodium chloride particle size can provide a way to reduce sodium overall. Optimizing the reduction of salt use can be done by reducing the size of the salt. Finer salt sizes will provide purity and faster dissolution. According to [11], partially dissolved salt crystals in the mouth are swallowed without giving a salty taste. Improving salt solubility can increase the salty taste, and it is conducted by reducing the salt particle size to increase the surface of the salt in contact with the solvent.

This research aimed to examine the formulation and quality of seasoning powder from blending Nagara bean tempeh flour, oyster mushroom powder, and microparticulate salt that could enhance the umami taste together.

2. Methodology

2.1. Materials

The materials used in this research included Nagara beans from Hulu Sungai Selatan, South Kalimantan, Indonesia, tempeh starter (Raprima), white oyster mushroom, commercial salt under the brand Kapal (100 mesh), sugar (100 mesh), chemicals for analysis, including AgNO₃ (Merck), K₂CrO₄ (Merck), and NaOH (Merck), phenophtalein indicator (Merck), 96% alcohol (Merck), Folin-Ciocalteu reagent (Merck), NaOH (Merck), NaCO₃ (Merck), CuSO₄ (Merck), Natrium K tartrate (Merck), oven (Memmert), furnace (Memmert), filter paper, and glassware for analysis.

2.2. Methods

2.2.1. Production of tempeh

Nagara beans were soaked in water in a ratio of 1:4 for 5 hours, then the skin was peeled and cleaned. The Nagara beans were steamed for 10 minutes, and then they were drained and cooled, added with tempeh starter at 0.2% and wrapped in plastic, and fermented for 42 hours. The tempeh produced was sliced and dried at 60 °C for 48 hours, then grounded and filtered at 100 mesh.

2.2.2 Production of oyster mushroom flour

An amount of mushrooms was washed and blanched for 10 minutes, then dried at 60 °C for 48 hours. Crushed dried mushrooms were filtered at 100 mesh.

2.2.3. Formulation of seasoning powder

Seasoning powder was formulated using salt, Nagara bean tempeh flour, white oyster mushroom flour, and sugar. Seasoning formulations were carried out with variations in salt size treatment and in the ratio of nagara bean tempeh powder to oyster mushrooms. Fifty percent salt was formulated with 50%

composite of Nagara bean tempeh powder and oyster mushroom, and then 30% sugar of 100 mesh was added out of 100% of the entire formulation. The salt particle sizes used were 60 mesh, 80 mesh, and 100 mesh. The proportions for tempeh flour to oyster mushroom flour used were 100:0, 90:10, 70:30, 50:50, and 0:100.

2.2.4. Parameters of analysis

Each formula of seasoning powder was tested for chemical analysis, including water content, tritatable acid, ash content, NaCl content (Mohr's method), and soluble protein (Lowry's method). The sensory analysis applied a scoring test for salty taste, umami taste flavor, and preferences.

2.2.5. Analysis of data

The chemical data obtained were subjected to Analysis of Variance (ANOVA) and Duncan's Multiple Range Test (DMRT), while the sensory data obtained were subjected to Kruskal-Wallis test and Multiple Comparison.

3. Results and Discussion

3.1. Chemical properties

The water content of the seasoning powder from Nagara bean tempeh and oyster mushroom powder refers to the Indonesian National Standard (SNI) for flavor enhancers. The water content of seasoning powder according to SNI 01-4273-1996[12] is a maximum of 4%. The moisture content of the seasoning formulated of Nagara bean tempeh and oyster mushroom powder ranged from 2.53% to 3.80%. This shows that the water content of the seasoning powder product was below the maximum limit of the SNI standard. An analysis of variance shows that the proportion of Nagara bean tempeh flour and mushroom had a significant effect ($p < 0.05$) on the water content of the seasoning powder. Duncan's test results are presented in Table 1.

Table 1. Duncan's Multiple Range Test (DMRT) for water content data (%)

Salt particle size	Proportion of Nagara bean tempeh flour to oyster mushroom					Mean
	100:0	90:10	70:30	50:50	0:100	
60 mesh	2.86 ±0.98	2.76±0.77	2.91±0.65	3.21±0.71	3.73±0.30	3.09±0.40
80 mesh	2.65±0.71	2.87±0.79	3.01±0.85	3.31±1.09	3.58±0.23	3.08±0.37
100 mesh	2.53±0.78	2.71±0.86	3.12±0.33	3.20±0.22	3.80±0.17	3.07±0.50
Mean	2.68±0.17 ^a	2.78±0.09 ^a	3.01±0.11 ^{a^b}	3.24±0.06 ^b	3.70±0.12 ^c	

Note: The same letters indicate that the Duncan's Multiple Range Test (DMRT) results are not significantly different

The higher the proportion of oyster mushroom flour the higher the water content in the seasoning powder formulation. The difference in water content was affected by the water content of the materials used; the water content of oyster mushrooms is higher than that of Nagara bean tempeh. [13] stated that the water content of oyster mushrooms is 88.75%, while the water content of Nagara bean tempeh is 65.11%[10]

Besides the water content, we need to pay attention to the mineral and salt content in the seasoning powder. Ash content is closely related to inorganic or mineral components contained in a material. The analysis of variance (ANOVA) shows that salt particle size and the proportions of Nagara bean tempeh to oyster mushroom flour had significant effects ($p < 0.05$) on the ash content of the seasoning powder. The Duncan's test results on ash content of it are presented in Table 2.

Table 2. Duncan's Multiple Range Test (DMRT) for ash content data (%)

Salt particle size	Proportion of Nagara bean tempeh flour:oyster mushroom					Mean
	100:0	90:10	70:30	50:50	0:100	
60 mesh	39.78±1.90	39.44±1.28	39.96±1.00	40.76±0.86	41.10±0.82	40.21±0.70 ^b
80 mesh	39.61±2.05	38.42±0.35	39.31±0.65	40.14±1.40	40.71±0.85	39.64±0.86 ^a
100 mesh	39.29±1.56	38.65±0.50	39.33±0.79	39.71±0.63	40.25±0.45	39.45±0.59 ^a
Mean	39.56±0.25 ^b	38.84±0.53 ^a	39.53±0.37 ^b	40.20±0.53 ^{bc}	40.69±0.43 ^c	

Note: The same letters indicate that Duncan's Multiple Range Test (DMRT) results are not significantly different

The finer the salt particle size the smaller the ash content produced. Salt is a crystalline mineral composed of sodium and chloride. Excessive sodium intake can cause hypertension, cardiovascular problems, and stroke. Therefore, there is a lot of consumer concern on these health risks, and the food industry is trying to minimize the salt content of food products [14].

The more proportion of oyster mushroom flour the higher the ash content produced. Oyster mushrooms contain relatively more minerals than Nagara bean tempeh. [15] stated that the nutritional content of white oyster mushrooms is 26.28–29.91% protein, 86.90–89.60% moisture, 0.48–0.91% fat, 19.64–22.82% fiber, 31.37–38.17% carbohydrate, and 5.18–6.39% ash. On a dry basis, according to Tolera and Abera, the mineral content of white oyster mushrooms is 9.76%. The mineral contents of oyster mushroom are 342–410 mg/100 g calcium, 1009–1133 mg/100 g phosphorus, 17–21 mg/100 g iron, 277–359 mg/100 g sodium, and 2088–2281 mg/100 g potassium.

The NaCl content of seasoning powder products ranged from 29.91% to 34.20% (Table 3). The analysis of variance (ANOVA) shows that the particle size of salt and the proportion of Nagara bean tempeh flour to oyster mushroom flour had no significant effect ($p < 0.05$). NaCl content according to SNI 01-4273-1996 is a maximum of 65%. This shows that the NaCl content of the flavor enhancer product is below the maximum limit of the SNI standard.

Table 3. NaCl content in the seasoning powder formulation (%)

Salt particle size	Proportion Nagara bean tempeh flour:oyster mushroom					Mean
	100:0	90:10	70:30	50:50	0:100	
60 mesh	32.07±1.85	31.01±0.89	31.83±0.93	32.06±0.67	29.91±0.33	31.38±0.93
80 mesh	32.56±1.34	31.05±3.21	31.70±3.22	31.82±2.22	30.74±2.07	31.57±0.71
100 mesh	33.08±1.71	32.02±2.61	32.34±1.74	34.20±1.95	31.88±0.76	32.70±0.96
Mean	32.57±0.50	31.36±0.57	31.96±0.34	32.69±1.31	30.84±0.99	

Note: The same letters indicate that Duncan's Multiple Range Test (DMRT) results are not significantly different

Salt particle size and proportion of Nagara bean tempeh flour to mushroom flour had no significant effect on NaCl content ($p > 0.05$). This suggests that the salt added to each formulation is the same even though the size of the particulates is different. This is in line with a previous study which stated that finer salt substitution at the same weight of micronized salt only gave a slight reduction in salt content but did not cause any significant changes in sodium content [16].

To describe the free amino acid content, soluble protein was measured. Protein solubility is interpreted as the proportion of the N value of food protein that is soluble under certain conditions. According to [17], protein solubility is influenced by amino acid composition, molecular weight, and amino acid polarity. The environmental factors that affect protein solubility are pH, temperature, and processing conditions. The analysis of variance (ANOVA) shows that the proportion of tempeh flour to oyster mushroom flour had a significant effect ($p < 0.05$) on soluble protein levels. The Duncan's test results on soluble protein are presented in Table 4.

Table 4. Duncan's Multiple Range Test (DMRT) of soluble protein data (mg/g)

Salt particle size	Proportion Nagara bean tempeh flour:oyster mushroom					Mean
	100:0	90:10	70:30	50:50	0:100	
60 mesh	121.83±3.16	97.29±6.21	108.64±11.57	95.62±8.57	83.94±5.35	101.46±8.98
80 mesh	100.13±4.25	106.47±8.97	115.99±8.57	109.48±10.86	96.29±7.15	105.67±4.84
100 mesh	101.30±5.90	111.65±2.98	107.31±3.87	106.64±6.21	108.81±3.61	107.14±2.37
Mean	107.15±7.63 ^b	105.14±4.54 ^a	110.64±2.92 ^b	103.91±4.57 ^{ab}	96.35±7.77 ^b	

Note: The same letters indicate that Duncan's Multiple Range Test (DMRT) results are not significantly different

Soluble protein is obtained from the hydrolysis of proteins into simple molecules, both peptides and amino acids. In a tempeh fermentation process, protein hydrolysis occurs into peptides and amino acids. Nagara beans contain glutamate and aspartate amino acids which are quite dominant. If both amino acids are increased in free conditions, the umami taste of the seasoning will be improved. Aspartic acid and glutamic acid play a very important role in providing umami flavor when in free amino acid conditions. Nagara bean tempeh contains soluble protein of 22.30 mg/g, with aspartic acid content of 0.663% and glutamic acid of 1.369% [10]. [18] stated that the dominant amino acids in oyster mushrooms include asparagine at 2.15 mg/kg, aspartic acid at 2.02 mg/kg, and glutamic acid at 3.06 mg/kg, while [19] stated that the contents of aspartic acid and glutamic acid are 2.04 mg/g and 5.01 mg/g, respectively.

3.2. Sensory properties

Evaluation of food quality can be done by relying on sensory quality. The sense of taste in the oral cavity can evaluate the caloric content of the food consumed, detect the presence of salt, and protect us from ingesting toxic molecules [20]. Umami is a distinct taste, arising from the perception of amino acids, such as l-glutamate, and 5'-ribonucleotide. Likewise, there are other taste qualities such as fat taste, according to fatty acid taste [21], metallic taste, and kokumi taste, which are associated with long-lasting elasticity, thickness, and savory taste sensation [22].

Table 5. Umami scoring test of the seasoning powder formulation

Salt Particle Size	Treatments		Score
	Proportion of Nagara bean tempeh:oyster mushroom		
60 mesh	100:0		3.25 ± 0.14 ^a
	90:10		3.38 ± 0.18 ^{ab}
	70:30		3.48 ± 0.04 ^{ab}
	50:50		3.60 ± 0.14 ^{ab}
	0:100		3.63 ± 0.04 ^{ab}
80 mesh	100:0		3.35 ± 0.14 ^{ab}
	90:10		3.65 ± 0.14 ^{ab}
	70:30		3.33 ± 0.11 ^a
	50:50		3.43 ± 0.04 ^{ab}
	0:100		3.38 ± 0.11 ^{ab}
100 mesh	100:0		3.80 ± 0.00 ^b
	90:10		3.55 ± 0.00 ^{ab}
	70:30		3.63 ± 0.04 ^{ab}
	50:50		3.50 ± 0.14 ^{ab}
	0:100		3.55 ± 0.14 ^{ab}

Note: The same letters indicate Multiple Comparison (Post Hoc Test) results that are not significantly different

The saltiness scoring scale shows values in the range 3.60–3.90. This indicates that flavor enhancer formulation was salty. Kruskal-Wallis analysis results show that the salt particle size and the proportion of Nagara bean tempeh flour to mushroom flour had no significant effect ($p < 0.05$) on the saltiness of the flavor enhancer formulation. According to [23], the salty taste sensation is caused by table salt or sodium chloride (NaCl). Sodium ions enter through ion channels in the apical microvilli, or through channels on the side of the taste cell, which will awaken the taste cell. Finer salt sizes can also increase the salty taste.

The results of the analysis of the umami taste scoring scale show values in the range 3.25–3.80. This indicates that the umami taste produced by the flavor enhancer formulation was quite strong. The Kruskal-Wallis analysis results show that the particle size of salt and the proportion of Nagara bean tempeh flour to mushroom flour had significant effects on the umami taste of the seasoning powder formulation. The umami taste characteristics of the seasoning formulation can be seen in Table 5.

The Multiple Comparison (Pos Hoc Test) test results show that the highest umami score was at 100 mesh salt size and the composite of Nagara bean flour and white oyster mushroom of 100:0. The term *umami* comes from the Japanese language, meaning meaty or savory [24]. Protein is hydrolyzed during the fermentation process that liberates glutamate into free glutamate and gives an umami taste [25]–[27]. In addition, umami taste also interacts very strongly when mixed with sweet and salty taste [28].

The panelists assessed the savory taste at the level of 3.25–3.60, which means that the seasoning powder product was slightly likable in terms of the umami taste resulted. Smaller sodium chloride particles can promote higher levels of saltiness because they dissolve more quickly in the mouth. [29] evaluated the effect of different sizes and varieties of sodium crystals in potato chips on the perception of trained panelists, and the results showed that smaller crystals caused a faster, but less intense, perception of salty taste compared to larger crystals. Meanwhile, in this study, reducing the size of salt to 100 mesh had not been able to significantly increase the perception of saltiness. However, in combination with the composite of Nagara bean tempeh powder, it provided good strengthening of the umami taste.

4. Conclusion

Reducing the salt particle size down to 100 mesh had not given any significant effect yet on the strengthening of the perception of saltiness and umami taste. The highest soluble protein was found in the proportion of Nagara bean tempeh flour and oyster mushroom of 70:30, but insignificant difference was demonstrated by the proportion of 100:0. Meanwhile, the formulation of Nagara bean tempeh flour and white oyster mushroom at 100:0 could give a strong perception of umami taste to the seasoning powder.

Acknowledgments

The authors would like to thank Lambung Mangkurat University for the financial support for this research. This research was conducted under the Lecturer Compulsory Research Program in 2021.

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