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It is our great pleasure to invite you to the 2nd and 3rd International Conference of Food Security Innovation (ICFSI). The 2nd ICFSI was carried out on 23rd October 2018 at Aston Anyer Beach Hotel Serang, Banten Indonesia with the theme “Emerging a Sustainable Agriculture, Maritime and Local Resources Empowerment for Global Food Innovation” and The 3rd ICFSI on 9th September 2019 in Ledian Hotel Serang Banten Indonesia with the theme “Rethinking Sustainable Development Goals Climate Change, Agriculture, Maritime, Plantation and Local Resources Empowerment for Global Food Innovation”. This seminar is organized by Indonesia Center of Excellence for Food Security (Local Food Innovation) Universitas Sultan Ageng Tirtayasa and supported by Universitas Mulawarman, Universitas Jember, and Universitas Negeri Malang. The aim of the conference is to gather scientists, educational experts, and practitioners, students, and civil society organizations representatives in the scientific forum, and to share and to discuss theoretical and practical knowledge about innovation in Food Security in Applied Engineering, Maritime, and agriculture economics.

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# The Application of Probiotic to Increase Growth, Body Composition, and Feed Efficiency on Catfish (*Clarias* sp.)

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**Abstract**—For 45 days, research was conducted to evaluate the administration of probiotic *Bacillus* NP5 to increase growth, body composition, and feed efficiency on catfish (*Clarias* sp.). This research was carried out with 3 different treatment of *Bacillus* NP5 probiotic doses (0, 0.5 and 1% probiotic) and 3 replications. The result showed that the value of the daily growth rate significantly showed the highest value ( $P < 0.05$ ) in 1% probiotic (11.32%), followed by 0.5% probiotic (9.20%) and control (8.20%). The value of protein and lipid composition was significantly in 1% probiotic (14.24%, 5.49%, respectively) than the other treatment. The administration of probiotic *Bacillus* NP5 not affect to water quality of catfish.

**Keywords:** Body composition, feed efficiency, growth, probiotic

## I. INTRODUCTION

Catfish is a popular freshwater fish commodity in Indonesia. The ministry of marine and fisheries of Indonesia [1] reported that catfish was the second largest commodity with 19.604.260 tons' production in 2017. However, the low of feed efficiency is one of the problems in the intensive cultivation of catfish system. In addition, feed is one of the biggest cost component in aquaculture, which is about 40-60% of total production costs [2]. [3] noted that only 20-30% of feed are assimilated in fish biomass, and the remaining for about 70-80% of the feed will be accumulated in the water body as uneaten feed and excretion products (ammonia). Ammonia is toxic to fish and at high levels can cause death [4].

One effort that can be applied to improve feed efficiency is the application of probiotic in fish feed. According to [5], probiotic is live micro-organisms which have positives effect on

their host by improving feed efficiency or increasing feed digestive enzyme [6], by ensuring increase response immune [7], by improving water quality [8]. The administration of *Bacillus* NP5 as probiotic has been reported could enhance growth performance of tilapia [9,10] and Dumbo catfish [11]. The supplementation of *Bacillus* NP5 also reported improve response immune of white shrimp [12] and catfish [13]. [14] noted that *Bacillus* NP5 is probiotic bacteria from digestive of tilapia. There are 7 steps of selection to obtain *Bacillus* NP5, namely: amyolytic test, bacterial growth test, resistant on acid and alkali test, activity of antagonistic, adhesion test, pathogenic test, and feeding trial test. The purpose of this study is to evaluate the administration of probiotic *Bacillus* NP 5 to increase growth, body composition, and feed efficiency on catfish (*Clarias* sp.).

## II. MATERIALS AND METHODS

### A. Preparation of Probiotic and Feed

At temperature of 29°C for 18 hours (exponential phase of *Bacillus* NP5), *Bacillus* NP5 were cultured on agar medium (trypticase soy broth). Then, culture of *Bacillus* NP5 was centrifuged at speed of 1000 rpm for 10 minutes to harvest probiotic bacteria. The commercial feed (protein of 33.95%, lipid of 7.73%, ash of 9.9%, fibre of 4.16%, nitrogen-free extract of 44.25% and moisture of 6.49%) was used in the present study. Probiotics (mixed with 2% yolk egg according to [9]) were added at different doses into the feed, i.e. 0% probiotic (control), 0.5% probiotic, and 1% probiotic (g/100g) and 3 replications.



B. Experimental Design

This research was conducted at Laboratory of Aquaculture, University of Sultan Ageng Tirtayasa for 45 days. The initial weight of juvenile of catfish is 9.02±0.29 g. Catfish obtained from Ary Farm, Serang, Indonesia. Catfish was reared in 12 tanks with volume of 60 L (20 fish/tank) and they were acclimatized for 7 days. Feed were given to catfish three times (08.00, 12.00, and 16.00) with satiations. The maintain water quality was conducted every 3 days by water replacement of tank (50% of total volume).

C. Measurement of Growth, Body Composition and Water Quality.

Dissolved oxygen and pH were measured weakly, while water temperature was measured every day. At the end trial, catfish were weighed and 5 fish from each tank were used for proximate analyses. Fish were analyzed (protein, lipid, moisture, nitrogen-free extract, ash, fibre and moisture) referring to [15]. Feed intake, specific growth rate, feed efficiency and survival rate were measured in accordance [16], by equations:

$$FI (\%) = \frac{F_t - F_o}{F_o} \times 100 \quad (1)$$

Where FI is feed intake, Fo is total feed at the beginning, and Ft is total feed at the end.

$$DGR (\% \text{ day}^{-1}) = 100 \times \left( \frac{W_t - W_o}{t} \right) \quad (2)$$

Where DGR is daily growth rate, Wt is final body weight, Wo is initial body weight, and t is days.

$$FE (\%) = 100 \times \left( \frac{W}{F} \right) \quad (3)$$

Where FE, W, F were feed efficiency, weight gain and feed consumption, respectively.

$$SR (\%) = 100 \times \left( \frac{N_t}{N_o} \right) \quad (4)$$

Where SR is survival rate, Nt is total individual at the end and No is total individual at the initial.

D. Statistical Analyses

The value of feed intake, specific growth rate, feed efficiency, survival rate, and body composition were analyzed using the Statistical Package for the Social Sciences (SPSS) program for Windows (v. 16.0). The significant data were compared by Duncan of multiple comparisons. All data of water quality were analyzed descriptively.

III. RESULT AND DISCUSSION

A. Growth and Survival Rate

Growth parameter and survival rate in this study was presented in Table 1. No significant effect (P>0.05) was obtained in feed intake for all treatments (control: 479.10±48.3 g, 0.5% probiotic: 472.24±42.3 g, and 1% probiotic: 544.78±21.3 g). Feed intake shows the amount of feed consumed by fish [17]. Its value related to feed palatability [18]. [19] noted that nutrient and toxin content in the feed are factor affecting feed palatability. In the present study, feed intake was found no different among all treatments. This result showed that the addition *Bacillus* NP 5 in the feed not influenced on feed palatability. The similar result has been reported by [20], the administration of *Lactococcus lactis* and *Enterococcus faecium* not effect on feed intake of grouper *Epinephelus coioides*.

TABEL I. GROWTH PARAMETERS AND SURVIVAL RATE OF CATFISH WITH DIFFERENT PROBIOTIC DOSES IN THE FEED.

Treatments	Control	0.5% probiotic	1% probiotic
<i>Parameters*</i>			
Feed intake (g)	479.10±48.3	472.24±42.3	544.78±21.3
Daily growth rate (% day <sup>-1</sup> )	8.20±0.55 <sup>a</sup>	9.20±1.61 <sup>a</sup>	11.32±0.8 <sup>b</sup>
Feed Efficiency (%)	77.20±3.23 <sup>a</sup>	87.35±8.78 <sup>ab</sup>	93.44±4.27 <sup>b</sup>
Survival Rate (%)	96.67±5.77	96.67±2.89	100±0.00

\* The value in the same row with different superscript are significantly different (p<0.05).

Daily growth rate was significant highest (P<0.05) in 1% probiotic (11.32±0.8 % day<sup>-1</sup>), but no significant differences between control (8.20±0.55 % day<sup>-1</sup>) and 0.5% probiotic (9.20±1.61 % day<sup>-1</sup>). Furthermore, the value of feed efficiency was significantly increased in 1% probiotic (93.44±4.27%) compared control (77.20±3.23%) and there are no significant between control and 0.5% probiotic (87.35±8.78%). This result is supported by [21], dietary probiotic *Lactobacillus acidophilus* of African catfish feed was increased growth and feed conversion ratio than control. [22] noted that application of Bacilli (*Bacillus subtilis* and *Bacillus licheniformis*) can improve growth performance and feed efficiency of white shrimp (*Litopenaeus vannamei*) postlarvae. Effect probiotic also has reported can increase several commodities of aquaculture, namely on tilapia with probiotic cocktail [23], on freshwater prawn *Macrobrachium rosenbergii* with *Lactobacillus sporogenes*, *Bacillus subtilis* and yeast as probiotic [24], on rohu, *Labeo rohita* with probiotic *Geotrichum candidum* [25].

Probiotic can produce digestive enzyme in host digestive tract [6, 26, 27]. [11] has been reported that supplementation of *Bacillus* NP5 as probiotic could increase protease, lipase and amylase activity in digestive tract of Dumbo catfish. At the present study, the high value of daily growth rate in 1% probiotic might due to probiotic can increase the population of bacteria in digestive tract. This will increase of feed absorption so that catfish in 1% probiotic treatment increased. The study of [9] was found that the addition of probiotic can improve the population

of microbiota and digestive enzyme in digestive tract of tilapia. In the present study, we obtained no significant different between control and 0.5 % probiotic. That is probably due to the low dose of 0.5% probiotic treatment, so that administration probiotic cannot increase daily growth rate of catfish in this treatment. The similar result has investigated by [28] on white shrimp with application *Bacillus* into feed. He noted that the low doses of *Bacillus* not influence on growth of white shrimp.

In our study, we found that there was no significant different ( $P>0.05$ ) in survival rate. The value of survival rate in control of  $96.67\pm5.77\%$ , 0.5 probiotic of  $96.67\pm2.89\%$  and 1% probiotic of  $100\pm0.00\%$ . this result indicates that administration *Bacillus* NP5 as probiotic did not effect on fish health of catfish. Similar effect has been reported by [28], supplementation of *Bacillus* in the feed showed not significant different on survival rate of white shrimp *Litopenaeus vannamei*. [29] also reported that administration of the mixed probiotics (*Bacillus subtilis*, *B. licheniformis* and *Enterococcus faecium*) was found not influence on survival rate of rainbow trout (*Oncorhynchus mykiss* Wabbaum).

**B. Body Composition**

The beneficial effects of *Bacillus* genus as probiotic on aquaculture have been observed, such as *Bacillus* spp. [26, 30, 31], *Bacillus subtilis* [22, 32, 33], *Bacillus* NP5 [10,12,13], *Bacillus* sp. [34], *Bacillus licheniformis* [22], *Bacillus cereus* [35], *Bacillus mycoides* [36], *Bacillus coagulans* [37]. Effects of administration of probiotic *Bacillus* NP5 was showed Table 2.

TABLE II. BODY COMPOSITION OF CATFISH WITH DIFFERENT PROBIOTIC DOSES IN THE FEED.

Treatments*	Control	0.5% probiotic	1% probiotic
<b>Parameters</b>			
Crude protein (%)	10.34±0.06 <sup>a</sup>	10.08±0.04 <sup>a</sup>	14.24±0.34 <sup>b</sup>
Crude lipid (%)	5.02±0.04 <sup>a</sup>	5.08±0.11 <sup>a</sup>	5.49±0.13 <sup>b</sup>
Fibre (%)	0.32±0.03	0.29±0.01	0.32±0.01
Nitrogen-free extract (%)	0.40±0.11	0.82±0.20	0.52±0.16
Ash (%)	2.98±0.68	2.57±0.14	3.87±0.04
Moisture (%)	80.94±0.57 <sup>b</sup>	81.16±0.03 <sup>b</sup>	76.56±0.42 <sup>a</sup>

\* The value in the same row with different superscript are significantly different ( $p<0.05$ ).

The result showed that protein composition was significantly increased in 1% probiotic ( $14.24\pm0.34\%$ ). In the present study was observed no different ( $P>0.050$ ) between control and 0.5% probiotic ( $10.34\pm0.06\%$ ,  $10.08\pm0.04\%$ ) in protein composition. The same result was found in lipid composition, the highest value of lipid composition was observed in 1% probiotic ( $5.49\pm0.13\%$ ) and no different ( $P>0.05$ ) between control ( $5.02\pm0.04\%$ ) and 0.5% probiotic ( $5.08\pm0.11\%$ ). In the present study no significant difference ( $P>0.05$ ) was showed in the data of fibre, nitrogen-free extract and ash. Body composition at the present study in agreement with the result of [22], who noted that the addition of *Bacilli* (*Bacillus subtilis* and *Bacillus licheniformis*) in the feed had

higher on crude protein and crude lipid than control of whiteleg shrimp (*Litopenaeus vannamei*) postlarvae. [37] also reported that supplementation of probiotic can improve body composition of white shrimp. Body compositions are related to growth performance of fish. Therefore, the highest value of crude protein and crude lipid on 1% probiotic treatment might due to the value of daily growth rate on this treatment.

**C. Water Quality**

The role of probiotic on water quality in aquaculture has been reported by researchers, such as on Nile tilapia [38], larvae shrimp (*Penaeus vannamei*) [39], blue swimming crab, *Portunus pelagicus* (Linnaeus, 1758) [40], and white shrimp (*Litopenaeus vannamei*) [41]. The range water quality in this study presented Table 3.

TABLE III. WATER QUALITY OF CATFISH WITH DIFFERENT PROBIOTIC DOSES IN THE FEED.

Treatments	Control	0.5% probiotic	1% probiotic
<b>Parameters</b>			
Temperature (°C)	27.13-28.63	27.17-28.80	27.13-28.63
Dissolved oxygen (mg/L)	5.30-7.10	5.67-7.23	5.70-7.13
pH	5.70-7.97	5.80-7.93	5.77-7.94

Temperature is important factor which can influence in fish metabolism and fish physiological [42]. The result show that the range temperature of control of 27.13-28.63°C, 0.5% probiotic of 27.17-28.80°C and 1% probiotic of 27.13-28.63 °C. This is indicated that temperature in this study is in accordance with the catfish culture. According to [43], the best temperature of catfish rearing is 27-30 °C. Oxygen is the limiting factor for water organism. The result show that the value of dissolved oxygen is 5.30-7.10 mg/l in control, 5.67-7.23 mg/L in 0.5% probiotic, and 5.70-7.13 mg/L in 1% probiotic. This value within the range suitable for catfish farming. The range of dissolved oxygen for catfish culture is  $>3$  mg/L [43]. The role of pH on the fish culture is a measure the acidity of water. The range of pH for catfish culture is 6,50 - 8,50 [42]. In this study, the range of pH is 5.70-7.97 which indicates the value within the range of suitable for catfish culture.

**IV. CONCLUSION**

The administration of *Bacillus* NP5 as probiotic show the best result on daily growth rate, feed efficiency, and protein and lipid composition of catfish. the value of daily growth rate was significantly highest ( $P<0.05$ ) in 1% probiotic (11.32%), followed by 0.5% probiotic (9.20%) and control (8.20%). The value of protein and lipid composition was significantly in 1% probiotic (14.24%, 5.49%, respectively) than the other treatment.

**ACKNOWLEDGMENTS**

This research was supported by funds from Islamic development bank with scheme of Research Grand IsDB-

Untirta (Program Penelitian Dasar Unggulan Perguruan Tinggi).  
Contract number: B/60/UN43.9/PT.01.03/2019.

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## Policy Analysis and Development Strategy of Cocoa Agribusiness in Lebak District, Banten

Andjar Astuti, Ratna Mega sari

More than 70 percent of cocoa plantation in Banten Province is smallholder farming. Most of them are located in Lebak district. The aims of this study is to analyze and formulate the best development strategy of cocoa agribusiness in Lebak District, Banten Province. Data used is primary and secondary...

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## Proximate Analysis of Some Local Food in Baduy Ethnic

FitriaRiany Eris, Aris Munandar, AM Kartina, Dian Anggraeni, Meutia, Taufik Hidayat, Dodi Hermawan

Baduy tribe is a tribe spreaded around Banten Province. The most dominant ethnics group has its own various food diversity in producing and creating food security in each small town. This study aims to determine the proximate analysis of Baduy local food. There are various kinds of local food processed...

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## Biplot and Correlation Analysis of 189 Superior F2 Genotypes Chili-Unpad in Indonesia

Ratna Fitry, N Rostini, Hersanti, Anas

This study aimed to examine genotype variations based on biplot analysis and correlation among the superior characters F2 genotype of Chili Unpad in Sumedang. The genetic material evaluated in this study was 187 F2 genotypes of Chili Unpad which were the result of crossing of local genotypes from crosses...

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## Analysis and Evaluation of the Political Implementation of Land Against Sustainable Food Security in Indonesia (Islamic Economic Approach)

Hady Sutjipto, Tubagus Ismail

This study aims to analyze and critically evaluate the land policy for food

security in Indonesia. This study explains descriptively about the implementation of the management of the policy now practiced in Indonesia. The method used in descriptive and quantitative approaches describes critically evaluating...

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### The Role of Rice, Corn, and Soybean Farmers Households in Banten Province: Gender Perspective

Asih Mulyaningsih, Aida Vitayala S Hubeis, Dwi Sadono Djoko Susanto

Indonesia is an agricultural country, so the people mostly work as farming. Development of farmers in rural areas does not recognize gender status, all of them in the household also work to fulfill their daily needs. This research uses quantitative methods which are strengthened by qualitative data. The...

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#### Proceedings Article

### Consumer Perceptions of Sate Bandeng Attributes

Meutia, Tubagus Ismail, Ahmad Bukhori

One of the potential processed fishes that characterizes Banten souvenirs is sate bandeng. The purpose of this study was to analyze consumer perceptions of various attributes of sate bandeng as a typical gift from Banten Province. The number of respondents taken were 150 people by organoleptic tests...

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## Factors Influencing Risk of Shallot by Using Arch Garch and Var

Ratna Mega sari, Yeni Budiawati

Some of the horticultural commodities that have been assigned to be excellent commodities in the period 2015-2019 are various chili, shallot, and orange. Shallot are strategic commodities in Indonesia as well as commodities with high price fluctuations compared to other horticultural commodities. The...

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## Game Media Design for Students' Banten Local Food Knowledge

Hepsi Nindiasari, Nurhaidah Gailea, Novaliyosi, Pipit Marianingsih, Ayrin

Banten Province has many local food, such as corn, Aren, and milkfish. The benefits of these local food is still largely unknown by school students in Banten Province. The developed of game interactive with local food content can be an interesting way as teaching learning media. The research aimed to...

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## The Effect of Additional Sludge Resulted From Laundry Wastewater in Flocculation – Coagulation Which Used as Mixture of Planting Media in the Growth of Chili Plants (*Capsicum annum L*)

Yeyen Maryani, Daniel Baginda, Ila Nurfadilah

Laundry services have become a necessity and spread in every city in



Indonesia. The number of laundry businesses produces waste containing surfactant (Linear Alkylbenzene Sulfonate/LAS) as an active detergent and phosphate compound (Sodium Tri Poly Phosphate/STPP) to improve washing power efficiency....

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Study of Food Security Based on Expenditure Household Farmers Tea on the Community Plantation at Citengah Village, Sumedang Selatan District

Yuliana Samantha, Ning Sri Menganti, Lilis Rosdiana Amaliah

Food insecurity and famine often happened to small-scale farmers, fisherman and woodsmen. In this regard farmers in plantation community sector could not adapt to use subsistence living to fulfill their basic needs unlike food crops farmers. Research used quantitative design with descriptive survey....

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Perception of Palm Sugar SMEs on E-Commerce in Business Development Effort

Agus David Ramdansyah, Nurul Umami, Mira Maulani Utami

By using descriptive analysis, the purpose of this study is to describe perception of palm sugar SMEs to ability of e-commerce as a media that can help develop their business. Result of this study shows that although use of e-commerce is still low, palm sugar SMEs have perceived benefit of it and can...

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## Community Empowerment and Social Media Models as Marketing Communication Innovations for Local Culinary Products in Serang, Indonesia

Nurprapti Wahyu Widyastuti, Abdelrahman Ali, Rahmi Winangsih, Hidayatullah Haila

Indonesia is predicted to experience demographic bonuses during the period 2025-2030. Consequently, the Indonesian government is required to provide employment opportunities, food sufficiency, and other basic needs. At the same time, Indonesia has been facing the challenges and problems resulted from...

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## How Impact Exchange Rate to Processed Food Industry in Indonesia

Indra Suhendra, Navik Istikomah

This Paper employs a series method to measure exchange rate to the price of food industries. We use Purchasing Power Parity as our theoretical basis to demonstrate exchange rate fluctuation. The regression model, derived from the theoretical model, gives the statistically robust result to show that years...

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## Mathematical Modelling in Agricultural Systems in Indones Case Study of Modelling in Predicting Production and Consumption Corn to Reach Corn Self-Sufficiency

Romli Ardie, Mukhtar, Cecep Anwar Hadi Firdos Santosa, Sholih, Nana Hendracipta

The study forecasting has been undertaken to fit different trend equations like time series models for corn and also made the future forecasts. The study was carried out in Indonesia using time series data from 1986 to 2017. Forecasting time series is a need in the agriculture sector or other fields....

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## Potential Contribution of Dark-Septate Endophytic Fungus Isolated From Pulau Dua Nature Reserve, Banten on Growth Promotion of Chinese Cabbage

Rida Oktorida Khastini, Roihatul Jannah

Root endophytic fungi are found in natural ecosystems, but little is known about their impact on plant growth. This study reports the impact of the three isolates of dark septate endophytic fungi isolated from Pulau Dua Sanctuary, Banten on its potential activity in Chinese cabbage growth. In vitro assay...

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## Zeolite and Active Carbon Addition on Closed System Transportation for Milkfish Juvenile (*Chanos chanos*) Survival

## Rate

Mustahal, Forcep Rio Indaryanto, Deri Hermawan, Mas Bayu Syamsunarno

The purpose of this study was to determine the effectiveness of the optimum ratio of zeolite and activated carbon to preserve the survival rate of milkfish juvenile in closed system transportation. This research was conduct from May to July 2018 at the Laboratory of Aquaculture, University of Sultan...

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### Proceedings Article

## The Evaluation of Has-23000 Implementation in Sate Bandeng Industry Certified of Halal

Mirajiani, Wahyu Susihono

The requirement for HAS-23000 is an obligation for all companies that have obtained halal product certification by LPPOM MUI. The purpose of this application is to ensure that work procedures are maintained as part of completing the criteria and procedures for handling halal products. Milkfish satay...

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## The Effect of Cellulose Nanocrystalline Blending to the Mechanical Properties of Composite Edible Film (PLA/CNC)

Rahmayetty, Endarto Y. Wardhono, Alfirano, Nufus Kanani

Edible film is a thin and transparent plastic made from edible materials and protects material from damage due to the environment and microorganisms disaster. Polylactic acid (PLA) is one of polymer which potentially used as raw

material of edible films. PLA is a very fragile nature material, so it necessar

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## Utilization of Local Food Sources From the Dayak Ethnicity of West Kutai as Monggomas Analog Rice to Support of Food Security

Bernatal Saragih, Indah Sari Purba, Anton Rahmadi

Research objectives to determine of the effect addition of super red dragon fruit skin extract to Monggomas analog rice (Mocaf, banana weevil and Mayas) on nutritional value and functional properties. This research made use of Completely Randomized Design with 3 repetitions. The effect of addition of...

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## Mapping of Processed Food Product Innovation on Small and Medium Enterprises in Banten

Fauji Sanusi, Gerry Ganika Koswara

The purpose of this study is to create a mapping of small and medium enterprises (SMEs) based on their internal innovation and external conditions. The model used for mapping is Quantified-SWOT analysis by adopting the concept of Multiple-Attribute Decision Making (MADM) to simplify complex problems...

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## Design of Temperature and Humidity Monitoring System for Drying and Storage of *Allium Ascalonicum L.* (Onion)

Irma Saraswati, Abdul Rahman, Heri haryanto, Alimuddin, Untung Mardono

These instructions give you the Onion is a basic necessity of the community and the food industry, but sometimes it is constrained / crisis due to unbalanced inventory, market needs and causes fluctuating prices. The manufacture of a drying and storage device with temperature and humidity monitoring...

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## Developing Teaching Materials of Indonesian Food Subtopic Tengger Ethnic Cuisine by Using Online Platform Model as Implementation of Blended Learning and Potential to Support Tourism Promotion of Bromo Tengger Semeru National Park

Budi Wibowotomo, Soenar Soekopitojo, Titi Mutiara, Nunung Nurjanah

Tengger ethnic cuisine is not yet widely known. To understand the concept of local knowledge and it's related in local food cultures, it needs to be taught formally in school's culinary roles and functions in shaping the culture of ethnic Tengger. It also enables to support ecotourism promotion in the...

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## Division of Regions in Indonesia That Can Achieve Food Security for Corn

## Romli Ardie, Mukhtar, Cecep Anwar Hadi Firdos Santosa, Sholih, Nana Hendracipta

Clustering is a common technique for statistical data analysis, which is used in many fields, including machine learning, agriculture, and economics. Clustering method will be focused on clustering every province in Indonesia that is able to achieve food security of corn. In most developing countries,...

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## Mineral Contents of Several Indonesian Rice Varieties

Susiyanti Susiyanti, Nurmayulis Nurmayulis, Sulastris Isminingsih, Rahmayety Rahmayety, Yeyen Maryani, Suseno Amin

Rice is an important food commodity in the world, even the majority of Indonesia's population consumes rice as a staple food. The chemical composition of rice consumed is very complex. Rice contains organic ingredients and minerals. At present, the mineral as a nutrient has not been widely recognized...

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### Proceedings Article

## The Role of Leading Commodities in Agricultural Sector on Security Food and Poverty at Food Barn in Banten Province

Samsul Arifin, Sayifullah

The purpose of this study are, first, to prove the interconnectedness of Banten and National economies. Second, to prove the relationship between poverty and food security. This study used pool data of 4 districts in Banten Province by

using dynamic simultaneous equation model to analyze 2 blocks of econometric...

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## Prospective Strategy for Strengthening the Fish Processing Innovation System in Banten Province

Shanti Kirana Anggraeni, M. Syamsul Maarif, Sukardi, Sapta Raharja

The fish processing industry in Banten Province has good potential but still has many weaknesses. In an effort to strengthen the innovation system of small and medium fish processing businesses in Banten Province, a variety of prospective strategy scenarios are needed that can describe the various possibilities...

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## Determining the Efficient Weighing Area for Food Commodities in Port by Discrete Event Simulation

Asep Ridwan, Ade Irman Saeful, Rino Emil Agusta

DF Inc. is a company provided in port services. One of its activities is the loading and unloading of food commodities such as soybeans, corn, wheat, and so on. There are around 500 trucks that want to carry out the loading and unloading process at DF Inc. so that there is a queuing of trucks in the...

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## Monitoring System of Humidity Environmental on Chilli Reu Green House Aeroponic System

Alimuddin, Dwi Rahmat Aryanto, Dewa Made Subrata, Rida Oktorida Khastini, Nurmayulis, Ria Arafiyah, Irma Saraswati

The research aims at monitoring the humidity of chilli plants on aeroponic growing media in greenhouses. The aeroponic system is used because of limited land for planting chili, while the Greenhouse is designed to manipulate the climate needed for chili plants to be able to grow optimally to produce...

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## Halal Thayyib & Kosher Food in Legal Conceptual Framework Based on Social Study in Indonesia and America

Ikomatussuniah, Mohammad Reevany bin Bustami

In Islamic teachings, the terms Halal-Thayyib are often used together in unison. Thayyib brings in the ontology of goodness into the discourse of religious permissibility (Halal). Nevertheless, Thayyib is often being removed from the legal and social dynamics of Halal contextualization. This article...

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## Land Suitability Evaluation for Patchouli Plant Cultivation (*Pogostemon cablin* Benth) in Dry Land Pontang District, Serang Regency, Banten Province

Sri Ritawati, Putra Utama, Eltis, Pancaningsih, Ismawati

Patchouli was one of the industrial plants that has the potential to be developed as a regional superior commodity. The purpose of this study was to analyze the

suitability of dry land in Pontang District, Serang Regency, Banten Province for the cultivation of patchouli plants. The research methods were...

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Carbohydrate of the Brown Seaweed, *Saccharina latissima*: A Review

Saifullah, Yngvar Olsen, Dini Surilayani, Aleksander Handå

*Saccharina latissima* is one of the potential seaweed sources because of its high carbohydrate content. The interest of farming of macroalgae has increased in European countries. Abundant research results have provided data for the biochemical composition of *S. latissima*. This paper collects and summarize...

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Study of Soil Fertility Status in Some Use of Rubber Plant Land in Pandeglang and Lebak Regencies, Banten Province

Andi Apriany Fatmawati, Nuniek Hermita, Aris Munandar, Mas Bayu Syamsunarno, Dodi Hermawan, Lukman Anugrah Agung, Achmad Noerkhaerin Putra

This research aims to determine soil fertility in some rubber plantations area. This research is expected to be used as basic information in increasing the

production of rubber plants. This research was conducted in Banjar Village Pandeglang Regency and Wanasalam Village, Lebak Regency, Banten Province....

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Infaq and Shodaqoh as Self-Financing Sources for Indonesian Halal Products Assurance in Food Security: A Literature Study

Ikomatussuniah, Mohammad Reevany bin Bustami

Food is a basic necessity that is private and has the protection of the state regarding its availability, security, and distribution so that consumers get good food access. Indonesia's protection regulated in civil laws, namely the Act of consumer protection and halal product assurance. Muslim consumer...

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### Proceedings Article

Hazard Analysis of Sate Bandeng as Indigenous Food From Banten

Dian Anggraeni, Zulfatun Najah, Winda Nurtiana, Nia Ariani Putri

Sate bandeng is indigenous food from Banten Province and produced by SMEs (small and medium enterprises). The market of sate bandeng is not yet wide because it has short shelf life about two days only. The short shelf life of sate bandeng because it is made from coconut milk and their standard processing...

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### Gender Justice and Equality in Rice Farming Friendly Environment in Realizing Family Food Security

Asih Mulyaningsih, Suherna, Gugun Gunawan

The purpose of this study was to analyze justice and gender equality in environmentally friendly lowland rice farming in realizing family food security in Banten Province. The research method is a survey with research design is descriptive that takes samples in one population using questionnaires as...

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### Small Pelagis Fisheries Productivity in Coast of the Sunda Strait of Banten Province

Ririn Irnawati, Hery Sutrawan Nurdin, Adi Susanto, Fahresa Nugraheni Supadminingsih, Dini Surilayani, Asep Hamzah

Banten Province has a very strategic position because it has unique water characteristics because the borders are direct with the Indian Ocean and the Java Sea, and the mixing of water masses in the Sunda Strait. These conditions make the waters as a center of fishing activity, especially pelagic fish....

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## Proceedings Article

### The Diversification Use of Melinjo (*Gnetum gnemon*) in Banten

## Local Food

Evi Amelia, Indria Wahyuni, Pipit Marianingsih

Melinjo (*Gnetum gnemon*) is a very potent plant because many of its parts, like leaves, flowers, and seeds, can be useful for culinary purposes. This study aims to explore and inventory the use of melinjo (*Gnetum gnemon*) in Banten Province, specifically the use in Banten local food. The research was carried...

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## Characterization of Flower and Fruit of Sugar Palm in Pandegelang and Serang Districts, Banten Province

Nurmayulis Nurmayulis, Susiyanti Susiyanti, Meilani Yusi, Ismingsih Sulastri

Sugar palm (*Arenga pinnata* Merr.) has a high economic value and have the potential to export and can be processed into various food and non-food products. Sugar palm is a versatile tree because all parts of the tree can be used, such as a trunk, palm sap, leaves, etc. Characterization of local sugar...

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## State Exclusivity of Fisheries Resources on Exclusive Economic Zone in Efforts to Support the Fisheries Availability as a Means of Increasing Food Security for the State

Belardo Prasetya Mega Jaya, Afandi Sitamala, Danial

Based on United Nations Convention on the Law of the Sea 1982 (UNCLOS 1982), Indonesia has sovereignty in the Indonesian waters and has exclusive rights in natural resources utilization in the Exclusive Economic Zone (EEZ). By having

## sovereignty in the Indonesian waters and exclusive rights in the EEZ,...

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## Defining Indonesian and African Small-Holder Farmers' Climate Change Adaptive Capacity and Practices: A Brief Argument

Kurniawati, Nia Kania, Luvhengo, Usapfa

The aim of this paper is to review literature on smallholder farmer's adaptive capacity and practices in the African continent and Indonesia. Climate change has been the centre of attention across all sectors worldwide. African and Indonesian agriculture is dominated by majority of smallholder farmers...

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## Examining the Arrangement of Community Food Barns in Term of Realizing Food Security in Banten Province According to Law Development Theory Perspective

Rena Yulia, Aliyth Prakarsa, Aan Asphianto

In realizing food sovereignty, food independence, and food security, the government establishes national food reserves consisting of government food reserves, regional government food reserves and community food reserves. The development of national food reserves is intended to anticipate shortages of...

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## Early Report on Fungal Rhizosphere of Rice Variety *Kewal B Putih* of Banten Origin

Nani Maryani, Iing Dwi Lestari, Susiyanti, Nurmayulis

Fungal rhizosphere plays a very important role for soil fertility. Its compositions effects plant growth and resistance to diseases. This study aims to explore and to identify the diversity of fungi from rice rhizosphere of Banten origins. In this report, we describe the diversity of fungi from paddy...

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## The Application of Probiotic to Increase Growth, Body Composition, and Feed Efficiency on Catfish (*Clarias* sp.)

Achmad Noerkhaerin Putra, Mustahal, Mas Bayu Syamsunarno, Dodi Hermawan, Muh. Herjayanto

For 45 days, research was conducted to evaluate the administration of probiotic Bacillus NP5 to increase growth, body composition, and feed efficiency on catfish (*Clarias* sp.). This research was carried out with 3 different treatment of Bacillus NP5 probiotic doses (0, 0.5 and 1% probiotic) and 3 replications...

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**Proceedings Article**

## Risk Preference of Palm Sugar Craftsman in Lebak Regency, Banten

Andjar Astuti, Ratna Mega Sari, Suherman, Asih Mulyaningsih, Setiawan Saryoga

The growth of palm sugar production in Lebak Regency as the center of palm sugar in Banten Province continues to show a positive trend so that it is an important source of income for many households in Lebak Regency. The purpose of this study is to analyze the risk of palm sugar craftsman business which...

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## California Papaya Fruit Maturity Classification Uses Learning Vector Quantization

Romi Wiryadinata, Andy A. Fatmawaty, Muhammad Saepudin, Alimuddin, Oktavia Widia Ningrum, Imamul Muttakin

This research aims to build a system for the classification of papaya maturity level using Learning Vector Quantization. The classification process is done by the colour feature extraction value. Forty-five images consist of 30 images for training data and 15 images for test data were used. The images...

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## The Influence of Magnetic Fields Supply and Hygromycin Concentration to the Optimization of Folate Gene Putative Transformant Selection in Rice (cv. Fatmawati)

Susiyanti, Winda Wati, Nurmayulis Nurmayulis, Sulastri Isminingsih, Sjaifuddin Sjaifuddin

The research was aimed to determine the influence of magnetic fields supply and hygromycin concentration on the optimization of folate gene putative transformant selection in rice (cv. Fatmawati). The Genetic transformation of rice used *A. tumefaciens* strain I RA4404 as a vector that contained plasmid



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## Vermicompost Biochemical Content of Different Types of Worms and Waste Feed Material

Dewi Hastuti, Sri Ritawati, Eltis Panca Ningsih, Rida Oktorida Kastini

Plant resistance can be induced with various secondary metabolites from vermicompost. Vermicompost has been known to have many advantages including containing a variety of secondary metabolites produced by earthworms. Polyphenols are a group of secondary metabolites needed by plants to form resistance...

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## Conceptual Understanding of Food Security of Higher Education Student in Banten Province

Heni Pujiastuti, Rudi Haryadi

The aim of this study is to analyze the conceptual understanding of food security of student higher education in Banten province. This research uses a descriptive method with a quantitative approach. The instrument used in this research is a test. This test was used to find out the understanding of the...

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**Proceedings Article**

## Short-Dated Products Marketing Strategies, Analytic Network Process Approach

Muhamad Taqi, Tubagus Ismai, Meutia Meutia, Sabaruddinsah Sabaruddinsah

The adverse impact if SMEs do not improve their marketing strategy is the stagnation of sales. This study discussed the proper strategy of short-dated products. This discussion related to the formulation of problems, solutions and strategies which found that the main problem of these short-dated products...

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**Proceedings Article**

## Effect of Speed Screw Press Extruder on the Grain Capacity and Sensory Properties of Monggomas Analog Rice

Bernatal Saragih, Almasih Isa, Hudaida Syahrumsah

Redesign the analog rice printing machines is one of the efforts to provide alternative printing machines. The name Monggomas was derived from the basic ingredients of analog rice made by researchers namely mocaf (mo), bonggol pisang (nggo)/banana hump, mayas (mas)/mayas rice. The purpose of this research...

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**Proceedings Article**

## Identification of Macro Elements (Sucrose, Glucose and Fructose) and Micro Elements (Metal Minerals) in the Products of Palm Sugar, Coconut Sugar and Sugar Cane

Yeyen Maryani, Agus Rochmat, Rida Oktorida Khastini, Teguh Kurniawan, Irma

Saraswati

Nowadays, there are many kinds of sweetener commonly found in foods and beverages available on the market such as sugar cane, brown sugar (coconut sugar) and palm sugar. Those types of sugar have different nutritional content. Palm sugar is widely consumed as a natural sweetener since it is quite safe...

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#### Proceedings Article

### Utilization of Milkfish in Making of Uli, Local Food of Baduy Tribe

Fitria Riany Eris, Dian Anggraeni, Aris Munandar, Meutia, AM Kartina

The processed food products of the Baduy tribe are known to be high in carbohydrate but lack of protein. One effort to fulfill the needs of protein for the Baduy tribe processed food is to consume fish through diversification of the fishery product processing; one of the efforts is by fortification....

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#### Proceedings Article

### Processing of Milkfish Bone on Al/Ti/Mg Into Hybrid Composites by Self-Propagating High Temperature Synthesis (SHS)

Agus Pramono, Akmal Faiz Fiftyandi, Fatah Sulaiman, Anistasia Milandia, Suryana

Powder metallurgy is a manufacturing process for a component that shape combine of making powder compaction. Determination final properties on hydroxyapatite (HAp)/Al<sub>2</sub>O<sub>3</sub>/SiC have an important role as a reinforced to determine the final properties on a biomaterial composite. Using of self-propagating

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### Proceedings Article

## Fertilizer Encapsulation to Support Food Security: Review

Retno Sulisty Dhamar Lestari, Jayanudin

Food security consists of four main pillars such as food availability, food access, food utilization, and food stability. Increased food production is the most important factor because it is sufficient to meet everyone's food needs. Food availability is associated with the modification and efficiency...

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### Proceedings Article

## The Effects of Zeolite-Based Slow-Release Nitrogen Fertilizer and Sulfur on the Dynamics of N,P,K, and S Soil Nutrients, Growth and Yield of Shallot (*Allium cepa* L.)

Kharisun, Mochammad Nazarudin Budiono, Muhammad Rif'an

Shallot or red onion is one of the horticultural commodities that has good economic value as it is needed for almost every cuisine. The aims of the research were to determine 1) the effect of nitrogen slow-release zeolite-based NZEO-SR fertilizer and elemental Sulfur on the dynamics of soil main nutrients...

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**Proceedings Article**

## Investigation of the Milkfish (*Chanos Chanos sp*) Freshness | , Infra-Red Spectroscopy

Yus Rama Denny, Untung Yudho Prakoso, Endi Permata, AM Kartina, Teguh Firmansyah

The milkfish (*Chanos Chanos sp*) is one of the flagship products of Banten Province, Indonesia. As the export potential product, the freshness is needed to control its quality. In this study, we investigated the freshness of the fish by combining infra-red spectroscopy. The milkfish was taken directly...

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**Proceedings Article**

## Evaluation of the Implementation of Halal Assurance System (HAS) -23000 With Ergonomics and Technometrics Approaches to the Tempe Industry in Cilegon City

W Susihono, H Haryanto, A Gunawan, I Istianah, S Mukarromah

The application of ergonomics in the halal-certified food processing industry is part of the improvement of the production process to produce comfortable and safe working conditions. This working condition can be improved when various human-related problems have been identified using 8 aspects of ergonomics....

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**Proceedings Article**

## Design and Application of Milk Fish Preserving Machine Using Liquid Smoke Method to Prevent Rotting Fish and Enhance

## Storability of the Fish

Agung Sudrajad, Iman Saefuloh, Dhimas Satria, Haryadi Surname, Risky At Pangestu, Andi Abdillah

Fish is well-known to be nutritious as it contains high quality protein, all types of essential amino acids, including lysine amino acids. Milkfish (*Chanos-chanos forsk*), known as ikan bandeng in Indonesian language, contains high rate of lysine amino acids, approximately 20% of its whole content of...

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### Proceedings Article

## Rasch Model on Serang City's Food Security Instrument Based on Milkfish's Stability and Availability

Benny Irawan, Nurul Anriani, Ahsanul Khair Asdar

This study was a development research which aimed to develop the food security instrument then described the Serang City's food security based on milkfish's stability and availability. The respondents in this study were 215 persons which selected by using cluster random sampling. The data were analyzed...

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