Preface

We were honored and delighted to welcome all participants to the 2nd International Conference on Sustainable Agriculture for Rural Development 2020 which was held virtually due to the pandemic of COVID-19. The main theme of the conference was "Strengthening Sustainable Agriculture through Development of Local Products and Innovative Technologies and Practices". This conference was organized by the Faculty of Agriculture, Jenderal Soedirman University and was a part of the event series to celebrate the 58th Anniversary of the Faculty of Agriculture, Jenderal Soedirman University.

This one-day seminar consisted of plenary and parallel sessions. In the plenary session there were three invited speakers who delivered such important materials so that all of us can deepen our knowledge about research related to sustainable agriculture. We would like to express our sincere gratitude to all invited speakers, Prof. Ting-ting Wu, Ph.D. from National Yunlin University of Science and Technology, Taiwan, Prof. Tatsuo Sato, Ph.D. from Ibaraki University, Japan, and Suprayogi, Ph.D. from Jenderal Soedirman University, Indonesia, who had accepted our invitation. We accepted 205 abstracts from researchers who presented their most recent research in the parallel session. Participants were mostly from Indonesia and also from abroad, i.e. Japan, Vietnam, Sudan, Oman, Iraq, and New Zealand.

We realize that the success of the conference depends ultimately on many people who had worked with us in planning and organizing both the technical program and supporting social arrangements. We would like to thank all committee members who had worked extremely hard for the details of important aspects of the conference programs.

Once again thank you for your participation in this conference and we do hope we can meet again in the forthcoming 3rd ICSARD. Thank you.

Susanto B. Sulistyo, Ph.D.
Chairman of the 2nd ICSARD 2020

Committee of the 2nd ICSARD 2020

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Peer review declaration

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Peer review declaration

All papers published in this volume of IOP Conference Series: Earth and Environmental Science have been peer reviewed through processes administered by the Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

- **Type of peer review:** Single-blind

- **Describe criteria used by Reviewers when accepting/declining papers. Was there the opportunity to resubmit articles after revisions?** There were 13 aspects of assessment for accepting/declining papers, i.e. Significance of research, Contribution to the field (novelty), Statement of the problem, Literature review, Appropriateness of the research/study method, Relevance and clarity of drawings, graphs and tables, Experimental/evidential support, Quality of data or findings, Discussion and conclusions, Direction for future research and recommendations, Standard of English Reference list (adequate and correctly cited), Writing style (according to IOP format). There were also opportunities to resubmit papers after revisions.

- **Conference submission management system:**
https://conference.unsoed.ac.id/index.php/icsard/ICSARD2020/login

- **Number of submissions received:** 205

- **Number of submissions sent for review:** 160

- **Number of submissions accepted:** 151

- **Acceptance Rate (Number of Submissions Accepted / Number of Submissions Received X 100):** 94%

- **Average number of reviews per paper:** 2

- **Total number of reviewers involved:** 30

- **Any additional info on review process (ie plagiarism check system):** We used TURNITIN to check the plagiarism issue during the review process

- **Contact person for queries:**
Susanto Budi Sulistyo, Ph.D.
Jenderal Soedirman University, Indonesia
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Published online: 09 February 2021

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The effect of addition of whey protein concentrate and emulsifier on characteristics of cheddar cheese analogue from corn milk

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Abstract. Corn milk has been considered as the ingredient of cheddar cheese analogue. In cheddar cheese manufacturing, whey protein and stabilizer like Tween-80 and Span-80 are required. This study objectives are to determine the best proportion of whey protein concentrate (WPC) concentration and emulsifier types to produce analogue cheddar cheese with corn milk base and its effect on the physical, chemical, and sensory characteristics of analogue cheddar cheese. The experimental design was factory randomized block design with two factors, the WPC level (20, 25, 30%) and emulsifier type (Tween-80, Span-80, and Tween-80 combination: Span-80). The physicochemical and sensory variables data were analyzed on a 5% F-test, and the significant results were further analyzed with the multiple-range test of Duncan at a level of 5%. The results showed that changes in WPC level had effects on yield value, water content, dissolved protein content, and fat content. The variation of emulsifiers affected water content and protein content. The best proportion of the analogue cheddar was WPC 30% and emulsifier Tween-80 1% with yield value 63.23%, pH 5.7, total dissolved solids 31.75%, moisture content 59.24%, protein dissolve 10.07% bk, fat content 13.65% bk, and total acid 1%.

1. Introduction

Cheese is a common dairy product that contain of complete and balanced nutrition. Cheddar cheese, cottage cheese, and mozzarella cheese are mostly consumed. Cheese typically consists of cow's milk, but the rising price of cow's milk has led to higher milk sales rates. The public's understanding of the high fat and cholesterol content of health-causing animal products opened the door to vegetable milk as an alternative for cow's milk to other raw materials. In addition, the lactose content of cow's milk can cause allergies, known as lactose intolerance in some people [1]. It opens up opportunities to produce vegetable cheeses such as analogue cheese.

Cheese analogue is usually made from various nuts such as soybeans, many other types of nuts, and cereals [2]. One of the basic ingredients that can be considered to be used in a production of cheddar cheese analogue is corn milk [3]. In the process of making cheddar cheese analogue, additional ingredients are needed to improve texture and increase yield, one of which is whey protein concentrate. Whey protein has several advantages, including: having high solubility, being able to create viscosity through water binding, forming gels, emulsification, binding fat, acting as an emulsifier, foaming and aeration, improving color, taste, and texture, and having nutritional benefits [4]. The production of

cheddar cheese analogue also requires ingredients to stabilize water and fat content, namely emulsifiers/emulsifying agents. Tween 80 and Span 80 are emulsifying agents that are often used together. In the interfacial film theory, the existence of a stable interfacial complex condensed film which is formed from the mixing of a water-soluble emulsifying agent and a fat-soluble emulsifying agent is able to form and maintain an emulsion more effectively than using a single emulsifying agent [5].

The concentration of whey protein concentrate (WPC) and emulsifiers was affected the character of the cheddar cheese analogue [6]. Thus, this research was conducted to determine the proportion of additional WPC and emulsifiers (Tween-80 and Span-80) in the production of cheddar cheese analogue which has high nutritional content and is acceptable to consumers. The purpose of this study was: 1) to find out the effect of WPC concentration on physical, chemical and sensory characteristics of cheddar cheese analogue; 2) identify the effect of variation in emulsifier concentration Tween-80 and Span-80) on the physical, chemical and sensory characteristics of manufactures cheddar cheese analogue; and 3) identify the best formula ratio of WPC and emulsifiers in the corn-based cheddar cheese analogue.

2. Experimental details

2.1. Ingredients

This study used several ingredients which include ingredients for production of cheddar cheese analogue and ingredients for chemical analysis. Ingredients for making cheddar cheese analogue consist of sweet corn obtained from Pasar Wage Purwokerto, WPC, virgin coconut oil (VCO), Tween 80, Span 80, Arabic gum, and papain. In addition, ingredients for conducting chemical analysis consist of distilled water, 0.1 N NaOH solution, PP (phenolphthalein) indicator, buffer solution pH 7.0, 1% CuSO4 solution, 2% Na K Tartrate solution, NaHCO3, Bovine Serum Albumin (BSA) solution, and petroleum benzene.

2.2. Cheese analogue production

Cheese analogue production was referred to Aini et al. [3] with modification. There were two stages in the development of cheddar cheese, production of corn milk and production of cheddar cheese analogue. Corn milk was prepared for 30 minutes by steaming sweet corn. The steamed corn was then shelled and mixed for 3 minutes with the ration of corn:water of 1:2. The mixed corn was then filtered before corn milk was obtained. The analog cheese was developed by mixing 300 ml of corn milk with WPC and 9 grams of Arabic gum in one minute until homogeneous. The mixture was pasteurized for 15 second at temperature of 70^{o}C. The pasteurized corn milk and WPC were then then cooled to 40^{o}C. The treatment followed with the addition of emulsifier and 15 gr of papain with 45 ml of VCO which were stirred until homogenous. After rested for 5 minutes, the mixture was then heated for 15 seconds at 40^{o}C, filtered, and refrigerated for 7 days. After the curing phase, the physicochemical and sensory characteristics of cheddar cheese were analysed.

2.3. Experimental design

This study used a randomized block design (RBD) method. There were 2 factors studied including the concentration of WPC consisting of 3 levels (20, 25 and 30 %), and type of emulsifier consisting of 3 types (Tween-80, Span-80, and combination of Tween-80: Span-80). Based on these two factors, there were 9 treatment combinations. The test was carried out three times, resulting in 27 experimental units.

2.4. Analysis of samples

There were two variables studied: physicochemical and sensory variables. Physicochemical variables included yield, pH value, total dissolved solids, total titratable acidity, moisture content, fat content, and dissolved protein content while sensory variables included color, aroma, taste, texture, and preferences. Data obtained from physicochemical and sensory variables were tested using ANOVA test. If the analysis results showed a significant effect, it was then continued with the Duncan Multiple Range Test

with a confidence level of 95%. The best treatment was determined by the effectiveness index method based on the physicochemical and sensory properties of cheddar cheese.

3. Results and discussion

3.1. Characteristics of the product

3.1.1. Yield. Variations in concentration of WPC had a very significant effect on the yield; but variation of the emulsifier and interaction between them did not have a significant effect. Increase in the addition of variations in concentration of WPC caused an increase in the yield of cheddar cheese analogue produced. This is corresponds to Zoidou et al. [7] that stated factor that affects the yield is the composition of milk, especially the levels of fat and protein. However, protein content is the main factor that affecting cheese yield. It indicates a linear correlation between the yield and the concentration of protein and fat, meaning that the higher protein and fat concentration, the higher the yield (Figure 1). It was indicated by the addition of 30% WPC which produced a higher yield than 25% and 20% WPC. The same result was reported by Abubakar and Usmiati [8] which found that the highest yield of low-fat white cheese was produced from the treatment of corn oil emulsion in skim milk with whey protein concentrate of 15.31±0.21%.

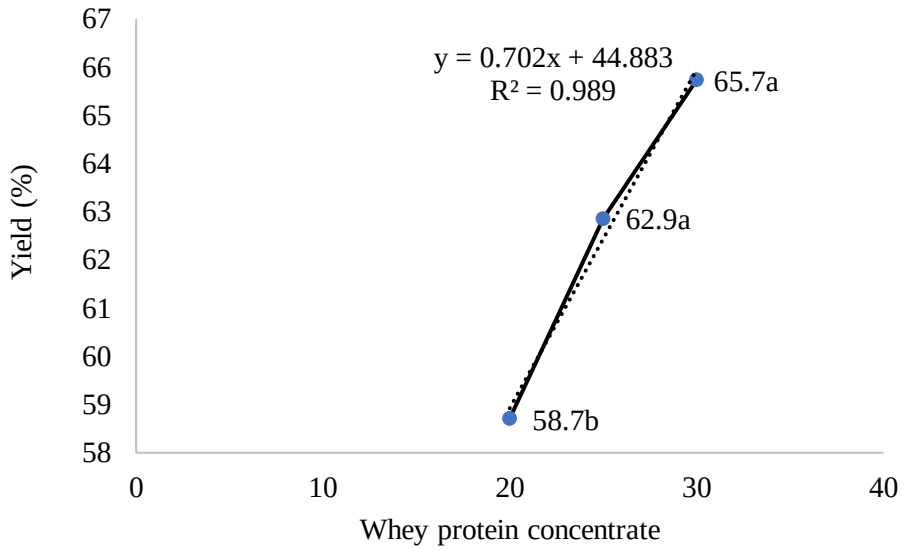

Figure 1. The yield of cheddar cheese analogue was affected by concentration of whey protein concentrate

More importantly, the yield of cheddar cheese analogue on the type of emulsifier did not have a significant effect. The yield in Tween 80 was 63.08%; the yield with Span 80 was 60.61%; and the yield in the combination of Tween 80 and Span 80 was 63.60%. According to Hou and Papadopoulos [9], combination of Tween 80 and Span 80 has high compatibility to create a stable interface layer and provide good performance in the emulsification process. However, in this study, the addition of the combination of Tween 80 and Span 80 did not have a significant effect. This would possibly occur because the added emulsifier concentration in cheddar cheese analogue did not stabilize fat and protein.

3.1.2. pH. pH value is a parameter to determine the acidity condition of cheddar cheese analogue. The concentration of WPC, type of emulsifier and interaction between them had no significant effect on pH of cheddar cheese analogue. pH cheddar cheese analogue with the addition at 20, 25 and 30 % were 5.7, 5.7, and 5.8 respectively. The same results were obtained from research conducted by Abd El-Salam [10] which concluded the pH of cheese was not affected by an addition of sunflower oil and whey protein

concentrate. The resulting average pH value was higher than pH value of cheddar cheese analogue (6.45 - 6.50).

Besides, the decrease in pH occurred due to the activity of lactic acid bacteria (LAB) in producing energy through the fermentation process by breaking down the substrate into simpler components [11]. This energy formation is intended for cellular metabolism. One of the substrates that exist is lactose which is contained in milk and WPC. Milk contains 5% sugar, while WPC contains 4-8% lactose which can be used by lactic acid bacteria (LAB) as a source of carbon and energy in the fermentation process. However, the process of making cheddar cheese analogue did not use LAB for the fermentation process, so there was no LAB activity in lowering the pH.

Additionally, the pH for various types of emulsifier, Tween 80, Span 80, and Tween 80: Span 80 were 5.6; 5.8; and 5.8 respectively. Abd El-Salam [10] claimed that type of emulsifier affects pH value of the resulting cheese. This is presumably due to the absence of large basic differences of the two types of emulsifiers.

In addition, there was curing process in making cheddar cheese analogue, but it was done without using bacteria so that biochemical processes did not occur. According to González et al. [12], pH levels decrease during the curing process. The decrease in pH level of cheese is influenced by the amount of lactic acid produced by microorganisms. The higher the lactic acid, the lower the pH level. The decrease in pH value is due to the activity of bacteria in the cheese.

3.1.3. Moisture content. Concentration of WPC and in type of emulsifier had a very significant effect, but the interaction between them had no significant effect. The higher WPC addition, the lower the moisture content of cheddar cheese analogue (Figure 2). Moisture content of cheese is influenced by its fat and protein content. The higher the protein content, the greater the ability of the casein matrix to bind to water. Cheese with water-in-oil-in-water emulsion in skim milk (A4) and cheese with a 60% reduction in milk fat (A1) had higher water content of 53.96 ± 4.26% and 53.01 ± 3.12 % than other treatments. This is due to the high protein content found in A1 and A4 cheese.

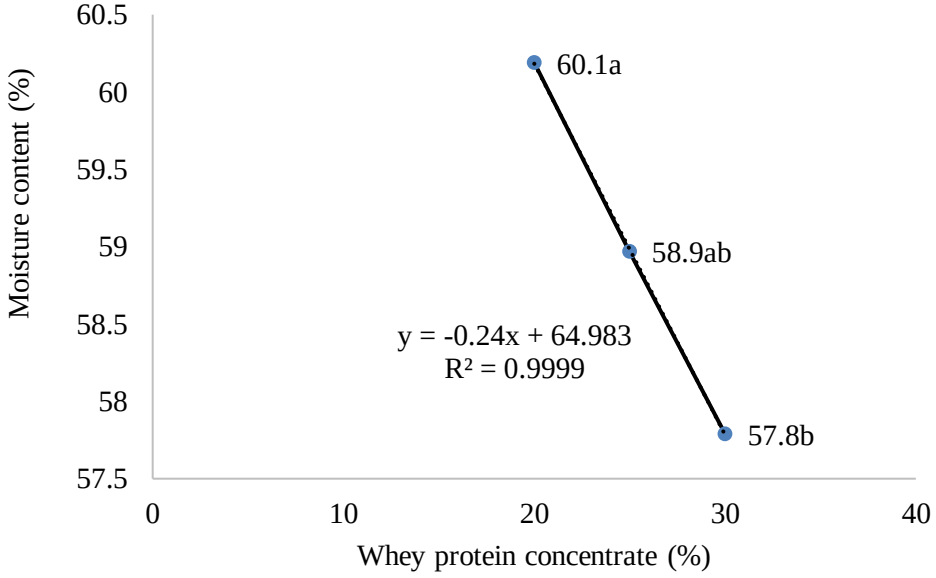

Figure 2. The moisture content of cheddar cheese analogue was affected by concentration of whey protein concentrate

The moisture content of cheddar cheese analogue at various concentrations of emulsifier types is presented in Figure 3. The highest average value of moisture content was found in 1% Tween 80 (E1) (59.69% wb) and the smallest average value was found in 1% Span 80 (E2) (57.73% wb). The value of

moisture content of cheddar cheese analogue produced was not much different from the results of research conducted by Abubakar and Usmiati [8] in the treatment of corn oil emulsion in skim milk, which was 51.51 ± 2.84% (%w/w).

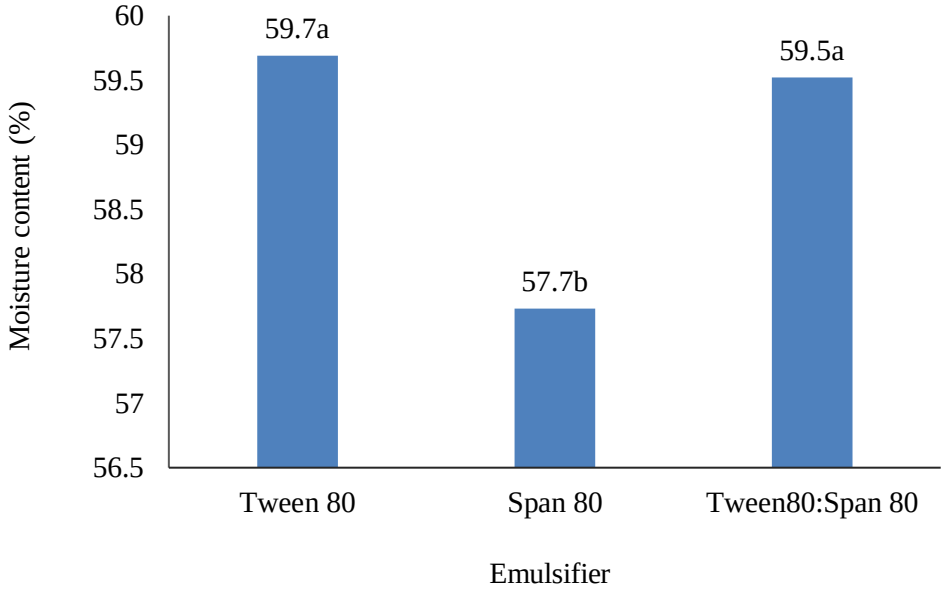

Figure 3. The moisture content of cheddar cheese analogue was affected by type of emulsifier

3.1.4. Dissolved solid. There was no significant effect in concentration of WPC, type of emulsifier and interaction between them on dissolved solids of cheddar cheese analogue. The dissolved solids of cheddar cheese analogue with addition of WPC 20, 25 and 30 % were 31.6, 31.8, and 31.9 °Brix. Cheddar cheese analogue that use Span 80, Tween 80, and combination Tween 80 and Span 80 as emulsifiers have dissolved solids 31.83, 31.89 and 31.67 °Brix.

The higher the addition of WPC and emulsifier concentrations, the higher the total dissolved solids of cheddar cheese analogue produced. This is in accordance with the statement of [13] that the addition of non-fat solids such as WPC and emulsifier can increase the total solids so that it can improve the characteristics of the resulting cheese.

3.1.5. Dissolved protein. Concentration of WPC, type of emulsifier, and interaction between them had a very significant effect on dissolved protein content of cheddar cheese analogue. The more addition of WPC, the more the dissolved protein content of cheddar cheese analogue (Figure 4). According to Stankey et al. [14] based on protein content, WPC is divided into WPC34 (around 34% of protein content), WPC50 (around 50% of protein content) and WPC80 (around 80% of protein content). WPC used in this study was WPC which contained 80% protein content. The same result was expressed by Dhanraj and Jana [15] who found that cheese added by WPC as a fat replacer had the highest protein content. WPC contains a lot of bioactive components so that it is expected to increase the functionality of low-fat cheese. The use of single WPC has not produced cheese of the same quality as fat-dense cheese.

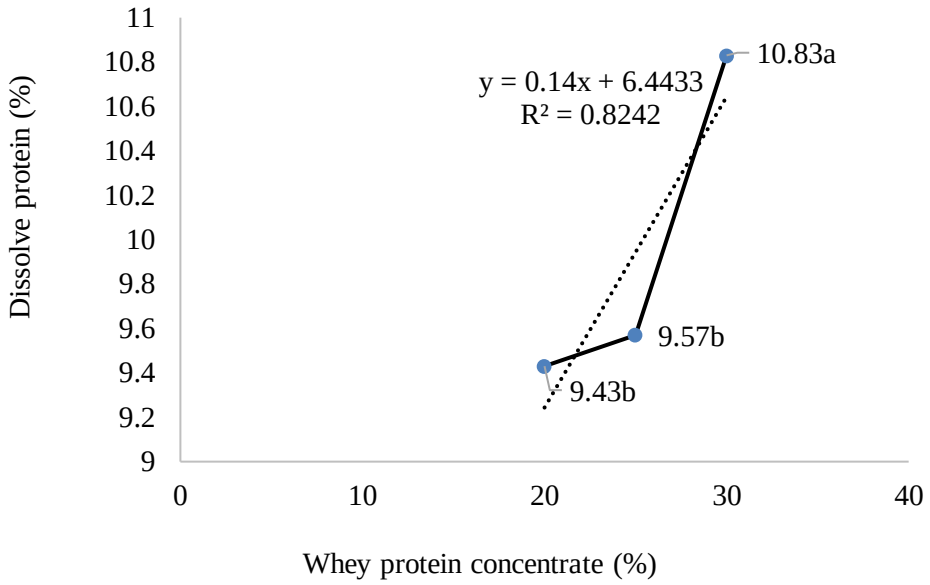

Figure 4. Dissolved protein of cheddar cheese analogue was affected by concentration of whey protein concentrate

In line with the results of this study, Priadi et al. [16] also found that the concentration of fillers (*mocaf* and wheat flour) will have different effects. Increasing the concentration of fillers decreases the protein content of processed cheddar cheese. The same result is conveyed by Mounsey and Riordan [17] that stated an increase in the concentration of maize flour causes a decrease in protein content in cheese analogue.

The highest of dissolved protein content was found in 1% Tween 80: Span 80 was 10.72%, and the smallest was found in 1% Tween 80 (9.33%) (Figure 5). It is in line with results of research conducted by Khan and Masud [18] which found that the use of a stabilizer has an effect on the protein content of the product, because it has a hydrophilic group that will bind water. Thus, the more stabilizer is added, the higher the protein concentration in the product.

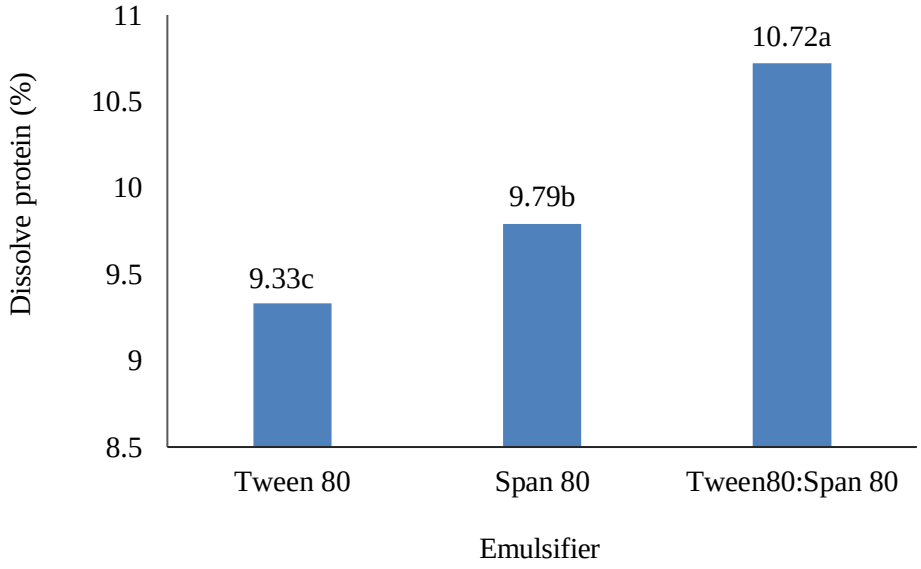

Figure 5. The moisture content of cheddar cheese analogue was affected by type of emulsifier

3.1.6. Fat content. The concentration of WPC and interaction between the concentration of WPC and type of emulsifiers had a very significant effect, but variations in the type of emulsifier had no significant effect on the fat content of cheddar cheese analogue. The higher addition of WPC, the lower the fat content of cheddar cheese analogue. This is in accordance with Perreault et al. [4] that increasing the concentration of WPC in milk causes a decrease in fat content in cheese. It is supported by who claimed that increased concentration of fillers in the form of *mocaf* and wheat flour had a significant effect on decreasing fat content. The addition of fillers increases the proportion of starch and decreases the proportion of fat in processed cedar cheese. Fat in cheese can form complex bonds with starch, which can cause incomplete gelatinization process.

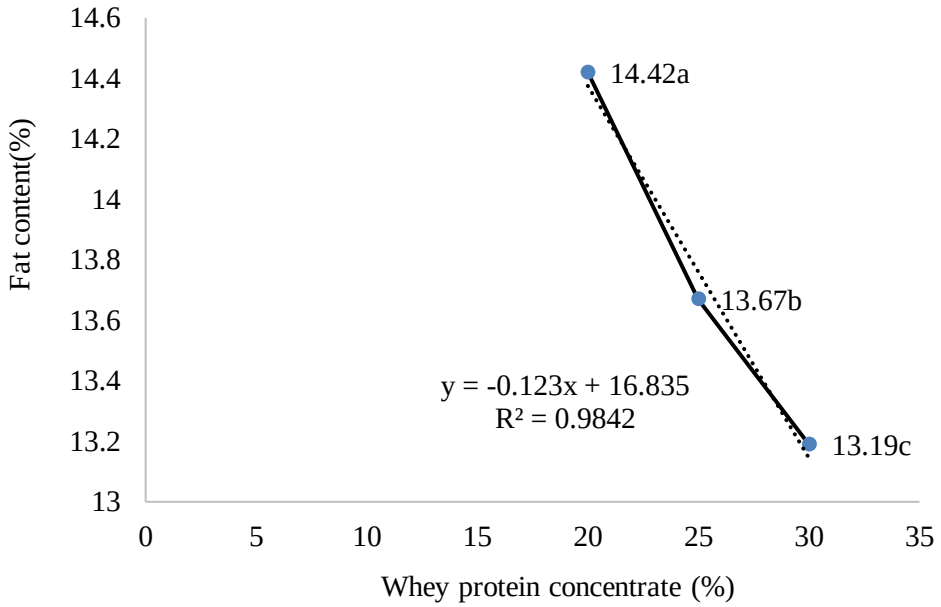

Figure 6. Fat content of cheddar cheese analogue was affected by concentration of whey protein concentrate

The average value of fat content in various types of emulsifier (E), namely Tween 80 (E1) was 13.64%, Span 80 (E2) was 14%; and Tween 80: Span 80 was 13.64%. These results indicate no significant effect on fat content in cheddar cheese analogue. It is different from Zoidou et al. [7] who stated that stabilizer concentration has an effect on fat content. The increase in fat content is due to the greater the concentration of lecithin, the higher the hydrophobic group, which affects the increase in fat content of apple cider margarine supplemented with peanut oil. It supports the results of this study due to the use of the same emulsifier concentration, so that it does not affect the fat content in the resulting cheddar cheese analogue.

Cheese in this study is categorized as low-fat cheese. The term low-fat cheese generally refers to cheese with a lower fat content than full-fat cheese. Based on wet weight, full-fat cheese in fresh form has a fat content of 24.5% [11]. According to Aini et al. [3], fat content in cheese really depends on the type of milk and other ingredients used as raw materials. Low-fat content in the results of this study is due to basic ingredients of cheese which do not fully use cow's milk but a mixture of corn milk. Aini et al. [19] stated that sweet corn has 1 g fat content per 100 g of ingredients, while fat content of milk was 3.4% [20]. This causes the fat content of the cheese to be low.

*3.1.7. Titratable acidity. T*here was no significant effect between concentration of WPC, type of emulsifier and interaction between them on total titratable acidity of cheddar cheese analogue. The titratable acidity of cheddar cheese analogue with addition of WPC 20, 25 and 30 % were 1.46, 1.47 and

1.38 respectively. In addition, titratable acidity of cheddar cheese analogue that use emulsifiers Tween 80, Span 80 and combination of Tween 80: Span 80 were 1.36, 1.36 and 1.59. These results demonstrate that using 1 type of emulsifier produces the same total titratable acidity, but using 2 emulsifiers has a higher total titratable acidity.

More importantly, cheddar cheese analogue in this study was cured but did not use a fermentation process. This is different from Syamsu and Elsahida [21], who claimed that vegan cheese made from soybeans have a pH value in powdered soy milk and fresh soy milk which decreases with the length of fermentation, while the total titratable acidity is inversely proportional to the pH value and increases with the length of fermentation. Powdered soy milk reaches the isoelectric point at the 16th hour, while the fresh soy milk reaches the isoelectric point at the 12^{th} hour.

3.1.8. Sensory variables. Based on the results of diversity test, the attributes of color, taste, texture and preferences were significantly different. Color is a physical parameter formed when light hits an object and is reflected on the sense of sight (eye). Color assessment of food ingredients is very important since color is one of the parameters that determines the quality of the ingredients. The colors were significantly different between each formula. The higher the average value, the more preferable the cheese color will be. The highest average values were obtained from the treatment combinations of W2E2 (4.78); W1E1 (4.74); W3E1 (4.66); and W1E3 (4.64), which demonstrates that the color produced by cheddar cheese analogue is slightly yellowish. The smallest average value was obtained in W2E3 with a value of 3.92, which means that the resulting color is yellowish white.

The yellow color of cheese is presumably the result of the color of corn milk. Hassan [22] stated that yellowish color is due to carotene contained in corn. In addition, the color produced by cheddar cheese analogue is also influenced by the combination of treatment between WPC and the type of emulsifier used. The yellowish white color of the cheddar cheese analogue is the result of the WPC color. According to Dhanraj and Jana [15], WPC gives a yellowish white color to the liquid yogurt starter. Besides the addition of WPC, the addition of an emulsifier also affects the color of cheddar cheese analogue produced. Hou and Papadopoulos [9] added that Span 80 is a thick yellow liquid and Tween 80 is a yellow oil.

Aroma is an odor caused by chemical stimuli that are smelled by olfactory nerves in the nasal cavity [23]. The product with the best aroma is the product with the maximum or strongest characteristic cheese aroma. The analysis of variance on the aroma of cheddar cheese analogue showed a significantly different effect on each formula. The highest average value was obtained in W2E1 treatment (4.59 - strong distinctive aroma of cheese), while the lowest average value was found in W1E3 treatment (4.02 - slight cheese aroma). It occurred due to the differences in the concentration of WPC used, since WPC has a distinctive aroma like milk. According to Panthi et al. [24], whey is a semi-transparent liquid that is left during the precipitation process in cheese making which has a slightly fragrant aroma. The higher the average value produced, the more distinctive the aroma of the resulting cheese, such as cheddar cheese on the market.

Cheddar cheese analogue has a slight or mild distinctive cheese aroma. It is because the production of cheddar cheese analogue only uses corn milk, without any additional cow's milk. Changes in dairy products such as cheese are caused by the fermentation of lactose, citrate and other organic compounds which become a variety of acids, esters, alcohols and volatile flavor and aroma-forming compounds [3]. The process of making cheddar cheese analogue does not use a fermentation process so that cheese aroma does not have a distinctive aroma like cheddar cheese on the market.

Analysis of variance on the taste of cheddar cheese analogue showed a significantly different effect on each formula. The highest value of taste was produced in W1E2 treatment (5.85 - salty), while the lowest value was found in W2E2 treatment (5.15 - slightly salty). The taste produced from cheddar cheese analogue is the same as the results of research conducted by Abubakar and Usmiati [8] that low-fat white cheese has a taste that is close to very salty to salty.

The taste produced by cheddar cheese analogue is influenced by the combination of treatment between WPC and emulsifier (Tween 80 and Span 80). Damin et al. [25] stated that whey has a slightly

sour taste, while Hou and Papadopoulos [9] stated that Tween 80 has a bitter taste. However, the taste produced by cheddar cheese analogue is neither sour nor bitter. It presumably occurs due to the use of emulsifier concentrations which tend to be small so that the cheese does not taste bitter.

The quality of texture is very important in assessing the quality of cheese [8]. Analysis of variance on the texture of cheddar cheese analogue showed a significantly different effect. The higher the average value of the cheddar analogue cheese, the harder the cheese will be. The highest average value was found in formula 9 (W3E3) and 7 (W3E1) which were included in the slightly hard category, while the other formulas had an average value of 2 which showed that the resulting cheese was not hard. It can happen because formula 9 had the highest WPC concentration of 30%. The same results are found in a research conducted by El-Sheikh et al. [6] which found that treatment with WPC dispersion increases the hardness of cheese than other treatments. The addition of protein-based fat replacers such as WPC at certain concentrations can increase the hardness and elasticity, while the addition of protein causes interactions between proteins and forms a harder matrix.

Product with the best preference is based on the best scoring of the attributes that have been tested previously. Results of analysis of variance on the preference for cheddar cheese analogue showed a significantly different level of preference. The average value of panelists based on the scoring test showed that cheddar cheese analogue with the best preference was found in formula 9 (W3E3), while the lowest average value was found in formula 2 (W1E2). The higher the average value of cheddar cheese analogue produced, the higher the level of preference for the panelists to the resulting cheddar cheese. The level of preferences is also based on other sensory attributes such as color, aroma, taste, and texture.

3.2. Effectiveness Index

The efficacy index was used to determine the best formula based on physical, chemical and sensory properties. Due to the cumulative value of effectiveness index, it is concluded that W3E1 with 30% WPC and Tween 80 as emulsifier is the best treatment. It has yield 63.23%, pH of 5.7, total dissolved solids of 31.75^{o}Brix, moisture content of 59.24%, dissolved protein of 10.07%, fat content of 13.65%, titratable acidity of 1.53 with a yellowish white color, slight cheese aroma, slightly salty, not hard, and tend to be preferred.

The yield of cheddar cheese analogue was greater than yield of low-fat white cheese with the addition of corn oil emulsion in skim milk with whey protein concentrate, conducted by Abubakar and Papadopoulos [8], with a yield of 15.31 ± 0.21%. Moreover, the protein and fat content was lower than dissolved protein and fat content in processed cheddar cheese added with modified cassava flour and tapioca flour, which was conducted by Priadi et al. [16]. Processed cedar cheese with the addition of modified cassava flour and tapioca flour had a protein content of 34.78% and a fat content of 45.79%. The moisture content in cheddar cheese analogue was not much different from the moisture content in low-fat white cheese with the addition of corn oil emulsion in skim milk with whey protein concentrate carried out by Abubakar and Usmiati [8] with a value of 55.48 ± 4.29% (%). The pH of cheddar cheese analogue was not much different from the pH and sensory of spreadable cheese analogue that has been studied by [26]. The pH of spreadable cheese analogue was 5.4 and had similar sensory such as having yellowish white color, distinctive cheese aroma, and texture that is neither hard nor soft.

4. Conclusion

Different variations in concentration of WPC result in different yield, moisture content, dissolved protein and fat content, but there is no difference in pH, dissolved solids, and titratable acidity. Different emulsifier types result in different values of moisture content and dissolved protein, but there is no difference in yield, pH, dissolved solids, fat content, and titratable acidity. The best formula proportion of cheddar cheese analogue is 30% WPC and 1% Tween 80, since it has yield of 63.23%, pH of 5.7, dissolved solids of 31.75^{o}Brix, moisture content of 59.24%, dissolved protein of 10.07%, fat content of 13.65%, titratable acidity of 1.53 with a yellowish white color, slight cheese aroma, slightly salty, not hard, and tend to be preferred.

Acknowledgements
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Certificate

Awarded to

Nur Aini

for participation in

The 2nd International Conference on Sustainable Agriculture for Rural Development (2nd ICSARD)

as

Oral Presenter

Faculty of Agriculture | Universitas Jenderal Soedirman

Purwokerto, October 20th 2020

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Chairman of
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Faculty of Agriculture - Jenderal Soedirman University
Jl. Dr. Soeparno, Karangwangkal, Purwokerto, Indonesia 53123
Web: bit.ly/icsard2020unsoed; Email: icsard@unsoed.ac.id

LETTER OF ACCEPTANCE

October 1, 2020

Dear Nur Aini

The organizing committee of the 2nd International Conference on Sustainable Agriculture for Rural Development (2nd ICSARD) 2020 is pleased to inform you that the submitted abstract entitled:

The Effect of Addition of Whey Protein Concentrate and Emulsifier on Characteristics of Cheddar Cheese Analogue from Corn Milk

has been accepted for Oral Presentation based on the peer-review by the scientific committee of 2nd ICSARD, which will be held virtually on October 20, 2020. The abstract will be appeared in the book of program and will be available for all participants of the conference. We would like to thank for your contribution in the 2nd ICSARD 2020 and look forward to your participation in this event.

Best regards,

Susanto Budi Sulistyo, PhD.
Chairman of 2nd ICSARD Committee

Book of Program

OCTOBER 20th
2020

The 2nd International Conference on Sustainable Agriculture for Rural Development (ICSARD)

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Universitas Jenderal Soedirman

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Conference Report by the Chairman

Assalamu'alaikum warahmatullahi wabarakatuh
Good morning

The honorable Rector of Jenderal Soedirman University or his representative,
The honorable deans of all faculties in Jenderal Soedirman University,
The honorable invited speakers,
And all distinguished participants,

Ladies and gentlemen,
On behalf of the Organizing Committee, I am honored and delighted to welcome you to the official opening of the 2nd International Conference on Sustainable Agriculture for Rural Development 2020 which is held virtually due to the pandemic of COVID-19.

This conference is organized by the Faculty of Agriculture, Jenderal Soedirman University and is a part of the event series to celebrate the 58th Anniversary of the Faculty of Agriculture, Jenderal Soedirman University. This one-day seminar comprises both plenary and parallel session. In the plenary session there are three invited speakers who will give presentations and share their knowledge and expertise. I would like to express my sincere gratitude to all invited speakers, Prof. Ting-ting Wu, Ph.D. from National Yunlin University of Science and Technology, Taiwan, Prof. Tatsuo Sato, Ph.D. from Ibaraki University, Japan, and Suprayogi, Ph.D. from Jenderal Soedirman University, Indonesia, who have accepted our invitation.

Ladies and gentlemen,
We have accepted 207 abstracts from researchers who will present their most recent research in the parallel session. Participants are mostly from Indonesia and also from abroad, i.e. Japan, Vietnam, Sudan, Oman, Iraq, and New Zealand. We hope that this virtual conference will provide a perfect forum for participants to interact and possibly discuss future collaborations.

As a general chair of this conference, I realize that the success of the conference depends ultimately on many people who have worked with us in planning and organizing both the technical program and supporting social arrangements. I would like to thank all committee members who have worked extremely hard for the details of important aspects of the conference programs.

We hope that you will experience a fruitful and inspiring meeting and leave this virtual conference with enlarged horizons for research and education perspectives.

Thank you.
Wassalamu'alaikum warahmatullahi wabarakatuh

Susanto B. Sulistyo, Ph.D.
Chairman of the 2nd ICSARD 2020

Welcome Remark by Rector of Jenderal Soedirman University

Assalamu'alaikum warahmatullahi wabarakatuh
Good morning

The honorable invited speakers,
The honorable deans of all faculties in Jenderal Soedirman University,
And all distinguished participants,

On behalf of my institution, I am very pleased to give you a warm welcome to the 2nd International Conference on Sustainable Agriculture for Rural Development. Following the success of the 1st conference in 2018, the Faculty of Agriculture Jenderal Soedirman University is now organizing the 2nd ICSARD. As we all know, due to the global COVID-19 pandemic, this conference has to be held virtually. However, I believe this situation will not lessen our enthusiasm to participate in this conference. I would also like to express my sincere gratitude to all invited speakers who have accepted the invitation and spent their time and efforts to share their knowledge and experience in a variety of expertise. I believe their speeches will bring significant contributions for all participants of this conference.

Ladies and gentlemen,
Agriculture is a vital sector since it provides foods and raw materials related to food for human life. Agriculture also gives employment opportunities to a very large proportion of communities. Achieving global food security whilst reconciling demands on the environment is the greatest challenge faced by mankind. The COVID-19 pandemic has affected the entire food system. The Food and Agriculture Organization (FAO) of the United Nations reported that the effects cover all elements of the food system, from primary supply, to processing, to trade as well as national and international logistics systems, to intermediate and final demand. It also affects factor markets, namely labor and capital, and intermediate inputs of production. However, Indonesia's Minister of Agriculture said Indonesia's agriculture sector has become very promising during the coronavirus pandemic. When different parts of Indonesia went into lockdown, there remained a steady demand for food. Most other sectors, such as transportation and warehousing, suffered steep declines as a result of pandemic-related restrictions.

Ladies and gentlemen,
This conference will address the food system activities of processing, distributing and consuming food, as well as food production from crop and livestock; the availability, access, utilization and stability dimensions of food security; and the synergies and trade-offs between economic, environmental, health and social objectives and outcomes. The conference would be an excellent opportunity for academic researchers, industry professionals, government delegates and students to interact and share their experiences and knowledge on cutting-edge developments in the fields of Agro-technology, Soil science, Agronomy, Horticulture, Plant protection, Plant breeding and biotechnology, Agroecology, Food science and technology, Agricultural and biosystems engineering, as well as Socio-economics of agriculture and agribusiness. Our main objective is to promote scientific and educational activities towards the advancement of knowledge by improving the theory and practice of various disciplines and areas of sustainable agriculture.

Ladies and gentlemen,
Let me not delay you from the excellent program ahead. I sincerely hope that you experience a valuable seminar. I hereby declare the 2nd International Conference on Sustainable Agriculture for Rural Development (ICSARD) 2020 open.

Thank you.
Wassalamu'alaikum warahmatullahi wabarakatuh

Prof. Dr. Suwarto
Rector of Jenderal Soedirman University

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ZOOM Meeting Guidelines

(Petunjuk Ruang Rapat Zoom)

For Participants

(untuk Peserta)

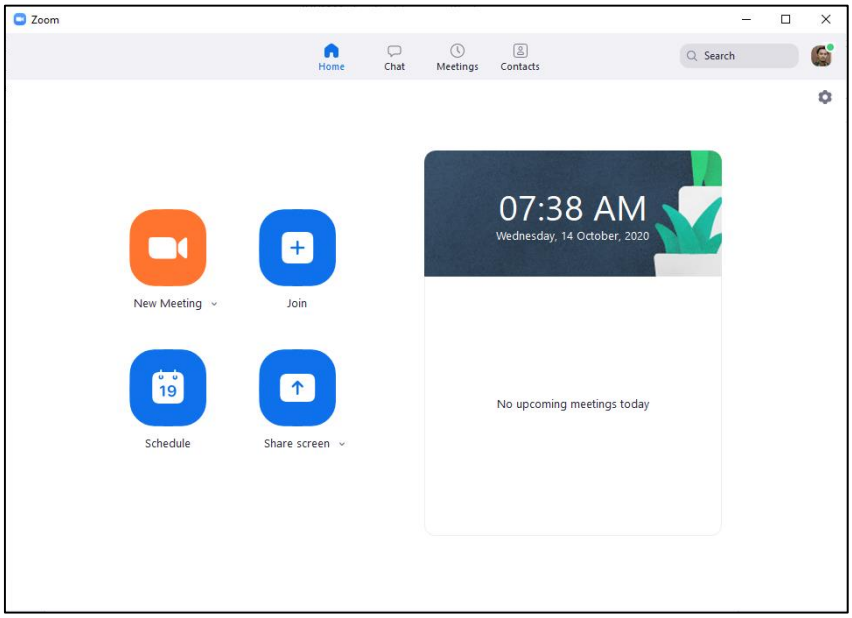
For Plenary Session

1. The conference will be held online using the ZOOM meeting platform, please make sure you have installed the latest version of ZOOM (version 5.3.2) in order to run the conference smoothly. If your computer/laptop doesn't have the Zoom application installed, install it first by clicking the meeting link provided. You may also download the latest Zoom Client for Meetings through this following link https://zoom.us/download#client_4meeting. The link will direct you to download zoom and install it.

   (Konferensi akan diselenggarakan secara daring/online melalui aplikasi rapat Zoom, pastikan Anda sudah menginstall aplikasi terbaru ZOOM [version 5.3.2]. Jika komputer/laptop Anda belum terinstal aplikasi Zoom, silakan menekan link rapat yang sudah disiapkan. Anda juga bisa mengunduh Zoom versi terbaru melalui link https://zoom.us/download#client_4meeting. Browser akan secara langsung mengarahkan Anda mengunduh aplikasi zoom. Silakan tekan download dan instal).

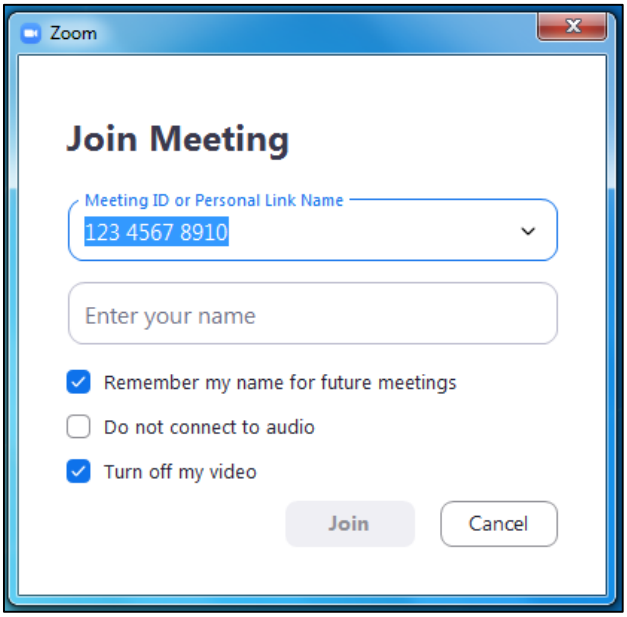
2. If it is already installed, open the zoom application, then select Join a Meeting. The Participants must enter the main ZOOM room starting at 08:30 A.M. [Jakarta time, GMT+7]

   (Jika aplikasi zoom sudah terinstal di perangkat lunak Anda, silakan buka aplikasi zoom, lalu pilih Join a Meeting. Peserta wajib memasuki ruang rapat utama ZOOM pada pukul 08:30 WIB. [Jakarta time, GMT+7]).



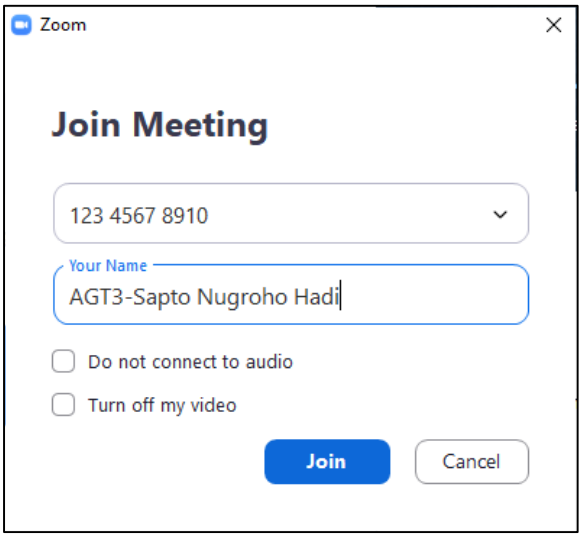
3. Enter the meeting code provided (generally consists of 11 digits).

   (Silakan masukan kode rapat yang sudah disediakan (umumnya memiliki 11 angka)



4. For a presenter participant, enter your name in the format Parallel Session Room Code - Participant's Full Name (e.g. AGT3-Sapto Nugroho Hadi). For a non-presenter participant, just enter your full name. Make sure your full name match with the name registered on the registration form. If the name does not match, the committee may not allow the participant to enter the meeting.

   (Untuk peserta presenter, tuliskan nama lengkap dengan format: kode ruang sesi paralel-nama lengkap peserta. Untuk peserta non-presenter, cukup tuliskan nama lengkap Anda saja. Pastikan nama lengkap yang digunakan sesuai dengan nama yang sudah didaftarkan pada formulir registrasi. Jika nama yang Anda cantumkan tidak sesuai, panitia tidak akan mengizinkan Anda memasuki ruang rapat zoom).

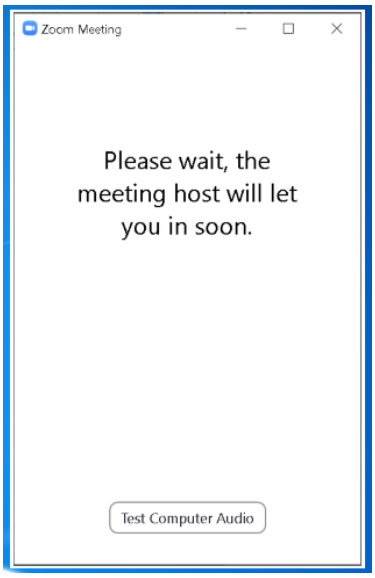


5. After clicking join, you will be asked for the meeting password. Enter the meeting password received in the email from the committee. Then click Join Meeting.

   (Setelah menekan tombol join, silakan masukkan kata sandi rapat yang sudah diinformasikan panitia melalui surat elektronik. Lalu tekan Join Meeting).

6. Wait for the host to put you into the Zoom meeting room.

   (Silakan menunggu host mengizinkan Anda memasuki ruang rapat zoom).



7. After entering the Zoom room meeting, make sure the speakers are muted, unless permitted by the host. Use the chat menu at the bottom to interact using text with the host.

   (Setelah Anda masuk ke dalam ruang rapat zoom, pastikan mikrofon dalam keadaan off, kecuali diizinkan oleh host. Silakan menggunakan menu chat untuk berkomunikasi dengan host).

For Parallel Session

1. Participants must attend the plenary session which will be held after the opening ceremony. After following the plenary session completely, participants can re-enter the main ZOOM room at least 15 minutes before the parallel session begins.

   (Peserta wajib hadir pada sesi pleno yang akan dilaksanakan setelah upacara pembukaan. Setelah mengikuti sesi pleno, peserta dapat memasuki ruang utama ZOOM lagi 15 menit sebelum sesi pararel dimulai).

2. The host will help the participants to enter the breakout room according to the participant's parallel session room code. Therefore, make sure you use the parallel session code correctly.

   (Host akan membantu peserta memasuki ruang breakout sesuai dengan kode ruang sesi pararel peserta. Pastikan Anda sudah mencantumkan kode ruang sesi pararel dengan benar).

3. Participants can also enter the breakout room independently by selecting the breakout room according to the participant's parallel session room code that provided by the host in the main Zoom room.

   (Peserta dapat juga memasuki ruang breakout secara mandiri dengan cara memilih ruang breakout sesuai kode ruang sesi pararel yang disiapkan host di ruang utama zoom).

4. If Participants still have difficulty entering the breakout room, the participants can ask directly to the host via the chat feature in the main Zoom room.

   (Jika peserta masih mengalami kesulitan memasuki ruang breakout, silakan jangan ragu berkomunikasi langsung dengan host melalui chat yang terdapat pada ruang utama zoom).

5. The parallel session will be guided by a moderator. Make sure you have sent the virtual presentation file to the committee.

   (Sesi pararel akan dipandu oleh seorang moderator. Pastikan Anda sudah mengirimkan file presentasi virtual ke panitia).

6. Virtual presentations can be delivered using an MS-PowerPoint, presentation video, or PowerPoint with voice-over.

   (Presentasi virtual dapat disampaikan menggunakan MS-PowerPoint, video presentasi, atau MS-PowerPoint dengan suara).

7. The time allocated for a presentation is 7 minutes, with a further 3 minutes allowed for discussion.

   (Setiap peserta disediakan waktu 7 menit untuk presentasi dan 3 menit untuk sesi tanya-jawab).

8. All presentations will be operated by the committee. The participant are not allowed to open their own presentation files.

   (Semua presentasi akan dioperasikan oleh panitia. Peserta tidak diizinkan membuka dan mengoperasikan file presentasi sendiri).

9. After the parallel session is over, the participants can re-enter the main ZOOM room at the closing ceremony.

   (Setelah sesi pararel berakhir, peserta dapat kembali bergabung ke dalam ruang zoom utama pada acara penutupan).

10. Do not forget to fill in the attendance list at the plenary and parallel sessions that have been prepared by the committee as a condition for obtaining a certificate.

    (Jangan lupa mengisi daftar hadir yang disiapkan panitia saat sesi pleno dan sesi pararel sebagai persyaratan untuk mendapatkan sertifikat).

THANK YOU
See You in 2nd ICSARD 2020

ENJOY YOUR CONFERENCE !

MEETING SCHEDULE OF 2nd ICSARD, 20 OCTOBER 2020

Time*	Session	Platform
08:30-09:00	**Participants enter the meeting room** Link: https://us02web.zoom.us/j/5630012894?pwd=aTFpTlE1V1dSV281Nmc5RTVFYnRyQT09 Meeting ID: 563 001 2894 Passcode: 201020	**Zoom**
09:00-09:45	**Opening Ceremony**	
	1. National Anthem "Indonesia Raya"	
	2. Prayer	
	3. Report by Chairman	
	4. Welcoming Remark by the Rector of Jenderal Soedirman University	
	5. Photo Session	
09:45-10:00	**Break**	
10:00-12:00	**Plenary Session** Moderator : Kharisun, Ph.D. Notulen : Dina Istiqomah, M.Sc.	**Zoom**
	Invited Speakers	
10.00-10.30	1. Prof. Ting-ting Wu, Ph.D. (National Yunlin University of Science and Technology, Taiwan) "*Investigating Determinants of Successful Entrepreneurship: the Using of Brainwave/EEG Technology to deliberate Individual Aspects"*	
10.30-11.00	2. Prof. Tatsuo Sato, Ph.D. (Ibaraki University, Japan) *"Revitalization of Farming after a Tsunami Disaster: A Model of Nitrogen Drip-fertilization for High Yield and Quality in Cucumber"*	
11.00-11.30	3. Suprayogi, Ph.D. (Jenderal Soedirman University, Indonesia) *"Innovation Research of Saline Tolerant Rice Variety, from Breeding Ground to Variety Release, Dissemination, Commercialization and Start-Up Teaching Industry"*	
11:30-12:00	Discussion	
12:00-12:30	**Break**	
12.30-13.00	**Participants enter the break out room**	**Zoom**
13:00-17:00	**Parallel Session (See detail parallel section)**	**Zoom**
17.00-17.15	**Closing Ceremony**	**Zoom**

** All times shown are based on the local time of the conference location (Jakarta time, GMT+7)*

PARALLEL SESSION (Room: AGT 1)

Session 1 (13.00 – 15.00)					
Moderator		Ahadiyat Yugi R., S.P. M.P. D.Tec.Sc.			
Notulen		Muhammad Bachtiar Musthafa, S.P., M.P			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	784	The Incorporation of Lime and NPK Fertilizer on Shallot Production in Peatland	Gina Aliya Sopha, Agnofi Merdeka Effendi, Fahmi Aprianto, and Anang Firmansyah	School of Agriculture and Environment, Massey University, New Zealand
2.	13.10-13.20	815	Effect of Indigenous Organic Fertilizer on the Growth and Yield of Paddy	Sigit Soebandiono, Anton Muhibuddin, Edi Purwanto and Djoko Purnomo	Sebelas Maret University, Indonesia
3.	13.20-1330	818	Heat Shock-Induced Resistance: The Involvement of Heat Shock Transcription Factors in the Defense Gene Expression in Cucumber Plants	Agung Dian Kharisma, Sayuri Tanabata, and Tatsuo Sato	Tokyo University of Agriculture and Technology, Japan
4.	13.30-13.40	862	Growth and Results Response of Three Maize Varieties Toward Fertilizing Package at Dry Land in Aceh Province	Fenty Ferayanti, Idawanni, Asis, and Lamhot Edy Pakpahan	Aceh Assessment Institute of Agricultural Technology, Indonesia
5.	13.40-13.50	906	Response of Growth and Rice Productivity to The Utilization of Superior Rice Varieties and Biosilica Application In Rainfed Land	Sagung Ayu Nyoman Aryawati, I Wayan Sunanjaya, I Made Rai Yasa, Anak Agung Ngurah Bagus Kamandalu, Anella Retna Kumala Sari and Hoerudin	Assessment Institute for Agricultural Technology-Bali, Indonesia
6.	13.50-14.00	916	Development of Local Boyolali Peanut and Corn Composite Planting Patterns on Rain-Filled Rice Fields	Meinarti Norma Setiapermas and Ridha Nurlaily	Assesment Institute for Agricultural Technology, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	980	The Potential of Seaweed Used as Hydroponic Solution on The Growth and Yields of Lettuce (*Lactuca Sativa* L.)	Ramal Yusuf, Syamsuddin Laude, Alfiana and Abdul Syakur	University of Tadulako, Indonesia
8.	14.10-14.20	987	Utilization of Coconut Water Waste to Increase Cocoa Growth Seedling by Different Application methods and Intervals	Santi Rosniawaty, Mira Ariyanti, Cucu Suherman, Rija Sudirja and Syifani Fitria	Faculty of Agriculture, Padjadjaran University, Indonesia
9.	14.20-14.30	989	The "PATBO SUPER" Technology Innovation to Increase Rice Production in Rainfed Rice Fields	Nana Sutrisna, Yanto Surdianto, Liferdi, and Yanuar Argo.	The Assessment Institute for Agricultural Technology of West Java, Indonesia
10.	14.30-14.40	993	Study of The Effect of Plant Growth Regulator on Yield and Catechin Content of Tea (*Camellia sinensis* (L.) O.Kuntze)	Intan Ratna Dewi Anjarsari, Jajang Sauman Hamdani, Cucu Suherman, Tati Nurmala, Heri Syahrian Khomaeni, Vitria Puspitasari Rahadi, and Erdiansyah Rezamela	Department of Agrotechnology Padjadjaran University, Indonesia
11.	14.40-14.50	1001	Inundation Land Conditions in Central Java Pantura and Inundation Tolerant Variety of Rice Productivity	Sri Minarsih and Meinarti Norma Setiapermas	Assesment Institute for Agriculture Technology of central Java, Indonesia
12.	14.50-15.00	1005	Response of Growth Oil Palm Nursery with Application the Compost Made Out of Oil Palm Midrib, Organic Fertilizer and Humic Acid	Mira Ariyanti and Esnakelga Bernadetha Keliat	Department of Agronomy, University of Padjadjaran, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Fatichin, S.P., M.P., Ph.D.			
Notulen		Muhammad Bachtiar Musthafa, S.P., M.P.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1105	Induced Resistance Against *Corynespora cassiicola* by Heat Shock in Cucumber	Muhamad Hafidz Fadjri and Tatsuo Sato	Graduate School of Agriculture, Ibaraki University, Japan
2.	15.10-15.20	1110	The Nutritional Value of Agricultural Waste Forages Fed to Ruminants as Affected by Agroecosystem on Grobogan Regency	Amrih Prasetyo and Tota Suhendrata	Assessment Institute for Agricultural Technology of Central Java, Indonesia
3.	15.20-15.30	1111	Morphology Characteristics of Orchids Species In Bukit Barisan, Bengkulu Province	Miswarti, Irma Calista, Wawan Eka Putra, Shannora Yuliasari, Darkam Musaddad, Yudi Sastro	Balai Pengkajian Teknologi Pertanian (BPTP) Bengkulu, Indonesia
4.	15.30-15.40	1112	The Role of Antagonist Microbia in Diseases Control for Increasing Rice Production	Arlyna Budi Pustika Kiki Yolanda and Sudarmaji	Assessment Institute of Agricultural Technology of Yogyakarta, Indonesia
5.	15.40-15.50	1123	Selection and Evaluation of 3rd Mutant Chili Generation for Resistance to *Pepper Yellow Leaf Curl Virus* (PepYLCV)	Redy Gaswanto, Rini Murtiningsih, andNeni Gunaeni	Indonesian Vegetable Research Institute (IVEGRI), Indonesia
6.	15.50-16.00	1127	The Application of the "Jarwo Super" Component to Increase the Cropping Index of Rice Fields in the Special Capital Region of Jakarta-Indonesia	Ana Feronika Cindra Irawati Nurmalinda, and Iskandar Zulkarnaen	Assessment Institute for Agricultural Technologi of Jakarta, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1137	Evaluation of thirty Indonesian chili varieties for resistance to *Phythopthora capsici*	Novi Irawati, Yanti Rohmayanti, Catur Hermanto, Wartono, and Rinda Kirana	Indonesian Vegetable Research Institute, Indonesia
8.	16.10-16.20	1213	Characterization and Distribution Banana Bunchy Top Disease on Sumatra Wild Banana at Bengkulu	Ruth Feti Rahayuniati and Ruly Eko Kusuma Kurniawan	Faculty of Agriculture, Jenderal Soedirman University, Indonesia
9.	16.20-16.30	1217	Evaluation of Chili Cultivars for Resistance against *Thrips* sp. (Thysanoptera: Thripidae)	Rini Murtiningsih, and Rinda Kirana1	Indonesian Vegetable Research Institute, Indonesia
10.	16.30-16.40	1225	Estimating Sowing Date and Yield of Rainfed Rice in Lomvok Island of West Nusa Tenggara Province Using WeRise (Weather-Rice-Nutrient Integrated Decision Support System)	Lia Hadiawati, Awaludin Hipi, Yanti Triguna Saleh and Mokhtar	Assessment Institute for Agriculture Technology of Bengkulu, Indonesia

PARALLEL SESSION (Room: AGT 2)

Session 1 (13.00 – 15.00)					
Moderator		Ir. Budi Prakoso, Grad.Dip.App. Sc., M.Sc., D.Tech.Sc.			
Notulen		Agus Suroto, S.Pd., M.Si.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	934	Seed Treatment to Improve Seedling Establishment in The Anaerobic Conditions	S Wahyuni, N Agustiani, S Salma, and M L Widiastuti	Indonesian Centre for Rice Research, Indonesia
2.	13.10-13.20	935	Land Suitability Alternatives for Agricultural Commodity Based on Agroecological Zone on Coastal Area in Tegal District of Central Java Province Indonesia	Samijan and Sodiq Jauhari	Assessment Institute for Agricultural Technology (AIAT) of Central Java, Indonesia
3.	13.20-1330	938	Effect of Botanical Insecticides against Fall Armyworm *Spodoptera frugiperda* J. E. Smith (Lepidoptera: Noctuidae)	Agus Kardinan and Paramita Maris	Indonesian Spice and Medicinal Crops Research Institute, Indonesia
4.	13.30-13.40	951	Farmer's Response to Improvement of Cropping Index (IP) Through Intercropping of Maize - Soybean and Groundnut in Pemalang	Endah Nurwahyuni, Forita Dyah Arianti and Yulis Hindarwati	Balai Pengkajian Teknologi Pertanian Jawa Tengah, Indonesia
5.	13.40-13.50	954	Seed Borne Fungal Species on Garlic Storage in Sembalun Highlands of Eastern Lombok, Indonesia	Baiq Nurul Hidayah and Yuli Handayani	Indonesian Agency for Agricultural Research and Development (IAARD), Indonesia
6.	13.50-14.00	957	Growth and Yield of Shallot (*Allium ascalonicum*) on Different Types of Media and Nutrient Solution on Hydroponic Wick System	D.A. Sugiyanta, E. Rokhminarsi, and B. Prakoso	Faculty of Agriculture, the University of Jenderal Soedirman, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1006	Identification of The Accumulation of Excess Air Temperature During one Growing Season as A Basis For Determining Suitability for Potato Plant (*Solanum tuberosum* L.) in A Tropical Region	I Firmansyah, N Sevirasari, E Sulistyaningsih, and M D Pertiwi	Central Java Assessment Institute for Agricultural Technology, Indonesia
8.	14.10-14.20	1007	Diversity of Arbuscular Mycorrhiza Fungi (AMF) in Rhizosphere of Sugarcane	Budi Hartoyo and OctiviaTrisilawati	Central Java Assessment Institute for Agricultural Technology, Indonesia
9.	14.20-14.30	1008	Increased Genetic Variability of Sugarcane Through Gamma Rays Irradiation	Sri Suhesti, Muhamad Syuku), Ali Husni and Rr. Sri Hartati	Indonesian Agency for Agricultural Research and Development (IAARD), Indonesia
10.	14.30-14.40	1009	In-vitro and In-Vivo Selection of Sugarcane (*Saccharum officinarum*, L.) Putative Mutant for Drought Stress	Rr Sri Hartati, Sri Suhesti, Suci Wulandari, I Ketut Ardana, and Rossa Yunita	Indonesian Centre For Estate Crops Research And Development, Indonesia
11.	14.40-14.50	1011	Study of "PATBO SUPER" Technology Innovation Promoting the Improvement of Planting Index and Productivity of Rainfed Rice in West Java Province	Yanto Surdianto, Nana Sutrisna, Kurnia and Yanuar Argo	Assessment Institute of Agricultural Technology West Java, Indonesia
12.	14.50-15.00	1012	Eficacy of Different Dose of Fungicide Mankozeb Against Purple Blotch Complex (*Alternaria porri*) of Shallot	Eli Korlina, Ahsol Hasyim, and Catur Hermanto	Indonesian Vegetable Research Institute, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Ir. Supartoto, M.Agr.			
Notulen		Agus Suroto, S.Pd., M.Si.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1138	Effectiveness of Botanical Pesticides against the Rhizome Flies *Mimegralla coeruleifrons* Macquart (Diptera: Micropezidae) in Red Ginger	Rismayani, Tri Lestari Mardiningsih, Paramita Maris, Molide Rizal and Agus Kardinan	Indonesian Spices and Medicinal Crops Research Institute (ISMCRI), Indonesia
2.	15.10-15.20	1145	Effect of Auxin Type and Concentration on The Induction of Alternanthera Reineckii Roots in Vitro	Rossa Yunita and Media Fitri Isma Nugraha	Indonesian Center for Agricultural Biotechnology and Genetic Resource Research and Development, Indonesia
3.	15.20-15.30	1154	The Increase of Rice Cropping Index Supported by River Dam Irrigation in Dry Land	Arif Anshori, Damasus Riyanto, Sukristiyonubowo, Sugeng Widodo and Suradal	Assesment Institute for Agricultural Technology of Yogyakarta, Indonesia
4.	15.30-15.40	1160	Composition of Pests and Predators in The Early Generative Phase of Rice Cultivation in Two Different Conditions	Agus Suroto, Dina Istiqomah, Risqa Naila Khusna Syarifah	Universitas Jenderal Soedirman, Indonesia
5.	15.40-15.50	1169	In Vitro Test of Ginger Rhizome Tissue Originated-Endophytic Bacterial Against 2nd-Stage Juvenile of Root-Knot Nematode, *Meloidogyne* spp.	Setyowati Retno Djiwanti, Ana Yulianti, and Miftahurrohmah	Indonesian Spice and Medicinal Crops Research Institute (ISMECRI), Indonesia
6.	15.50-16.00	1173	Growth Analysis of Some Cultivars on Weedy Conditions	Muji Rahayu, Prapto Yudono, Didik Indradewa, Eko Hanudin	Agrotechnology Program Study, Agriculture Faculty, Sebelas Maret University, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1240	Effect Combination of Chemical Fertilizer and Organic Fertilizer Enriched With Functional Microbes on The Growth and Yields of Shallot (*Allium Cepa* L.)	Sugiono and Eny Wahyuning Purwanti	AIAT East Java, Indonesia
8.	16.10-16.20	1241	Growth and Yield of Shallots (*Allium ascalonicum* L.) Lokananta In Various Doses of Nitrogen Fertilizers and Number of Plants Per Hole on Coastal Sandy Land	Saparso, Kartini and Ibnu Dwi Apriliyanto	Faculty of Agriculture, Jenderal Soedirman University, Indonesia
9.	16.20-16.30	1243	Effect of Liming to The Herb and Quercetin Yield of *Sonchus arvensis* L.	O. Trisilawati, Ediningsih, and B. Hartoyo	Indonesian Spices and Medicinal Crops Research Institute, Indonesia
10.	16.30-16.40	1244	Increasing Yield and Benefit of Local Garlic var. Sangga Sembalun in Different Phosphorus Basal Fertilizer Rate	Lia Hadiawati, Titin Sugianti, Fitria Zulhaedar	Balai Pengkajian Teknologi Pertanian (BPTP) Balitbangtan NTB, Indonesia

PARALLEL SESSION (Room: AGT 3)

Session 1 (13.00 – 15.00)					
Moderator		Prita Sari Dewi, S.P., M.Sc., Ph.D.			
Notulen		Eka Octaviani, S.Si., M.Biotech.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	958	The Influence of Variety and Explant Size on Garlic (*Allium sativum* L) Proliferation using Murashige and Skoog media	Asih K. Karjadi and Neni Gunaeni	Vegetable Crops Research Institute / Ivegri, Bandung, Indonesia
2.	13.10-13.20	960	The Dormancy Breaking of Garlic Bulb Seeds Through Thermal Shock Storage Methods and Addition of Gibberellin Acid	K S Sasmitaloka, T Hidayat, A B Arif, and I B Jamal	1Indonesian Center for Agricultural Postharvest Research and Development, Indonesia
3.	13.20-1330	961	The Effect of The Intensity of Endophytic Bacteria Application Toward Some Types of Organic Fertilizer on Hot Pepper (*Capsicum ascalonicum*) Productivity	Eny Wahyuning Purwanti	Politeknik Pembangunan Pertanian Malang, Indonesia
4.	13.30-13.40	972	Combined Compost with Biochar Application to Mitigate Greenhouse Gas Emission in Paddy Field	Ali Pramono, Terry A. Adriany, Eni Yulianingsih and Anggri Hervani	Indonesian Agriculture Environment Research Institute, Indonesia
5.	13.40-13.50	973	Virulence of Five Anthracnose *Colletotricum acutatum* Isolates from West Java Against the Resitance of Hot pepper	Neni Gunaeni, Eli Korlina, Redy Gaswanto, A.W. Wulandari, and Ineu Sulastrini,	Indonesia Vegetable Research Institute, Indonesia
6.	13.50-14.00	974	Net Assimilation Rate, Growth and Yield of Rice (*Oryza sativa* L cv Inpago Unsoed 1) with PGPR Application in Different Rate of Nitrogen	Purwanto, Teguh Widiatmoko, B.R. Wijonarko, Mujiono, Tarjoko	Agrotechnology Departement of Agriculture Faculty, Jenderal Soedirman University, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1016	Application of Natural Silica Fertilizer to Alleviate The Stress Conditions of Shallots Plant (*Allium ascalonicum* L.) on Inceptisol	Kharisun, MN Budiono, Nur Prihatiningsih, Citra Ayu Trisetya Rurohati, and Etik Wukir Tini	Agriculture Faculty, University of Jenderal Soedirman, Indonesia
8.	14.10-14.20	1017	Effect of Natural Silica to Alleviate Salinity Stress of Tomatoes (*Lycopersicum escullentum* Mill.) on Entisol	Kharisun, Slamet Rohadi Suparto, Ratri Noorhidayah, and Chris Madya Astuti	Agriculture Faculty, University of Jenderal Soedirman, Indonesia
9.	14.20-14.30	1019	The Contribution of Jajar Legowo Super Technology in Achieving Diy Food Sovereignty During The Covid-19 Pandemic	Riefna Afriani and Arlyna Budi Pustika	Assessment Institute of Agricultural Technology of Yogyakarta, Indonesia
10.	14.30-14.40	1020	Contribution of Agricultural Machinary to Achieve Food Sovereignty in Yogyakarta Special Region	Mahargono Kobarsih and Arlyna Budi Pustika	Assessment Institute of Agricultural Technology of Yogyakarta, Indonesia
11.	14.40-14.50	1030	The Effect of Organic Fertilizer, Biochar, and Hormone on Bulb Splitting in the Cultivation of True Shallot Seed	Imam Firmansyah, Aryana Citra Kusumasari, Ridha Nurlaily, Sutoyo, Agus Hermawan, Ratih Kurnia Jatuningtyas, and Fitri Lestari	Assessment Institute of Agricultural Technology Central Java, Indonesia
12.	14.50-15.00	1033	Growth and Production of Seed Bulbs from True Shallot Seed Planted on Dry Low Land on Rainy Season	Aryana Citra Kusumasari, Retno Pangestuti, Rini Rosliani and Endang Sulistyaningsih	Assessment Institute of Agricultural Technology Central Java, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Dr. Purwanto, S.P., M.Sc.			
Notulen		Eka Octaviani, S.Si., M.Biotech.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1176	The Influence of Cropping Pattern of Pepper With Lemongrass and Citronella on The Diversity and Population of Insect Pests	Siswanto and Iwa Mara Trisawa	Agricultural Agency for Research and Development, Indonesia
2.	15.10-15.20	1183	The Role of Phosphate Solubilizing Bacteria from Rhizosphere of Upland Rice in the Growth and Yield of Upland Rice on Ultisol Soil	Sapto Nugroho Hadi, Fatichin, Ahmad Fauzi, Ida Widiyawati, Ahadiyat Yugi R	Department of Agrotechnology, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
3.	15.20-15.30	1190	Study of Indonesian Garlic Varieties to Flowering	Chotimatul Azmi, Rini Rosliani, Liferdi, Endah R. Palupi and Dwi Pangesti Handayani	Indonesian Ministry of Agriculture, Indonesia
4.	15.30-15.40	1208	In Vitro Shoot Propagation of White Turmeric (*Kaempferia rotunda* L.) at Various Types and Concentrations of Cytokinin	Murgayanti, Sumadi and Fatilla Ramadhanti	Department of Agronomy, Faculty of Agriculture, Universitas Padjadjaran, Indonesia
5.	15.40-15.50	1212	Effect of Pruning and Fertilization on Content of Some Macronutrients and Hormones in Leaves of Rewatered Citrus Trees	Sakhidin, Anung Slamet Dwi Purwantono, and Slamet Rohadi Suparto	Faculty of Agriculture, Jenderal Soedirman University, Purwokerto, Central Jawa, Indonesia
6.	15.50-16.00	1245	Study of The Soil Chemical Properties, Sulfur Distribution and The Yield of Rice Plant in Rawalo District, Banyumas Regency	M. Rif'an	Agriculture Faculty Jenderal Soedirman University, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1246	Influence of Varieties, Plant Spacing and Manure Fertilizer to Maize Productivity in Dry Land	Donald Sihombing, Dwi Setyorini, Zainal Arifin dan Wahyu Handayati	Assessment Institute of Agriculture Technology East Java, Indonesia
8.	16.10-16.20	1270	Endophytic Bacteria: An Emerging Tools for Biological Control Bacterial Leaf Blight of Paddy	Nur Prihatiningsih, Heru Adi Djatmiko, Puji Lestari2)	University of Jenderal Soedirman, Indonesia
9.	16.20-16.30	1280	Kinetics Phosphate Rock Dissolution as Affected by NH4+- and H+-charged Natural Zeolites	Mochammad Nazarudin Budiono, Kharisun and Peter van Straaten	Department of Agrotechnology, Faculty of Agriculture, Universitas Jenderal Soedirman, Indonesia
10.	16.40-16.50	1233	Effects of Gamma Irradiation on Citrus Bud Sprout to Produce New Genotypes	Agus Sarjito, Noor Farid, Sakhidin, Ismangil, Joko Maryanto and Prita Sari Dewi	Department of Agrotechnology, Faculty of Agriculture, Jenderal Soedirman University, Indonesia

PARALLEL SESSION (Room: AGB 1)

Session 1 (13.00 – 15.00)					
Moderator		Dr. Dindy Darmawati Putri, S.P., M.P.			
Notulen		Lufti Zulkifli, S.P., M.Sc.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	702	Risk Analysis of Shallot Supply Chain From Nganjuk Regency to Jakarta Indonesia	Susanawati	Departement of Agribusiness Faculty of Agriculture Universitas Muhammadiyah Yogyakarta, Indonesia
2.	13.10-13.20	816	Village Development Program: The View of "Askesiros" in Aocial Construction, A Development Reality of Local Papuan Residents in Manokwari Regency	Triman Tapi, Ganjar Kurnia, Iwan Setiawan and Agus Sumule	The development of Agriculture Polytechnic Manokwari, West Papua, Indonesia
3.	13.20-1330	844	Analysis of Comparative and Competitive Advantage of Maize, Rice and Cocoa Commodities in Gorontalo	Jaka Sumarno, Fatmah Sari Indah Hiola, and Nova Maya Muhammad	Assessment Institute for Agricultural Technology (AIAT) of Gorontalo, Indonesia
4.	13.30-13.40	868	Yield and Benefits Performance of Tabasco Pepper Farming in Indonesia	A A Rouf and S Munawaroh	Gorontalo Assesment Institute for Agricultural Technology, IAARD, Ministry of Agriculture, Indonesia
5.	13.40-13.50	904	Sweet Potato Agribusiness Development Strategy to Improve Farmersâ€™ Income	S K Dermoredjo, M Azis, Y H Saputra, G Susilowati and B Sayaka	Indonesian Center for Agricultural Socio-Economic and Policy Studies, Bogor, Indonesia
6.	13.50-14.00	913	Characteristics and Farmers' Response to Climate Variability to Support Sustainable Agriculture	Woro Estiningtyas, Suciantini, Saktyanu and Kristyantoadi Dermoredjo	Indonesian Agroclimate and Hidrology Research Institute, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	977	Climate Smart Agriculture Implementation Facing Climate Variability and Uncertainty in Coffee Farming System	Fadjry Djufry and Suci Wulandari	Indonesian Center for Estate Crops Research and Development, Indonesia
8.	14.10-14.20	986	Rice Cultivation Sustainability on Irrigated Paddy's Field in Upland Bengkulu Indonesia	Muhammad Faiz Barchia, Hesdianto Eko Mareja, Agus Susatya, Ridha Rizki Novanda, and Andi Ishak	Faculty of Agriculture, University of Bengkulu, Indonesia
9.	14.20-14.30	990	Farmers' Perceptions of Soil Block Nursery Techniques on Shallot Seeds in Grobogan Regency, Central Java	Chanifah, Dewi Sahara, Aryana Citra Kusumasari, Imam Firmansyah, Ekaningtyas Kushartanti and Agus Hermawan	Central Java Assessment Institute for Agricultural Technology, Indonesia
10.	14.30-14.40	992	The Production Performance and Feasibility Studies of New High Yield Varieties in Tegal District	Anggi Sahru R , Forita Dyah Arianti and Komalawati Komalawati	Indonesian Agency for Agricultural Research and Development, Indonesia
11.	14.40-14.50	994	The Synergy of Palm Oil Certification and The Regional Spatial Plan in Realizing a Sustainable Landscape	Diana Chalil and Riantri Barus	Universitas Sumatera Utara, Indonesia
12.	14.50-15.00	1000	The Analysis of Household Income and Expenditure of Farmers in The Rain-Fed Areas of Boyolali District	Budi Hartoyo, Komalawati, and Dewi Sahara	Balai Pengkajian Teknologi Pertanian Jawa Tengah, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Dr. Ir. Suyono, M.S.			
Notulen		Lufti Zulkifli, S.P., M.Sc.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1171	Competitiveness Effect of The Upsus Program on Rice Production in West Java Province, Indonesia	Adi Setiyanto, Isabelita M. Pabuayon, Cesar B. Quicoy, Jose V. Camacho Jr and Dinah Pura T. Depositario	Indonesian Center for Agricultural Socio Economics and Policy Studies (ICASEPS), Indonesia
2.	15.10-15.20	1172	Food Security in The Disaster-Prone Area: An Empirical Study from The Rural Area of Indonesia	AR. Rohman Taufiq Hidayat, Turniningtyas Ayu Rachmawati, Loetvy Wahyuningtiyas	Regional and Urban Planning Department, Universitas Brawijaya, Indonesia
3.	15.20-15.30	1174	The Empirical Analysis of Farmers' Income: A Case of Potato Farming In West Java, Indonesia	Eliana Wulandari, Ernah, and Hepi Hapsari	Faculty of Agriculture, Universitas Padjadjaran, Indonesia
4.	15.30-15.40	1186	The Implementation Analysis of Potato Production in West Java, Indonesia	Hepi Hapsari, Eliana Wulandari, and Zumi Saidah	Faculty of Agriculture, Universitas Padjadjaran, Indonesia
5.	15.40-15.50	1188	Analysis of Meat Price Volatility: Implications For Food Security in Indonesia	Resti Prastika Destiarni, Ahmad Syariful Jamil, and Fanny Septya	Department of Agribusiness, University of Trunojoyo Madura, Indonesia
6.	15.50-16.00	1201	The Effect of Antractant Production Factors On Curly Red Chili Farming (*Capsicum Annum* L.) (A Case In Pasirwangi Subdistrict, Garut District)	T. Karyani, A.Susanto, S.Tedy, H.Hapsari	Faculty of Agriculture, Universitas Padjadjaran

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1230	Reviewing Portraits of Coastal User Communities in the Segara Anakan Area	Suharno, and Emmy Saraswati	Economics Department, Faculty of Economics and Business, Jenderal Soedirman University, Indonesia
8.	16.10-16.20	1232	Analysis of Conservation Index and Economic Development of Northern Bandung Area	E. Supriyadi, P. Samodro, and T. Karyani	Institut Manajemen Koperasi Indonesia
9.	16.20-16.30	1273	The Role of Community Institutions in Upland Rice Farming in Banyumas District, Central Java, Indonesia	Anisur Rosyad, Budi Dharmawan, Dindy Darmawati Putri	Department of Agricultural Economics and Social Sciences, Jenderal Soedirman University, Indonesia

PARALLEL SESSION (Room: AGB 2)

Session 1 (13.00 – 15.00)					
Moderator		Budi Dharmawan, S.P., M.Si., Ph.D.			
Notulen		Sunendar, S.P., M.Sc.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	923	Technical Efficiency Comparison of Hoaloc-Mango between Cooperative and Non-Cooperative Grower Groups in Vietnam	Truong Hong Vo Tuan Kiet, Pham Thi Nguyen and Le Xuan Thai	Researcher in Can Tho University, Vietnam
2.	13.10-13.20	924	Perceived Attributes Driving The Adoption of System of Rice Intensification (SRI): The Indonesian farmers' view	Poppy Arsil, Tey Yeong Sheng, Mark Brindal, Ardiansyah, and Masrukhi	Agricultural Technology Department, Faculty of Agriculture, Universitas Jenderal Soedirman, Indonesia
3.	13.20-1330	926	Livelihood Impacts of The Cattle Management Practices in Mixed Crop-Livestock Farming Systems in South Sulawesi, Indonesia	Syamsu Bahar, Liana J. Williams, Clemens M. Grünbühel and Monica van Wensveen	Assessment Institute for Agricultural Technology, Jakarta Indonesia
4.	13.30-13.40	948	Enhancing Onion Agribusiness: The Needs of E-Planting Calendar and Production Allocation	Sri Wahyuni, Juni Hestina, Iwan A Setiajie, dan Erma Suryani	Indonesian Centre for Agricultural Socio Economics and Policy Studies, Indonesia
5.	13.40-13.50	963	Analysis of Rice Farming and its Marketing in DKI Jakarta	Nurmalinda, Waryat, Syarifah Aminah, Ana Feronika C.I., Muflihani Yanis, Wylla Silvia Maharani and Chery Soraya Ammatilah	Jakarta Assessment Institute of Agriculture Technology, Indonesia
6.	13.50-14.00	965	Development of Technology Adoption Model for Analysis of Integrated Crop Livestock Systems: The Case of Palm-Cattle Integration in Indonesia	Suci Wulandari and Renato Villano	Indonesian Center for Estate Crops Research and Development, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1013	Study of Social Interaction between internal elements in Rubber Cooperative through the Communication Aspect in Riau Province	Elfi Rahmadani, Rudy Febriamansyah, Ira Wahyuni Syarfi, and Yonariza	Department of Agricultural Sciences, Graduated Program, Andalas University, Indonesia
8.	14.10-14.20	1018	Use of Organic Fertilizers Variations to Increasing Upland Rice Production in Minahasa	Jefny B. Markus Rawung and Rita Indrasti	The Assessment Institute for Agricultural Technology of North Sulawesi, Indonesia
9.	14.20-14.30	1121	Indonesian Sugarcane Seeding System Performance: An Assessment from The Perspective of Institutional and Technological Innovation Support	I Ketut Ardana, Rr. Sri Hartati, Suci Wulandari, Saefudin, dan Sri Suhesti	Indonesian Center for Estate Crops Research and Development, Indonesia
10.	14.30-14.40	1143	Analysis of Consumer Preference of Rambutan Fruit as a Leading Commodity In Langsa City	Faoeza Hafiz Saragih, and Fiddini Alham	Agribussiness, Agriculture Faculty, Samudra University, Indonesia
11.	14.40-14.50	1168	Predicting The Impact of Climate Change on Indonesia's Five Main Horticulture Commodities	Adi Setiyanto and Sahat M. Pasaribu	Indonesian Center for Agriculture Socio-Economic and Policy Studies (ICASEPS), Ministry of Agriculture, Indonesia
12.	14.50-15.00	1170	The Household Welfare of Horticulture Farmer: A Case in Pengalengan Sub-District, Bandung Regency, West Java	Hepi Hapsari, Eliana Wulandari, Zumi Saidah, and Tuti Karyani	Dept. Social Economic, Faculty of Agriculture, Universitas Padjadjaran, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Dr. rer. Ir. Djeimy Kusnaman, M.Sc.Agr.			
Notulen		Sunendar, S.P., M.Sc.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1203	Supporting Institutional and Independence Economic Development for Small-Scale Fishers	Suharno, Agus Arifin and Ary Yunanto	Faculty of Economics and Business, Jenderal Soedirman University, Indonesia
2.	15.10-15.20	1207	The Risk Vulnerability Analysis of Supply Chain Vegetables in Coastal Farming Land	Banun Diyah Probowati, Adi Djoko Guritno, Mochammad Maksum, and Dyah Ismoyowati	Department of Agro-Industrial Technology, Universitas Trunojoyo Madura, Indonesia
3.	15.20-15.30	1210	Price Volatility of Staple Food Using ARCH-GARCH Model	Indah Setiawati and Ardiansyah	Faculty of Agriculture, Jenderal Soedirman University, Indonesia
4.	15.30-15.40	1211	Agroindustrial Development of Strategy for Cardamom Coffee Agroforestry Farmer Group in Sumberjambe subdistrict, Jember District, East Java, Indonesia	Nita Kuswardhani, M. Rizky E.K S, Alifah D. E	Department of Agricultural Product Technology, Faculty of Agricultural Technology, University of Jember
5.	15.40-15.50	1219	Evaluating Farmers' Knowledge, Perceptions and Practices in Managing Inputs of Maize Farming in Majalengka	Zumi Saidah, Erna Rachmawati, and Rani Andriani Budi Kusumo	Faculty of Agriculture, Padjadjaran University
6.	15.50-16.00	1226	Determinants of Farmer Behavior in Using Input Production: Empirical Study on Red Chili Farming	Zumi Saidah, Hepi Hapsari, and Eliana Wulandari	Faculty of Agriculture, Padjadjaran University

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1275	Assessing Emerging Agribusiness Entrepreneurs by Using Brainwave Technology	Budi Dharmawan, Anisur Rosyad, Alpha N. Mandamdari, Lutfi Zulkifli, Sunendar, and Lusia M. Silitonga	Department of Agricultural Economics and Social Sciences, Jenderal Soedirman, University, Indonesia
8.	16.10-16.20	1276	Development Strategy of Rice Business "Inpago Unsoed 1" Using Blue Ocean Strategy	Budi Dharmawan, Ulfah Nurdiani, and Ratna Satriani	Department of Agricultural Economics and Social Sciences, Jenderal Soedirman, University, Indonesia
9.	16.20-16.30	1278	Technical Efficiency And Factors Affecting The Technical Ineficiency Of Dry Onion And Rain In Brebes District	Agus Sutanto, Suyono and Sri Widarni	Department of Agricultural Economics and Social Sciences, Jenderal Soedirman, University, Indonesia
10.	16.30-16.40	1279	The Influence of Land Tenure Status Towards High-yield Saline Rice Production in Pemalang District, Central Java, Indonesia	Ratna Satriani and Budi Dharmawan	Department of Agricultural Economics and Social Sciences, Jenderal Soedirman, University, Indonesia

PARALLEL SESSION (Room: ABE 1)

Session 1 (13.00 – 15.00)					
Moderator		Ardiansyah, S.TP., M.Si., Ph.D.			
Notulen		Dian Novitasari, S.TP., M.Si.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	657	Design of Handheld Arduino-based Near Infrared Spectrometer for Non-Destructive Quality Evaluation of Siamese Orange	Susanto B. Sulistyo, Siswantoro, Agus Margiwiyatno, Masrukhi, Asna Mustofa, Arief Sudarmaji, Rifah Ediati, Riana Listanti, and Hety Handayani Hidayat	Agricultural Technology Department, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
2.	13.10-13.20	887	Papaya Fruit Characters Based Selection on New Superior Variety Assembly Program to Improve Health and Consumption	Tri Budiyanti, Noflindawati , Riry Prihatini, and Dewi Fatria	Indonesian Tropical Fruit Research Institute, Jalan Raya Solok-Aripan km.8 Solok 27301, West Sumatra, Indonesia
3.	13.20-1330	914	The Addition of Biosilica and Coconut Oil to Improve the Characteristic of Biofoam Packaging	Kendri Wahyuningsih, Evi Savitri Iriani, and Bunda Amalia	Badan Penelitian dan Pengembangan Pertanian, Ministry of Agriculture, Indonesia
4.	13.30-13.40	927	Optimization of Tapping Time, Duration and Addition of Natural Preservation (Laru) for Quality Control of Coconut SAP	Mustaufik, Lilik Sutiarso, Kuncoro Harto Wododo, and Sri Rahayoe	Food Technology Department, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
5.	13.40-13.50	936	Development Potential of Multi Purpose Trees Special (MPTS) Area In Northern Bandung as An Alternative for Sustainable Land Use in The Upstream Area	Bambang Susanto, Hendi Supriyadi, and Yanuar Argo	West Java Assessment Institute for Agricultural Technology
6.	13.50-14.00	942	Application of Soil Water Assessment Tool (SWAT) in Selopamioro Catchment for Determining Soil and Water Conservation Strategy	H Habib, Ngadisih, R Tirtalistyani, S Susanto	Department of Agricultural and Biosystem Engineering Faculty of Agricultural Technology Universitas Gadjah Mada

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	979	The Relationship of Soil Nitrate Distribution and Growth Rate of Capsicum frutescens in Subsurface Flow Constructed Wetland integrated with Household Septic Tank	Yudha Dwi Prasetyatama, Ngadisih, Rizki Maftukhah, Rudiati Evi Masithoh, J.N.W. Karyadi, and Lilik Soetiarso	Universitas Gadjah Mada, Indonesia
8.	14.10-14.20	981	Kinetics Analysis of The Effect of Types and Concentrations of Ripening Agents on The Physical Quality Changes of Banana Fruit (Musa acuminata Colla)	Ahmad Khairuddin and Nursigit Bintoro	Department of Agricultural Engineering and Biosystem, Faculty of Agricultural Technology, Gadjah Mada University, Indonesia
9.	14.20-14.30	991	Equilibrium and Kinetic Studies of Methylene Blue Biosorption by Sugar Plam Dregs	Hisyam Musthafa Al Hakim and Wahyu Supartono	Doctoral Student at Gadjah Mada University, Indonesia
10.	14.30-14.40	1037	Application of Spectroscopy Fourier Transform Near-Infrared (FT-NIR) For Detection Adulteration in Palm Sugar	Kunti Rismiwandira, Ferini Roosmayanti, M Fahri Reza Pahlawan, and Rudiati Evi Masithoh	Department of Agricultural and Biosystems Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
11.	14.40-14.50	1198	Crop Stage Classification Using Supervised Algorithm based on UAV and Landsat 8 Image	A Hardanto, Ardiansyah, and A Mustofa	Faculty of Agriculture, Jenderal Soedirman University, Indonesia
12.	14.50-15.00	1102	Evaluation of The Flushing Efficiency of The Pengasih Weir Sand Trap, Special Region of Yogyakarta	Ansita Gupitakingkin Pradipta, Gina Isna Nafisa, Murtiningrum, Chandra Setyawan, and Sigit Supadmo Arif	Department of Agricultural and Biosystems Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Dr. Afik Hardanto, S.TP., M.Sc.			
Notulen		Dian Novitasari, S.TP., M.Si.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1157	Prediction of the velocity of air flow by dimentional analysis for drying application	Siswantoro, Agus Margiwiyatno, and Joko Maryanto	Study Program of Agricultural Engineering, Department of Agricultural Technology, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
2.	15.10-15.20	1167	Anomaly Weather and Its Impact on The Growth of Maize (Zea mays)	Wini Prayogi Abdila A, and Bayu Dwi Apri Nugroho	Master Program, Departement of Agricultural and Biosystems Engineering, Universitas Gadjah Mada, Indonesia
3.	15.20-15.30	1175	The effect of Extreme Weather on Rice Growth and Productivity	Hertiyana Nur Annisaa, and Bayu Dwi Apri Nugroho	Master Program Departement of Agriculture and Biosystem Engineering
4.	15.30-15.40	1229	Development of Short-Term Evapotranspiration Forecasting Model using Time Series Method for Supporting the Precision Agriculture Management in Tropics	Andri Prima Nugroho, Dita Endah Rahayu, Lilik Sutiarso, Murtiningrum, Mohammad Affan Fajar Falah and Takashi Okayasu	Department of Agricultural and Biosystems Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
5.	15.40-15.50	1247	Physical Characteristics of Heat Resistant Dark Chocolate Made with The Addition of Cocoa Butter Replacer at Several Durations of Crystal Maturation	Nafisa Shinta Syafira, Arifin Dwi Saputro, Annisa Nur Khasanah, Theresia Oetama1, Sri Rahayoe1, and Nursigit Bintoro	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
6.	15.50-16.00	1248	Physical Characteristics of Chocolate Made with Cocoa Butter Replacer (CBR) and Coffee Powder	Annisa Nur Khasanah, Arifin Dwi Saputro, Nafisa Shinta Syafira, Theresia Oetama1, and Joko Nugroho Wahyu Karyadi, and Yudha Dwi Prasetyatama	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1272	Physical and Mechanical Properties of Paper Pulp Packaging made from Banana Stalk and Rice Husk	Rifah Ediati, Ulumul Nur Aina, Agus Margiwiyatno and Riana Listanti	University of Jenderal Soedirman, Indonesia
8.	16.10-16.20	1274	Rice fields Classification among Google Earth Sattelite Images using Convolutional Neural Network	Imron Rosyadi, Fendy Prayogi, Farida Asriani, and Rifah Ediati	Electrical Engineering, Jenderal Soedirman University, Indonesia
9.	16.20-16.30	1193	Biomass Growth of Red Spinach in Plant-Factory System under Three Kinds of LED Light Sources	Ardiansyah, Afik Hardanto, and Eni Sumarni	Lab. of Bio-Environmental Management and Control Engneering, Dept. of Agricultural Engineering, Jenderal Soedirman University, Indonesia

PARALLEL SESSION (Room: ABE 2)

Session 1 (13.00 – 15.00)					
Moderator		Krissandi Wijaya, S.TP., M.Agr., Ph.D.			
Notulen		Abdul Mukhlis Ritonga., S.TP., M.Sc.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	943	Soil Moisture Distribution Analysis of Subsurface Flow Constructed Wetland using Capacitive Soil Moisture Sensor and its Relationship with The Growth Characteristics of *Ipomoea aquatica* Forsk.	Danang Setiawan, Fatkhul Rohman, Yudha Dwi Prasetyatama , Lilik Soetiarso, and Radi	Department of Agricultural and Biosystem Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
2.	13.10-13.20	946	Retention Basins and Their Roles in Land Water Balance: Case Study Longan (*Dimocarpus longan*) Orchard in Selopamioro Village, Imogiri Sub District, Bantul Yogyakarta	H Dhiyaurrohman, Murtiningrum, A G Pradipta, Ngadisih, and R Kurniawan	Department of Agricultural and Biosystem Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
3.	13.20-1330	947	The Effect of Types and Moisture Contents of Soybeans (*Glycine max*) on Terminal Velocity	Aldhayu Sam Safira and Nursigit Bintoro	Departement of Agricultural Engineering and Biosystem, Faculty of Agricultural Technology, Gadjah Mada University, Indonesia
4.	13.30-13.40	950	The Influence of The Types and Moisture Contents on Sphericity and Geometric Means Diameter of Coffee Beans (*Coffea* sp)	Azizah Putri Khansa and Nursigit Bintoro	Departement of Agricultural Engineering and Biosystem, Faculty of Agricultural Technology, Gadjah Mada University
5.	13.40-13.50	952	Modelling the respiration rate of Mango (cv. Manalagi) during storage under various temperatures and gas composition	Dwi Rahayua, Nursigit Bintorob and Arifin Dwi Saputrob	University of Gadjah Mada, Indonesia
6.	13.50-14.00	953	Design of Bed Dryer for Sweet Corn Seeds (*Zea mays saccharata* L.)	J N W Karyadi, A Purnomo, R E Masithoh and D Ayuni	Department of Agricultural and Biosystem Engineering, Universitas Gadjah Mada

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1101	Determination of Thermal Difusivity of Corn Kernel and Milled Corn Kernel Using Numerical Method	Sri Waluyo, Andiko Ardiyanto, and Mareli Telaumbanua	Department of Agricultural Engineering, University of Lampung, Indonesia
8.	14.10-14.20	1114	Effect of Various Drying Methods on the Physical Characteristics of Arrowroot Powder	Y P Indrasari, J N W Karyadi, N F Nugraheni, S N Tarwaca, R Albyan, I Setiyadi and D Ayuni	Dept. of Agricultural and Bio-systems Engineering, Universitas Gadjah Mada, Indonesia
9.	14.20-14.30	1125	Impact of Pandemic Covid-19 on Food Sufficency in Bantul Yogyakarta - Indonesia	L Fitriana, S Susanto, Ngadisih, C Setyawan, and R Tirtalistyani	Department of Agricultural and Biosystem Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
10.	14.30-14.40	1126	Climate Stresses and its Impact Towards Food Sufficency: A Case in Bantul Regency Yogyakarta - Indonesia	L Fitriana, S Susanto, Ngadisih, C Setyawan, and R Tirtalistyani	Department of Agricultural and Biosystem Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
11.	14.40-14.50	1129	Estimating of Soil Moisture using Shetran Model at the Cisanggarung Catchment Area	Suroso, Rizky Putri Wahyuni, and Ardiansyah	Department of Civil Engineering, Faculty of Engineering, Universitas Jenderal Soedirman, Indonesia
12.	14.50-15.00	1132	Design of Wireless Soil Moisture Probe Based on Internet of Things for Sandy Land	Arief Sudarmaji, Purwoko Hari Kuncoro, Krissandi Wijaya, and Agus Margiwiyatno	Study Program of Agricultural Engineering, Agriculture Faculty, Jenderal Soedirman University, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Arief Sudarmaji, S.T., M.T., Ph.D.			
Notulen		Abdul Mukhlis Ritonga., S.TP., M.Sc.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1144	Ground Water Depth Prediction Using Shetran Model in Citarum River Basin	Suroso, Febiani Pratama Rahmat, and Ardiansyah	Department of Civil Engineering, Faculty of Engineering, Universitas Jenderal Soedirman, Indonesia
2.	15.10-15.20	1286	Investigation on the application of subsoiler vibration to reduce the energy requirement	Saad Abdul Jabbar Al-rajabo, Yousif Yakoub. Hilal, and Raqeeb Hummadi Rajab	Department of Agricultural Machines and Equipment, College of Agriculture and Forestry, University of Mosul, Iraq
3.	15.20-15.30	1194	Vegetation Cover Modelling for Soil Erosion Control in Agricultural Watershed	A Prasetyo, C Setyawan, Ngadisih and R Tirtalistyani	Department of Agricultural and Biosystem Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
4.	15.30-15.40	1196	Impact of Vibration on the Quality of Tomato Produced by Simulated Transport	Mai Al Dairi; Pankaj B. Pathare,and Adil Al-Mahdouri	Dept.of Soils, Water & Agricultural Engineering; College of Agricultural & Marine Sciences; Sultan Qaboos University; Oman
5.	15.40-15.50	1249	Physical Characteristics of Chocolate Compound Made with Various Flavouring Agent Produced using Melanger as A Small Scale Chocolate Processing Device	Zulvika Kusuma Devi, Arifin Dwi Saputro, Ayu Kirana Dewi, Faris Irmandharu, Theresia Oetama, Sri Rahayoe, and Nursigit Bintoro	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
6.	15.50-16.00	1250	Physical Properties of Heat Resistant Red Velvet Compound Chocolates Sweetened with Stevia And Inulin as An Alternative Sweetener	Ayu Kirana Dewi, Arifin Dwi Saputro, Zulvika Kusuma Devi, Faris Irmandharu, Theresia Oetama, Sri Rahayoe, and Joko Nugroho Wahyu Karyadi	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1251	Physical Characteristics of Instanised Chocolate Beverage Powder Produced with Palm Sugar and Sucrose as Sweeteners	Phung Adi Setiadi, Arifin Dwi Saputro, Zahfarina Nurkholisa, Yusuf Fahrudin Hardiyanto, Nursigit Bintoro, and Joko Nugroho Wahyu Karyadi	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
8.	16.10-16.20	1289	Effect of horizontal ridge with various drainage intervals on soil water and nutrients dynamics in potato field	Krissandi Wijaya, Asna Mustofa, Purwoko Hari Kuncoro, Poppy Arsil, Susanto Budi Sulistyo, Arief Sudarmaji, and Dwi Rarasati Sandra Devi	Agricultural Engineering Study Program, Department of Agricultural Technology, Indonesia

PARALLEL SESSION (Room: ABE 3)

Session 1 (13.00 – 15.00)					
Moderator		Rifah Ediati, S.TP., M.P.			
Notulen		Hety Handayani Hidayat, S.T.P., M.Si.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	970	Physiological Activity of Banana Coated with The Combination of Sago Starch and Cellulose Nanofiber Edible Coating	Rahmiyati Kasim, Nursigit Bintoro, Sri Rahayoe, and Yudi Pranoto2	Gadjah Mada University, Indonesia
2.	13.10-13.20	971	Evaluation of Watermelon Ripeness Using Self-Developed Ripening Detector	Wiyan Afriyanto Pamungkas and Nursigit Bintoro	Gadjah Mada University, Indonesia
3.	13.20-1330	975	The Effect of Concentrations and Exposure Durations of Ethylene Gas on The Respiration Rate of Tomato Fruit (Solanum lycopersicum)	Siti Aprianti and Nursigit Bintoro	Department of Agricultural Engineering and Biosystem, Faculty of Agricultural Technology, Gadjah Mada University, Indonesia
4.	13.30-13.40	976	Content and Potential of Rice Straw as a Mineral Source of Zinc in Ruminant Feed	N D Suretno and F Y Adriyani	Lampung Assessment Institute for Agricultural Technology, Indonesia
5.	13.40-13.50	978	Optimization of Irrigation Water Allocation by Using Linear Programming: Case Study on Belitang Irrigation System	Fathul Imron, and Murtiningrum	Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
6.	13.50-14.00	970	Physiological Activity of Banana Coated with The Combination of Sago Starch and Cellulose Nanofiber Edible Coating	Rahmiyati Kasim, Nursigit Bintoro, Sri Rahayoe, and Yudi Pranoto	Gadjah Mada University, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1147	Application of Path Analysis to Determine Factors Relationship Affecting Irrigation Water Sufficiency in Tertiary Level of Belitang Irrigation System, Indonesia	Murtiningrum Murtiningrum and Fathul Imron	Department of Agricultural and Biosystem Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
8.	14.10-14.20	1152	Insects Identification with Convolutional Neural Network Technique in the Sweet Corn Field	Aldeansyah Prima Naufal, Choatpong Kanjanaphachoat, Adi Wijaya, and Rudiati Evi Masithoh	Department of Agricultural and Biosystem Engineering, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
9.	14.20-14.30	1155	Impact of Land Use Changes on the Water Availability in the Ciwulan Watershed, West Java	Suroso, Afsari Putudewi, and Ardiansyah	Department of Civil Engineering, Faculty of Engineering, Universitas Jenderal Soedirman, Indonesia
10.	14.30-14.40	1252	Physical Characteristics of Instanised Cocoa Drink Formulated With The Addition of Maltodextrine Produced Using Continuous-Type Steam Jet Agglomerator	Zahfarina Nurkholisa, Arifin Dwi Saputro, Yusuf Fahrudin Hardiyanto, Phung Adi Setiadi, Nursigit Bintoro, and Joko Nugroho Wahyu Karyadi1	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
11.	14.40-14.50	1253	The Effect of Cocoa Powder, Material Thickness and Time of Steaming on The Characteristics of Instanised Cocoa Drink Powder Made Using Batch-Type Steam Jet Agglomerator	Yusuf Fahrudin Hardiyanto, Arifin Dwi Saputro, Phung Adi Setiadi, Zahfarina Nurkholisa, Nursigit Bintoro, and Redika Ardi Kusuma1	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia
12.	14.50-15.00	1254	Physicochemical Characteristics of Chocolate Produced with Cocoa Bean at Different Level of Fermentation Process	Arifin Dwi Saputro, Dimas Rahadian Aji Muhammad, Wenny Bekti Sunarharum, Zulvika Kusuma Devi, and Faris Irmandharu	Department of Agricultural and Biosystems Engineering Faculty of Agricultural Technology Universitas Gadjah Mada, Indonesia

PARALLEL SESSION (Room: FST 1)

Session 1 (13.00 – 17.00)					
Moderator		Dr. Ervina Mela Dewi, S.T., M.Si.			
Notulen		Ali Maksum, S.TP., M.P.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	889	Characteristics of Vegetarian Patties Burgers Made from Tofu and Tempeh	Heny Herawati, and Elmi Kamsiati	Indonesian Center for Agricultural Postharvest Research and Development, Indonesia
2.	13.10-13.20	890	Effect of Stabilizer Type and Concentration on the Characteristics of Black Pepper Sauce	Elmi Kamsiati, and Heny Herawati	Indonesian Center for Agricultural Postharvest Research and Development, Indonesia
3.	13.20-1330	901	Low Tannin Instant Sorghum Porridge to Support Food Diversification	Winda Haliza and Sri Widowati	Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Indonesia
4.	13.30-13.40	905	Sustainable Single Origin Chocolate Production for Rural Development	Dimas Rahadian Aji Muhammad, Dwi Larasatie Nur Fibri, Arifin Dwi Saputro, and Wenny Bekti Sunarharum	Universitas Sebelas Maret, Indonesia
5.	13.40-13.50	909	Application of Monodiacylglycerol (MDAG) From Nutmeg Butter in Mayonnaise and Its Characteristic	Prima Luna, Herlina Marta and Hernani	Indonesian Center for Agricultural Postharvest Research and Development, Indonesia
6.	13.50-14.00	911	Nutrition Value and Color of Se'i Processed From Cull Bali Cow With Different Body Condition Score and Smoking Method	Gemini E.M. Malelak, Imanuel Benu, Arnol E Manu, and I Gusti Ngurah Jelantik	Faculty of Animal Science, Nusa Cendana University, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1010	The Effect of Temperature and the Sodium Bicarbonate Addition on the Performance of The Microwave-Assisted Extraction of Phenolic Compound from Red Sorghum	Devi Yuni Susanti and Wahyudi Budi Sediawan, Mohammad Fahrurrozi, and Muslikhin Hidayat	Department of Chemical Engineering, Faculty of Engineering, UGM, Indonesia
8.	14.10-14.20	1026	Technology Transfer for The Empowerment of Cocoa Farmers and Small-Scale Chocolate Industries in Rural Area: A Case Study in Gunung Kidul	Dimas Rahadian Aji Muhammad, Mercy Bientri Yunindanova, and Sigit Prabawa	Faculty of Agriculture, Universitas Sebelas Maret, Indonesia
9.	14.20-14.30	1091	The Effect of Coconut Sap and Skim Milk Concentration on Physicochemical and Sensory Characteristic of Coconut Sap Drink Yogurt	Karseno, Erminawati, Tri Yanto and Isti Handayani	Department of Agriculture Technology, Jenderal Soedirmn University, Indonesia
10.	14.30-14.40	1128	The Effect of Techniques and Fermentation Time on The Cocoa Beans Quality (*Theobroma cacao*, L.).	Kun Tanti Dewandaria, Rahmawatib, S. Joni Munarsoa	Indonesian Centre for Agriculture Postharvest research and Development, Indonesia
11.	14.40-14.50	1130	Environmental Cause of Postharvest Enlargement in Cucumber Fruit	Junjira Satitmunnaithum, Hikaru Muroi, Yuuki Tashiro, Haruna Sato, Sayuri Tanabata, and Tatsuo Sato	Tokyo University of Agriculture and Technology, Japan
12.	14.50-15.00	1163	Physicochemical Quality Characterization of Dehydrated Strawberry Fruit Production in Tropical Environment	Ivonny Cahya Ardhani, Kuncoro Harto Widodo and Mohammad Affan Fajar Falah	Department of Agroindustrial Technology, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Karseno, S.P., M.P., Ph.D.			
Notulen		Ali Maksum, S.TP., M.P.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1164	Determination of Production Factors of Dehydrated Strawberry by Using Taguchi Method Approach.	Ivonny Cahya Ardhani, Refika Melina Putri, Mohammad Affan Fajar Falah and Kuncoro Harto Widodo	Department of Agroindustrial Technology, Faculty of Agricultural Technology, Universitas Gadjah Mada, Indonesia
2.	15.10-15.20	1139	Product Development of Coconut Sugar Tea Drink with Quality Function Deployment	Ervina Mela, Karseno and Dayinih	Food Technology Study Program, Agricultural Faculty, Universitas Jenderal Soedirman, Indonesia
3.	15.20-15.30	1191	Physicochemical Characterization of Cocoyam (*Xanthosoma Sagittifolium*) Starch from Banjarnegara Highland as A Local Source of Carbohydrate	Lukmanul Hakim, D W Marseno, Supriyanto, and P Triwitono	Department of Food and Agricultural Product Technology, Faculty of Agricultural Technology, Gadjah Mada University, Indonesia
4.	15.30-15.40	1199	The Thickness of the Microcapsule Layers of the SPI Nanofibrils	Warji, Nanik Purwanti, Sutrisno Suro Mardjan, and Sri Yuliani	Agricultural Engineering Department, Lampung University, Indonesia
5.	15.40-15.50	1200	Antioxidant and Sensory Properties of Coffee-Ginger Beverage Based on Decaffeinated and Non-Decaffeinated Robusta Coffee Beans on Various Formulas	Nita Kuswardhani, Niko Pandu, Aji Sukoco, Puspita Sari	Department of Agricultural Product Technology, Faculty of Agricultural Technology, University of Jember, Indonesia
6.	15.50-16.00	1281	The Determination of Shelf Life of The Carica Seeds Powder	Santi Dwi Astuti, Sri Lestari, Erminawati, Sri Widarni, and Feronika Nathan Wibawa	Jenderal Soedirman University, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	16.00-16.10	1282	The Effect of Addition of Whey Protein Concentrate and Emulsifier on Characteristics of Cheddar Cheese Analogue from Corn Milk	Juni Sumarmono, Nur Aini, Budi Sustriawan, V. Prihananto, Eka Safitri, and Annisa Widiastuti	Department of Animal Science, Jenderal Soedirman University, Indonesia
8.	16.10-16.20	1283	Characteristics of sorghum cookies with the addition of almond flour and fat variations	Budi Sustriawan, Retno Setyawati, Rifka Hania, Revilla Tresna, Reza Irfan, and Nur Aini	Department of Food Technology, Jenderal Soedirman University, Indonesia
9.	16.20-16.30	1284	The Effect of Hydrocolloid on stability of Papaya-Pineapple Jelly drink During Storage	Isti Handayani	Department of Food Technology, Faculty of Agriculture, Universitas Jenderal Soedirman, Indonesia
10.	16.30-16.40	1285	Enzymati Kinetis Study of Cellulosa Hydrolysis Using Cellulase From Goath's Rumen	Gunawan Wijonarko, Agus Margiwiyatno, Nova Damayanti	Department of Agricultural Technology, Faculty of Agriculture, Universitas Jenderal Soedirman, Indonesia

PARALLEL SESSION (Room: FST 2)

Session 1 (13.00 – 15.00)					
Moderator		Dra. Erminawati, M.Sc., Ph.D.			
Notulen		Nur Wijayanti, S.TP., M.P.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	13.00-13.10	930	Potential for Processing of Pondoh Zalacca Seeds to be Zalacca Seed Cofee as Functional Drinks	Ratna Wylis Ariefa and Robet AsnawiIa	Lampung Assesment Institute Agricultural Technology (AIAT), Indonesia
2.	13.10-13.20	933	The Effect of Materials Amount in the Steam and Water Methods Distillation Tank on the Citronella Oil Chemical Composition (*Cymbopogon Nardus* L. Rendle)	I Ketut Budaraga and Rera Aga Salihat	Universitas Ekasakti, Indonesia
3.	13.20-1330	962	Development of In-situ Detection Method of Chicken Meat Quality Using Gas and Color Sensors Equipped with Chemometric System	Rr Pramilih Wahyu Nastiti and Nursigit Bintoro	Department of Agricultural Engineering and Biosystem, Faculty of Agricultural Technology, Gadjah Mada University), Indonesia
4.	13.30-13.40	984	Value-Added Analysis of *Lactobacillus Acidophilus* Cell Encapsulation Using Eucheuma Cottonii By Freeze-Drying and Spray-Drying Methods.	S.O.N. Yudiastuti, Sukarminah, E, Mardawati, E and Kastaman, R	Politeknik Negeri Jember, Indonesia
5.	13.40-13.50	997	Shelf-Life Evaluation of Local West Java Sorghum Biscuits Enriched with *Lactobacillus Acidophilus* on Various Types Of Packaging	S.O.N. Yudiastuti, Sukarminah, E, Mardawati, E and Kastaman, R	Politeknik Negeri Jember, Indonesia
6.	13.50-14.00	1002	Quality of Flour Prepared from Various Varieties of Potatoes	Setyadjit, Tatang Hidayat, Ermi Sukasih, Dwi Amiarsi, Sandi Darniadi, and Ali Asgar	Indonesian Center for Agriculture Postharvest Research and Development, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
7.	14.00-14.10	1180	Physicochemical and Sensory Properties of Cookies Produced from the Flour of Banana Variety of "Raja Lawe" and "Raja Labu"	Rifda Naufalin, Condro Wibowo1, and Nuurul Arofah	Food Science and Technology Study Program, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
8.	14.10-14.20	1141	Effects of Different Heat Shock Treatment Methods on The Isolation and Purification of Strawberry Active Ingredients	Zhou Yixuan and Tatsuo Sato	Ibaraki University, Japan
9.	14.20-14.30	1150	Physical Properties of Dried-Growol Made with Variation of Cassava Variety and Fermentation Time	Chatarina Wariyah, Riyanto, Bayu Kanetro, Tri Windarsih and Rika Nuraini Ardiah	Faculty of Agroindustry, Universitas Mercu Buana Yogyakarta, Indonesia
10.	14.30-14.40	1156	Fat Content and Preferences of Salted Duck Egg Enriched With Pepper	E Novitasari, ND Suretno and A Rivaie	Lampung Assessment Institute for Agricultural Technology, Indonesia
11.	14.40-14.50	1161	Characteristic of Banana Flour Produced from the Variety of "Raja Lawe" and "Raja Labu"	Wibowo, C, Naufalin, R. and Nafisah, M.	Faculty of Agriculture Jenderal Soedirman University, Indonesia
12.	14.50-15.00	1162	Effect of Organic Fertilizer and Application of Charcoal on Quality of Potato	Wibowo, C., Wijaya, K. and Biyantara, A.L	Faculty of Agriculture Jenderal Soedirman University, Indonesia

Session 2 (15.00 – 17.00)					
Moderator		Condro Wibowo, S.TP., M.Sc., Ph.D			
Notulen		Nur Wijayanti, S.TP., M.P.			
No	Time	Paper ID	Title	Authors	Affiliation
1.	15.00-15.10	1204	The Hardness Analysis of Noodles Made From Modified Cassava Flour, Spirulina (*Spirulina platensis*) and Basil Leaves Extract (*Ocimum sanctum* l.)	Ahmad Ni'matullah Al-Baarri, Widayat, Anang M Legowo, Ranti Aulia, Ega Kinanti Prahasiwi, and Ailsa Afra Mawarid	Department of Food Technology, Faculty of Animal and Agricultural Sciences, Diponegoro University, Indonesia
2.	15.10-15.20	1206	Study of Color Development from D-psicose and Methione Maillard Reaction Products (MRPs)	Ahmad Ni'matullah Al-Baarri, Widayat, Anang M Legowo, Asa Alifia Ranini, Bagoes Aris Setiawan, and Fatma Puji Lestari	Department of Food Technology, Faculty of Animal and Agricultural Sciences, Diponegoro University, Indonesia
3.	15.20-15.30	1209	The Effect Of Accelerated Aging Of Rough Rice With High-Temperature Storage On Color And Quality Of Milled Rice	Tanwirul Millati	Department of Agro-Industrial Technology, Faculty of Agriculture, University of Lambung Mangkurat, Indonesia
4.	15.30-15.40	1218	Optimization of Simple Sugar Extraction of Nagara Bean (*Vigna Unguiculata* ssp. Cylindrica) on Concentration and Proportion of Ethanol	Susi, Udiantoro and S. Gendrosari	University of Lambung Mangkurat, Indonesia
5.	15.40-15.50	1221	Physical Quality Change in Orange Fruit (RGL Variety): Effects of Different Temperatures in Storage	Wilda Mikasari, Irma Calista, Darkam Mussadad, Emlan Fauzi, Monita Puspitasari, Lina Ivanti, Taufik Hidayat, Shannora Yuliasari, and Yudi Sastro	Researcher BPTP Bengkulu, Indonesia

No	Time	Paper ID	Title	Authors	Affiliation
6.	15.50-16.00	1271	The Effect of Arginine Addition on Chemical and Antioxidant Properties of Coconut Sap During Heating Treatment	Pepita Haryanti, Djagal Wiseso Marseno, Supriyadi and Umar Santoso	Jenderal Soedirman University, Faculty of Agriculture, Department of Agricultural Technology, Indonesia
7.	16.00-16.10	1287	Antioxidant Activities, Physicochemical Properties and Sensory Characteristics of Kecombrang Tea (*Etlingera elatior*) as Functional Food	Erminawati, Rifda Naufalin and Dwi Nugroho Wibowo	Department of Food Science and Technology, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
8.	16.10-16.20	1288	Antioxidant Potential Ingredient of Kecombrang Plants (*Etlingera elatior*)	Rifda Naufalin, Erminawati, and Rumpoko Wicaksono	Department of Food Science and Technology, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
9.	16.20-16.30	1290	Effect of Feeding an Antioxidant Rich Coffee on MDA and SOD of Serum and Liver Tissue on Diabetic Rats Induced Streptozotocin	H. Dwiyanti, R.Setyawati, D.Krisnansari and V.Prihananto	Department of Food Science and Technology, Faculty of Agriculture, Jenderal Soedirman University, Indonesia
10.	16.30-16.40	1291	Effect of Drying Method and Water Ratio on Microbial, Rheological and Sensory Properties of Rehydration of Cow and Goat Yogurt Powder	Ibrahim Aldaw Ibrahim, Rifda Naufalin, Erminawati Wuryatmo, Hidayah Dwiyanti	Faculty of Agriculture, Omdurman Islamic University, Khartoum, Sudan
11.	16.40-16.50	1292	The Role of Pretreatment in Enhancing Yield and Antioxidant Activity of Lemongrass (*Cymbopogun citratus*) Essential Oil	Erminawati, Rifda Naufalin, Wuryatmo Sidik and Fadhil A Rahman	University of Jenderal Soedirman, Purwokerto, Indonesia

ID: Invited Speaker's Abstract

INVESTIGATING DETERMINANTS OF SUCCESSFUL ENTREPRENEURSHIP: THE USING OF BRAINWAVE/EEG TECHNOLOGY TO DELIBERATE INDIVIDUAL ASPECTS

Lusia MS, Budi Dharmawan, Ting-ting Wu, Astrid Tiara Murti, Pei-Yu

ABSTRACT

The paper describes an attempt to integrate neuroscience into Entrepreneurship classroom using EEG (Electroencephalogram) Technology. The purpose of the study is to find out whether EEG result has a correlation with the students' entrepreneurial skill and to know the students' perceptions of and attitudes toward their learning experiences in using EEG tools. One class experiment with pretest and posttest was conducted to collect the learners' attention level, learning achievement and learning attitude, both quantitative and qualitative data. The student's learning attention states was monitored via an EEG monitor. The participants were 20 University students in Indonesia. Using EEG tools for 25 minutes during the regular class for five meetings is challenging. The experimental results show a significant correlation between the attention level and creativity skill of the students. Besides, it shows that there is an influence of learning activity using EEG brainwave to participants' risk-taking and decision-making, and this study also yielded a positive result on the students' satisfaction and performance. Moreover, qualitative analysis demonstrates that visual feedback that was showed on EEG monitor significantly increase student's attention in the learning experience. The study suggests that when conducting similar studies, it is important to consider that different sample size needs different treatment; therefore, future research might focus on learning activity with a different characteristic of sample size.

Keywords: Electroencephalogram (EEG), neuroscience, attention level, entrepreneurship, entrepreneurial skill, learning performance, learning attitude

ID: Invited Speaker's Abstract

REVITALIZATION OF FARMING AFTER A TSUNAMI DISASTER: A MODEL OF NITROGEN DRIP-FERTILIZATION FOR HIGH YIELD AND QUALITY IN CUCUMBER

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College of Agriculture, Ibaraki University, Japan

To avoid nutrient deficiency and prevent wastage from excess nitrogen application, the nitrogen uptake, and the relationships between other growth parameters of a drip-fertilized greenhouse containing cucumber plants, was estimated by destructive analysis at two-week intervals. Nitrogen uptake positively correlates with leaf area, and periodical nitrogen uptake can be estimated by leaf counts. Thus, the following formula was established:
The amount of absorbed nitrogen (g/m^2/14 days) =
The number of leaves added (number/m^2/14 days) × 0.0441 + 2.189 (spring cultivation)
The number of leaves added (number/m^2/14 days) × 0.0383 + 1.856 (autumn cultivation)
This formula was tested in a practical cultivation experiment. One fourteenth of the formula was applied daily as nitrogen fertilizer through a drip tube. We found that although the amount of nitrogen applied was only 76% of that used in the conventional method, the cucumber yield remained the same.
Rikuzentakata City in the coastal area of Iwate Prefecture, northeast of Honshu Island, was completely devastated by a tsunami caused by the Great East Japan Earthquake (March 11, 2011). Farmlands that sank under the sea were redeveloped by top dressing, but this resulted in immature soil. After the disaster it became increasingly necessary to recover productivity and improve the quality of crops such as cucumber, to prevent farmers from decreasing and, eventually, abandoning cultivation. Thus, the drip fertilization technique was tested for use in the resurgence of cucumber production. The formula for spring cultivation indicated above was adapted for outdoor cucumber cultivation in the summer. A simple handmade drip fertigation device was also developed, which can be affordably built by farmers using generic products. The resulting cucumber yield was 93% and 27% higher in 2016 and 2017, respectively, than that of conventional fertilization. Maintaining plant vigor in the latter cultivation period by sufficient nitrogen fertilization is considered to result in decrease deformities in the products and a more marketable yield. This method saved the nitrogen, costs, and labor associated with fertilization, creating the expectation of high productivity even in immature farm soils. The drip fertilization technique is under investigation as a contributive method to revitalize cucumber production in tsunami-affected areas.

ID: Invited Speaker's Abstract

INNOVATION RESEARCH OF SALINE TOLERANT RICE VARIETY, FROM BREEDING GROUND TO VARIETY RELEASE, DISSEMINATION, COMMERCIALIZATION AND START-UP TEACHING INDUSTRY

Suprayogi
Faculty of Agriculture, Jenderal Soedirman University

Extensive conversion of paddy field into non-agricultural purposes have resulted in the need of extension of rice production area to marginal land which include, among others, saline area which is spread along the coastal area of North Java Island, East Sumatra, South Kalimantan, as well as some other islands. Despite the salinity, this area is potential for rice production. To this concern, Rice Research Group of Faculty of Agriculture, Jenderal Soedirman University has developed saline tolerant rice variety. Through multi-location yield trials supported by Indonesia Rice Consortium, one out of four breeding lines was eventually released in Desember 2014 as saline tolerant high yielding rice variety named 'Inpari Unsoed 79 Agritan'. In the effort of variety extension, an action research was then carried out aiming at knowing yield stability and production challenge of 'Inpari Unsoed 79 Agritan' when grown in a more varied field condition. The method used for this study involved demonstration-plots of 'Inpari Unsoed 79 Agritan' at several costal area of 2-6 d-Siemens meter^{-1} salinity at Central Java, Lampung and Aceh, supported by Grant of Technology Commercialization (2016-2018) of the Ministry of Research, Technology and Higher Education. The result of the study demonstrated that 'Inpari Unsoed79 Agritan' is very promising to be developed in the area where salinity is a limiting factor with the average yield of 6-8 ton hectare^{-1}, depending on salinity condition. 'Inpari Unsoed79 Agritan' has good milling quality, cooking quality, as well as rice palatability. In 2018 'Inpari Unsoed79 Agritan' was recognized by the Indonesian Farmers Association (HKTI) with the Award of 'On-farm Innovative Technology'. In 2019, a Start-up Teaching-Industry for Seed and Premium Rice Production of 'Inpari Unsoed79 Agritan' was established at Jenderal Soedirman University with the support of Grant of Ministry of Research, Technology and Higher Education.

Keywords: Inpari Unsoed 79 Agritan, rice, saline tolerant, technology commercialization, teaching industry.

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ID: 657

Design of Handheld Arduino-based Near Infrared Spectrometer for Non-Destructive Quality Evaluation of Siamese Orange

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ABSTRACT

Quality evaluation, in particular chemical properties, of orange fruit is commonly conducted destructively by extracting its juice. A near infrared spectrometer (NIRS) can be used to quantify chemical properties of orange non-destructively. However, it is quite expensive, not easy to use, and requires special expertise to operate. This research aimed to design a handheld NIRS using AS7263 sensor and Arduino programming to estimate acidity (pH), total soluble solids (TSS) and vitamin C content of Siamese orange. The AS7263 sensor has six NIR channels for different wavelengths, i.e. R (610 nm), S (680 nm), T (730 nm), U (760 nm), V (810 nm) and W (860 nm). A performance test was carried out using 300 samples of orange. The results show that acidity and TSS of orange can be estimated using the developed device with mean absolute percentage error (MAPE) was less than 10%. The accuracy of vitamin C estimation was not good as indicated by MAPE higher than 10%. In addition, the estimation of orange chemical properties by means of backpropagation neural network (BPNN) yielded better results compared to simple regression and multiple regression methods.

Keywords: Chemical properties, AS7263 sensor, Backpropagation neural network, total soluble solids, regression.

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ID: 702

Risk Analysis of Shallot Supply Chain From Nganjuk Regency to Jakarta Indonesia

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ABSTRACT

Production of shallots from Nganjuk District besides being distributed in East Java area also reach Jakarta through Kramatjati Central Market Jakarta (KCMJ). In the distribution of shallots, it can not be removed from the concept of supply chain. Therefore, this research aims to describe the structure of the supply chain of shallots and analyze the risk of the supply chain of shallots from Nganjuk Regency to Jakarta. Farmer sampling is done with random for 30 people in Rejoso District. Supply chain actors after farmers are taken by snowball sampling technique. The respondents experts consisting of representative of academia, government, and supply chain actors, each 1 person. The primary data used are 12 types of risks. Supply chain structure is analyzed in the form of image and AHP model used to analyse supply chain risk. The results showed that the structure of the supply chain from Nganjuk to Jakarta was formed by seven actors consisting of farmers, middlemen, wholesalers, big-scale merchant, traders, retailers, and consumers. There are three biggest risks in the supply chain of shallots from Nganjuk to Jakarta namely market risk, partnership risk, and information risk, where market risk is the most prominent.

Keywords: Risk, supply chain, AHP model, shallot.

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ID: 784

The incorporation of lime and NPK fertilizer on shallot production in peatland

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[2]Indonesian vegetable Research Institute
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ABSTRACT

High on acidity level and low on nutrient availability are the most challenging of shallot production in peat soils. The purpose of this study was to find out the best of lime material and the level of NPK fertilizer on shallot production in peat soil in Central of Borneo, Indonesia. The experiment was used as a Split Plot Design with three replications. The main plot was three types of lime material: 3 t ha^{-1} dolomite, 3 t ha^{-1} agriculture limestone and 1.5 t ha^{-1} calcium hydroxide. The subplots were ten combinations of NPK fertilizers. The results showed that lime materials and doses of NPK fertilizer had a significant effect on shallot growth and yield. Hydrated lime doses 1.5 t ha^{-1} and NPK fertilizer dose 100 kg N ha^{-1}, 100 kg P_2O_5 ha^{-1} and 100 kg K_2O ha^{-1} gave the highest bulb yield (7 t ha^{-1}) compared to other trials. However, this bulb yield was lower compared to different adaptive cultivars from previous studies. Further experiments using higher levels of lime and adapted varieties are necessary to get the optimum bulb yield.

Keywords: Allium cepa; bulb yield; lime; onion; peatland; NPK fertilizer

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ID: 815

Effect of Indigenous Organic Fertilizer on the Growth and Yield of Paddy

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ABSTRACT

Nowadays the continued use of inorganic fertilizer (IF) is too high, it is a serious problem because it affects the soil conditions (biology and chemistry). Long term use of IF also affects people's health because of the chemical content residues. Organic fertilizer (OF) not only provides the solution to maintain soil quality and human health care but also increases farm yield. Back to nature fertilizer is an alternative option by using indigenous materials that are available near us. This research aimed to analyze the effects of indigenous organic fertilizer (IOF) application among other various fertilization on the growth and yield of paddy. The field experimental planned method used Randomized Block Design Pattern with five treatments and repeated four times, that was 1) no fertilizer (control); 2) IF; 3) cow manure compost (CMC), 4) IOF; and 5) commercial fertilizer (CoF). The data were analyzed statistically by the F test, followed by the Duncan Multiple Range Test at the level of 95%. The results showed that various fertilization treatments had no significantly different on the plant height and had very significantly different on the number of tillers at 14, 21, 28, 35, 44, 50, 57, 64, 70 and 80 dat (days after transplanting) and had significantly different on the number of panicles at 86, 93 and 99 dat and had no significantly different on 1000 grains weight and grain yield. The grain yield with IOF higher 1.8% than no fertilizer (control) and higher 4.9% than IF. Our results highlight the benefit of IOF application by using the materials from potential local sources.

Keywords: Plant Growth Promoting Rhizobacteria, manure, local microorganism, paddy

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ID: 816

Village Development Program: The view of "askesiros" in social construction, A Development reality of Local Papuan Residents in Manokwari Regency

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[2,3]Agriculture department of Padjadjaran University
[4]Agriculture department of Papua University, Manokwari
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ABSTRACT

This research aims to explore the knowledge and experience of local Papuan on village programs. Data were obtained from three villages, using questionnaires, focus group discussions (FGD), observations, and interviews. The field findings added more knowledge and experience to participants, such as the program's name, the amount of funds, and its source. The initial limited knowledge was due to the dominance of village elites in information mastering, social status, participation levels, language factors, and social relationships. Village development is internalized with the view of life "askesiros" (progress), which is subjective, considers the development program as the domain and responsibility of the government. Conversely, the village elite felt they had the right to enjoy the "askesiros" in order to accelerate program implementation. The development program needs to start from the village for it is owned by the interest of the government (Monuh). This is because, for the past 10 years, the welfare of the poor population has been ignored with the program destroyed by various interests, minimal participation, and assistance. Therefore, the willingness and sincerity of the village elite, all program managers, and stakeholders are needed in appreciating the cultural value and meaning of "askesiros" as "Ororoisa" development (flowing down).

Keywords: village development program, participation, askesiros (progress), welfare

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ID: 818

Heat Shock-Induced Resistance: The Involvement of Heat Shock Transcription Factors in the Defense Gene Expression in Cucumber Plants

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ABSTRACT

Heat shock transcription factors (HSFs) play as main regulators of plant response to heat stress, but their functions in induced resistance are little known. The aim of this study was to investigate the involvement of HSFs in the expression of peroxidase (*POX*) as a marker gene of induced resistance. Aerial part of cucumber seedlings at the second-leaf stage were dipped into hot water at 50°C for 20s. The expression level of heat shock transcription factor A2 (*HSFA2*) and *POX* in the treated leaves were measured by qRT-PCR. *HSFA2* upregulated 18 hours earlier than *POX*. It was suggested that *HSFA2* activation might be preceded to *POX* in response to heat shock. Therefore, *HSFA2* is assumed to have a key role on the upstream of the process of inducing resistance.

Keywords: *Cucumis sativus* L., defense response, heat shock transcription factor, heat shock treatment

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ID: 844

ANALYSIS OF COMPARATIVE AND COMPETITIVE ADVANTAGE OF MAIZE, RICE AND COCOA COMMODITIES IN GORONTALO

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ABSTRACT

The aims of the study are to: 1) Analyze the profitability aspects of maize, rice and cocoa farming in Gorontalo Province, 2) Analyze the comparative and competitive advantages of maize, rice and cocoa farming in Gorontalo Province, 3) Analyze the impact of government policies on maize, rice and cocoa farming competitiveness in Gorontalo Province. The study was conducted in five districts in Gorontalo Province in 2017. The analysis method used was the Policy Analysis Matrix (PAM). The results of an analysis of costs and profits socially or economically indicate that the cultivation of maize, rice and cocoa farming is profitable. The PCR value of maize, rice and cocoa farming based on the results of the PAM analysis were 0.74, 0.58 and 0.31, respectively. These results indicate that maize, rice and cocoa farming in Gorontalo Province has a competitive advantage because it has a PCR value <1. This means that financially the farming of these three commodities has competitiveness at the farm level. The results of the analysis show that the DRCR value of maize, rice and cocoa farming were 0.5, 0.5 and 0.27, which means that these three farms have a comparative advantage. To improve the competitiveness of maize farming in Gorontalo, the government should adopt a general policy of increasing the selling price of maize by applying regional purchase prices. This is an effort to control the market so that the price at the level of farmers is not played by the traders. Based on the results of the sensitivity analysis, the policy that can be taken by the local government on the commodity of maize and rice in Gorontalo is to reduce fertilizer prices by 10% and increase output prices by 30%. In the cocoa commodity, policies that can be taken by the local government are increasing the ability and quality of cocoa farmers, improving the quality of cocoa pods and creating a conducive business climate.

Keywords: comparative and competitive advantage, maize farming, rice, cocoa, PAM

ID: 862

Growth And Results Response Of Three Maize Varieties Toward Fertilizing Package At Dry Land In Aceh Province

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ABSTRACT

Province of Aceh is one of the hybrid corn production centers with a total area of 47,160 ha and 205,125 tons of production. Production of corn has increased with application of technological components including the use of superior varieties and fertilizer recommendations as well as planting spacing to get maximum results. This study was aimed to find out the response of growth and yield of three superior varieties by hybrid corn to fertilization packages. This research was conducted in July to October 2019 in Bireuen Regency of Aceh Province. The study design used a randomized block design (RBD) with 3 replications and in each treatment set 15 plants as samples. The first factor is the variety (V), that is V1 = Pioner 32; V2 = Bima 19 and V3= Bima 20. The second factor is fertilization package (P) consisting of 2 (two) levels; P1 (Recommendation) (urea 270 kg/ha, NPK 40 kg/ha, and KCl 50 kg/ha); P2 (specific location) (urea 150 kg/ha, SP-36 75kg/ha, and NPK 300 kg/ha). The results showed the Bima 20 variety with the recommended package gave the highest production of 8,03 tons/ha.

Keyword: Aceh Province, Bima 19 Varieties, Bima 20 Varieties, Dry land, Pioner 32 Varieties

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ID: 868

Yield and benefits performance of tabasco pepper farming in Indonesia

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ABSTRACT

Tabasco pepper is the third-largest horticultural commodity after shallots and cabbage cultivated by Indonesian farmers. Previous results showed more than 1.6 million farmers are living on chilli farming. This study aims to determine the efficiency of farming tabasco pepper, through the analysis of agricultural input-output data from 28 provinces of Indonesia using the revenue cost ratio method. The results showed that the cultivation of tabasco pepper was efficient in the country, as illustrated in the value of RC Ratio> 1, which was between 1.12 (South Sumatra)-3.69 (NTT) with an average value of 1.77. The profit level obtained by farmers was IDR 32,483,363/ha/season. Furthermore, the maximum profit was IDR 88,847,100 ha/season while the minimum was IDR 7,805,500/ha/season. The average productivity of tabasco pepper was 3,084 kg/ha, with the highest yield in West Java being 6,423 kg/ha. However, the lowest was Gorontalo at 1,210 kg/ha. The average selling price at the farm level was IDR 27,005/kg, while the highest in West Papua was IDR 46,266/kg, and the lowest in South Sulawesi was IDR 14,824/kg. Therefore, tabasco pepper farmers have an opportunity to increase profits by IDR 56,363,737/ha/ season and productivity by 3,339 kg/ha.

Keywords: efficiency, rc ratio, tabasco pepper, yield

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Papaya Fruit Characters Based Selection on New Superior Variety Assembly Program to Improve Health and Consumption

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ABSTRACT

The recent papaya new superior variety assembly program is focusing on fruit quality improvement. The consumer preference of papaya fruit characters includes small to medium size, thick reddish orange chewy flesh, and sweet taste. To assembly such a variety, plant breeding technique comprises population selection may be adapted. Indonesian Tropical Fruit Research Institute (ITFRI) had conducted several papaya hybridizations in order to obtain a wide genetic variability. The research was carried out in Sumani Experimental Filed of ITFRI, Solok Regency, West Sumatra. This research was performed to select several high quality hybrids based on fruit characters. The study applied Randomized Block Design with 70 papaya hybrids as treatments, each with three replicates. The tested genotypes were selected based on high heritability index on fruit size (length, diameter, and weight), flesh thickness and total dissolved solids (TSS). Among 70 genotypes, six were selected for best fruit quality, namely genotypes code 27, 29, 35, 43, 49, and 50.

Keywords: consumer preference, papaya genotypes, papaya hybrids

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Characteristics of Vegetarian Patties Burgers Made from Tofu and Tempeh

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ABSTRACT

Patties burger is a meat restructuring product that easily served and consumed, usually consume with burger. Patties burgers are generally made from beef with the addition of seasonings and go through a moulding and heating process. The development of vegetarian burgers aims to determine the effect of the proportion of raw materials on the characteristics of vegetarian burgers. The treatments being tested were the proportion of raw materials used, namely tempeh (100%), tempeh: tofu (50:50), and tofu (100%). The results showed that the raw material that used had a significantly effect on moisture content, the colour of raw and cooked burgers, texture, cooking yield and the moisture retention of vegetarian burger that produced. Tempeh-based burgers produce a more compact texture compared to tofu-based burgers. Tempeh-based burgers have the highest texture values, namely 7.51 N hardness, 2.18 mm springiness, 4.75 N gummminess, and chewiness 10.32 mJ. Tofu-based burgers have the highest brightness colour values, namely raw L 71.19 and cooked L 51.61. The highest moisture content in raw burgers was in tofu burgers 74.49%, but in cooked burger, tofu burger has the lowest moisture content 23.35%. Tempeh burgers has the highest cooking yield 78.05% and the highest moisture retention 34,84%. The use of tempeh in tofu and tempeh mixed burgers increases the value of texture, cooking yield and moisture retention of the burger that produced compared to tofu-based burgers.

Keywords: patties burger, vegetarian, tofu, tempeh

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Effect of Stabilizer Type and Concentration on the Characteristics of Black Pepper Sauce

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ABSTRACT

Black pepper sauce is one type of sauce that widely used in a variety of modern dishes. The stabilizer is used to increase viscosity, forming the body and texture of sauce product. This study aims to determine the effect of various types of stabilizers on the characteristics of black pepper sauce. There are four types of stabilizers used, namely Carboxy Methyl Cellulose (CMC), xanthan gum, alginate and maltose with concentrations of 0.5 and 1,0% so that there were 8 treatments. The results of analysis of variance, showed that the type and concentration of the stabilizer had a significant effect on the viscosity, pH, and colour of the black pepper sauce that produced. The use of 1% CMC produces the highest viscosity, 21414 cP. Whereas 0.5% maltose produces the lowest viscosity, 371.05 cP. The use of a stabilizer increases the pH value of black pepper sauce from 4.53 to around 4.61-4.75. Furthermore, the use of stabilizers also reduces the brightness and redness of the black pepper sauce. The use of stabilizers affects the characteristics of the black pepper sauce produced, especially the value of viscosity and colour of the product.

Keywords: stabilizer, viscosity, CMC, maltose, xanthan gum, alginate

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Low tannin instant sorghum porridge to support food diversification

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ABSTRACT

Sorghum has the potential to be developed as a staple food alternative like rice and corn. Sorghum can be processed into various food products, such as instant porridge. The aim of the study was the produce low tannin application sorghum flour and its application for making of instant porridge to support food diversification. Experimental design used in the formula optimization of instant sorghum porridge is a general factorial designs with two treatments namely the ratio of sorghum flour: tapioca (100:0; 90:10; 80:20; 70:30; 60:40) and the ratio of water (1: 7; 1:9; 1:11) using Design-Expert software DX 7.1.6 (trial version). Optimum instant sorghum porridge formula has a composition of 80% sorghum flour 20% tapioca with the addition of water ratio 1:11 and desirability value 0.716. Nutritional value of optimum formula as follows: water content of 4.93%, ash 0.49%, fat 5.92%, protein 8.37% and carbohydrate 85.2% with an average score of total acceptance of the organoleptic test about 4 (like). Optimum formula reshave high the digestibility and dietary fibre (77.97% and 9.07%). Instant sorghum porridge is one of nutritious and healthy food alternatives.

Keywords: *Sorghum bicolour* L. Moench, instant porridge, low-tannin food

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Sweet Potato Agribusiness Development Strategy to Improve Farmers' Income

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ABSTRACT

Sustainable agricultural commodity production is determined by the conducive policy implemented by both central and local governments as well as the stakeholders. To meet domestic and export demands it is necessary to conduct agribusiness development strategy for farmers' income improvement, i.e. investment climate upgrading. Enhancing export opportunity of potato products has large opportunity, but domestic production is still limited. This paper aims to analyze agribusiness strategy for export purpose. Specific purposes of this paper are: (i) to analyze sweet potato domestic production, (ii) to evaluate sweet potato processing and marketing, and (iii) to assess partnership between sweet potato farmers and processors. The study was conducted in East Java. The research results show that sweet potato production expansion is due to export-oriented partnership resulting in farmers' income enhancement. It is urgent to increase sweet potato production based on good agricultural practices (GAP) to meet export market demand in terms of quantity and quality.

Keywords: agribusiness, sweet potato, partnership, farmers' income, East Java

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Sustainable Single Origin Chocolate Production for Rural Development

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ABSTRACT

In the market, single origin chocolate is gaining high attention nowadays. This study aims to find the correlation between the development of single origin chocolate and the development of a rural area, particularly in cocoa producing region, in Indonesia. A conceptual approach given in this study was elaborated based on previous scientific articles published in highly reputable journals mainly from Sciencedirect and SpringerLinks databases in the last 5 years with keywords “sustainable agriculture”, “cocoa”, “chocolate”, “rural development” and “biodiversity”. Some other sources were also used to support the study. The results show that 32 of 34 provinces in Indonesia have cocoa plantation meaning that Indonesia has a great opportunity as single origin chocolate producer. However, to develop high quality single origin chocolates, there are still some challenges. In the context of food technology, some factors influencing the quality of chocolate, such as raw material condition, pulp-preconditioning, fermentation, drying, roasting, mixing, refining and conching. This is important to assure the product can survive in the premium chocolate market, thus it can assure the sustainable production of the single origin chocolate and eventually give a positive impact on the rural area where the cocoa trees grow. The development of single origin chocolate in every cocoa producing region in Indonesia can contribute not only in economical aspect locally but also in biodiversity. At the end, a recommendation to develop high quality single origin chocolate in Indonesia is given.

Keywords: single origin, chocolate, cocoa, production

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RESPONSE OF GROWTH AND RICE PRODUCTIVITY TO THE UTILIZATION OF SUPERIOR RICE VARIETIES AND BIOSILICA APPLICATION IN RAINFED LAND

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ABSTRACT

This research aimed to understand response of growth and rice productivity to the utilization of superior rice varieties namely Inpari 40, Situ Bagendit and Towuti and application of biosilica fertilizer on rainfed land at different planting season. The study was built by split plot design with three superior varieties of rice as main plot treatment and biosilica application (with or without biosilica) as sub-plot treatment, replicated three times. The growth and rice productivity were observed during dry season and rainy season. Result showed that the utilization of superior rice varieties was only effected on number of total grains, 1000 grains weight and productivity at dry season meanwhile it was positively effected on most variables observed at rainy season. Application of biosilica fertilizer was not effected on plant height, number of empty and total grains at dry season meanwhile it positively effected on overall variables observed at rainy season. Rice productivity obtained was significantly different by both varieties and biosilica factors. Result showed that most of variables value obtained with biosilica application were higher than without biosilica. Biosilica fertilizer able to increase productivity up to 1,08 ton/ha from 6,48 ton/ha to 7,56 ton/ha at dry season and up to 1,92 ton/ha from 8,7 ton/ha to 10,62 ton/ha at rainy season. This result indicated that utilization of superior rice varieties and biosilica fertilizer could be recommended to increase rice productivity on rainfed land.

Keywords: Growth ; Productivity ; Superior rice varieties ; Biosilica fertilizer ; Rainfed land

ID: 909

APPLICATION OF MONODIACYLGLYCEROL (MDAG) FROM NUTMEG BUTTER IN MAYONNAISE AND ITS CHARACTERISTIC

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ABSTRACT

Monodiacylglycerol (MDAG) was synthesised from nutmeg butter, due to its potential as a natural preservative and also a fat replacer. Mayonnaise is one of the most popular emulsion-based foods, and attempts have been made to boost its nutritional value and reduce its caloric content. This research aimed to apply MDAG in mayonnaise and to investigate the properties. Mayonnaise was enriched with MDAG with three various concentration against to egg yolk namely 1.2% w/w (A); 2.4% (w/w) (B); and 3.2% (w/w) (C). The properties of mayonnaise were determined by pH, viscosity, protein content, and fat content. Additionally, antimicrobial activity was determined by total plate count, *Salmonella sp* and *E. Coli*. Results revealed that the pH of mayonnaise was in the range of 4.56-5.07; the viscosity was in the range of 4830-9660 cP. The molecular structure of mayonnaise has shown that the addition of MDAG has also provided a greater particle size and polydispersity index. Mayonnaise calories ranged from 566.47 to 660.66 Kcal/100 g, which still met the Indonesian Standard of mayonnaise calory at least 600 Kcal/100 g. In terms of antimicrobial activity showed that total plate count still met the requirement of Indonesian Standard less than 10^4 CFU. However, MDAG was unable to suppress *Salmonella* and *E. Coli* during storage.

Keywords: MDAG, mayonnaise, physical properties, antimicrobial activity

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NUTRITION VALUE AND COLOR OF SE'I PROCESSED FROM CULL BALI COW WITH DIFFERENT BODY CONDITION SCORE AND SMOKING METHOD

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ABSTRACT

Se'i quality (*smoked meat*) was influenced by the quality of fresh meat and smoking method. This research aims to study the effect of different smoking methods on nutritional value and color of se'i made from Balinese cull cows beef with different Body Condition Score (BCS). Experimental design used was a completely randomized design (CRD) 4 x 3 with factorial patterns. The first factor was smoking method: P0; open methods P1; close method , P3; liquid smoke. The second factor was different BCS; cull cow with BCS2; cull cow with BCS3; cull cow with BCS4. The parameters measured were water, protein and fat content; se'i color (*L (lightness), a (redness)* and *b (yellowness)*. The results showed that water and protein content of se'i that was smoked in different ways depending on the BCS, as BCS increased the water content decreased while the protein content increased ($P < 0.01$). Changes in the values of *Lightness* and *brightness* were influenced by the smoking method while changes in the value of *redness* were influenced by BCS. In conclusion the water and protein content and value of *redness* were influenced by BCS while the *Lightness* and *brightness* were affected by the smoking method.

Keywords: Se'i, cull cow beef, smoking method, body condition score

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Characteristics and Farmers' Response to Climate Variability to Support Sustainable Agriculture

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ABSTRACT

Rice farming is strongly influenced by climate conditions. The availability of water from rainfall is a major consideration for farmers when determining the start of planting, while rainfall will changes due to extreme climate events. The impact of climate variability as floods, droughts and attacks from pests and diseases brings losses for farmers in their food farming. This paper presents the results of farmers' surveys and interviews in Tasikmalaya and Garut Distric to determine the characteristics and responses of farmers and the impact of climate variability on rice farming system. The result shows that farmers are generally more than 50 years old (57-64%). Education is dominated by elementary schools (36-57%) with less than 20 years of farming experience. Average land ownership <0.5 ha. Rice production in the rainy season is 4-6 ton/ha, whereas in the dry season <3 to 5 ton/ha. The impact of climate variability is early season shifting. The start of the rainy season is late from normal condition (52-66%) and the beginning of the dry season comes earlier than normal conditions (48-59%). The availability of water and assistance in agricultural infrastructure and facilities are needed by farmers to support food farming and increase production.

Keywords: characteristics of farmers, rice farming, climate variability

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The Addition of Biosilica and Coconut Oil to Improve the Characteristic of Biofoam Packaging

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ABSTRACT

Biofoam (biodegradable foam) is food packaging made of starch with biodegradable characteristic that is environmentally friendly. However, to produce starch-based biofoam with the good physical characteristic requires the large amount of starch, approximately 30% to 60% in the formula. Therefore, to be economical and to reduce the use of starch in the formula, it needs the addition of environmentally friendly filler. This research aimed to investigate the effect of the addition of biosilica and coconut oil on the characteristic of cassava starch-based biofoam. Biosilica used as biofiller was from rice husk produced with sol-gel method. The production of starch-based biofoam used thermopressing method. The treatments in the experiment were biofoam control (without filler addition) and biofoam using filler which was commercial silica, biosilica from rice husk and coconut oil. Product characterization conducted on physical and mechanical properties included moisture content, density, color (Chromameter), contact angel (3D-Optic Microscope), crystallinity (X-Ray Diffraction), surface morphology (Scanning Electron Microscope), compressive strength and tensile strength (ASTM). The result indicated that cassava starch-based biofoam with the addition of biosilica from rice husk and coconut oil has increased the physical and mechanical properties of biofoam. This typical biofoam induced the increase of moisture content up to 13,82% and density 17,39% compared to biofoam control. However, the mechanical properties and the water resistance has increased. Biofoam compressive strength has increased up to 146% and the tensile strength 56% compared to biofoam control.

Key words : Biofoam, cassava starch, biosilica, rice husk

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Development of Local Boyolali Peanut and Corn Composite Planting Patterns on Rain-Filled Rice Fields

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ABSTRACT

The program to increase food production can be carried out by increasing planting area and increasing productivity. The activity of developing cropping patterns in rain-fed rice fields is a demonstration of a technology plot in one district which is a food crop area. The location of the activity was carried out in Nogosari District, Boyolali Regency. The implementation time is from June 2017 to September 2017. Before conducting the demonstration plot the BPTP Central Java team conducted a survey of peanut farmers to find out the technology components that are commonly applied at the farm level. The technology component introduced is in accordance with integrated crop management (corn composite and local groundnuts) with the introduction of biodecomposers and new composite corn varieties. The area for demonstration of crops commodities is around 0.5 hectares. Peanut varieties commonly grown are Boyolali local varieties and for maize commodities are Srikandi and Provit A. The treatment introduced is the recommended fertilizer dosage plus biodecomposer treatment before planting on planting land and farmer fertilizer dosage. The data taken included the knowledge and response of farmers to the cultivation of peanuts and corn and data on harvest weight / yield. Data were analyzed descriptively or Duncan. The results of the survey on farmers 'understanding are very high on peanut and corn cultivation technology, which is usually done by farmers and demonstration plots around 4. The yield of local Boyolali monocultures is still higher in farmers' doses (7.5 tons / ha) compared to the recommendations of Central Java BPTP technology (5.6 tons / ha). The yield of local Boyolali peanut cassava intercropping composite corn was higher at the farmer's dose (6.1 tons / ha) compared to the recommendation of the Central Java AIAT (5.0 tons / ha). Whereas the yield of monoculture corn has not reached optimal production, from each Srikandi variety is 3.6 tons / ha in the recommended dosage treatment and in Provit A variety is 4 tons / ha. While the results of maize on intercropping experienced crop failure. Thus the intercropping pattern of peanuts and composite corn can be accepted by farmers and can develop in this region if it is assisted with dissemination in the form of a demonstration plot in the rainfed lowland agro-ecosystem.

Keywords: rainfed lowland, cropping patterns, composite corn

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Technical Efficiency Comparison of Hoaloc-Mango Between Cooperative and Non-Cooperative Grower Groups in Vietnam

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ABSTRACT

A structured questionnaire was used to collect data with 184 observations of the cooperative farmer group and 230 that of the non-cooperative farmer group. The results indicated that technical efficiency mean of the cooperative grower group was greater than that of the non-cooperative grower group in seasons 2, and 3, while this figure of the cooperative farmer category was lower than that of the non-cooperative farmer category in the first season. Additionally, the positive determinants of technical efficiency in the cooperative farmer group were the age and plant density in season 1, the wrapping bag in seasons 1, and 2, the land area in season 1, and 3, and the credit access and market access in season 3. Meanwhile, the negative factors were the payment for agro-input wholesaler and classifying sale in season 1, the credit access in season 2, the age, education, farming experience and plant density in season 3. In the non-cooperative farmer group, the positive determinants were the land area in seasons 2, and 3, the credit access in season 2, and the plant density in season 3. However, the negative elements were the wrapping bag in seasons 1, and 2, the age, education, farming experience, market access and land area in season 1, and the classifying sale in season 2.

Keywords: technical efficiency, HoaLoc-mango, cooperative, non-cooperative

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Perceived Attributes Driving The Adoption of System of Rice Intensification (SRI): The Indonesian Farmers' View

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ABSTRACT

This paper deduces that the future promotion of the System of Rice Intensification (SRI) should be based on a good understanding of the potential users toward sustainable agriculture. This study examines perceptions of SRI attributes among Indonesian rice farmers using a qualitative approach, which is built upon the theory of diffusion of innovation. Through focus group discussions, a number of key drivers crystallised. Compatibility, complexity, and relative advantage emerged as key attributes driving the adoption of SRI. SRI was perceived as conflicting with existing farming practices, labour capacity, budget, and with the time available for extra labour inputs. SRI was regarded as somewhat complex in respect to the processing and application of composts and, additionally, considering many farmers' limited knowledge, for the operation of mechanised farm technologies. The economic surplus gained from SRI was realisable only to the group of organised farmers who enjoyed price premiums. Environmental and agronomic benefits were regarded as bringing delayed rewards. Such outcomes demonstrate in, in fact, the subjective evaluation of SRI by farmers which is critical to its adoption.

Keywords: diffusion of innovation, rice, roger's theory, relative advantage, technology adoption

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Livelihood Impacts of The Cattle Management Practices in Mixed Crop-Livestock Farming Systems in South Sulawesi, Indonesia

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ABSTRACT

The research project to increase cattle production was conducted in South Sulawesi, Indonesia of ACIAR funded projects in South Sulawesi (SMAR-2006-061). The project worked in 3 regencies (Bone, Barru and Gowa) and four villages in each. Bali cattle (*Bosjavanicus*) are a vital component of Indonesia's crop-livestock farming systems. Improving Bali cattle productivity on these smallholdings is essential not only to the Indonesian Government's beef self sufficiency targets, but also to improving the economic development of farmers living in these regions. However, smallholder farms in the region are usually less than two hectares in total and comprise a mix of crop, forage, livestock and human activities.The aim of this research was to investigate how the introduction of cattle management practices impacted on household livelihoods. The result showed that these types of projects may contribute to improved livelihoods in the long-term, unlikely to be visible in short term.

Keywords**:** livelihood impacts, cattle management, smallholders, crop-livestock systems

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Optimization of Tapping Time, Duration and Addition of Natural Preservation (Laru) for Quality Control of Coconut Sap

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ABSTRACT

This study aims to examine changes in the quality of coconut sap, determine the time and duration of tapping and the addition of natural preservation (laru) that is optimal for controlling the quality of coconut sap during the tapping process. The study was conducted by an experimental method with a factorial design (RCBD). The factors that were tried were tapping time (P) in the morning to noon (06.00 - 14.00 wib) and afternoo to night (14.00 - 22.00 wib), tapping duration (T) in 2, 4, 6, and 8 hours and laru addition (L) in 0% (L0) dan 2% (L1). Statistical analysis uses analysis of variant (F test) and DMRT with $\alpha = 0.05$ and correlation analysis. The results showed that the quality of coconut sap (volume, discharge, sucrose content, total dissolved solid, and acidity level) from tapping in the afternoon to nigjt was higher and better than the results of tapping in the morning to noon. In tapping of coconut sap without laru, the optimal time duration of tapping in the moorning to noon is 6 hours, while the tapping time in the afternoon to night t is 8 hours. The effect of laru addition is very significant in maintaining the quality of coconut sap compared to without laru. Giving laru during tapping in the morning to noon is more effective in maintaining the quality of coconut sap than in the tapping in the afternoon to night. The relationship or correlation between the pH of coconut sap with sucrose content and TPT of coconut sap during the process of tapping coconut sap is negative, while for discharge is positive.

Keywords: the quality of coconut sap, tapping and natural preservation (laru)

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Potential for Processing of Pondoh Zalacca Seeds to be Zalacca Seed Cofee as Functional Drinks

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ABSTRACT

Zalacca consists of three main parts namely the skin, flesh, and seeds. Actually the zalacca fruit is utilized, only the flesh of the fruit, while the skin and seeds of zalacca are waste that has not been used optimally. Currently has begun processing zalacca seeds into coffee substitutes, but not many have done scientific research on the content of active compounds contained in zalacca seeds . This research was conducted in Sungai Langka Village, Gedong Tataan Subdistrict, Pesawaran Regency, from August to October 2018. Observation parameters were carried out on: flavonoid levels, caffeine levels, consumer preference levels and business analysis. From the results of the research that has been carried out it was concluded that: zalacca seed coffee has the potential to be used as a functional drink, because it has a flavonoid level of 9.69 % and caffeine content of 0,1009%; treatment of zalacca seeds (90%)+cinnamon powder (10%) , produces the most preferred zalacca seeds coffee compared to other treatments ; the results of the analysis of the business of making zalacca seeds coffee show that the business of making zalacca seeds coffee is quite profitable with a B/C ratio for one process of 2.19.

Keywords: processing, functional drinks, *Salacca edulis*

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The Effect of Materials Amount in the Steam and Water Methods Distillation Tank on the Citronella Oil Chemical Composition (*CymbopogonNardus* L. Rendle)

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ABSTRACT

The need for essential oils such as citronella oil has increasingly increased along with the development of modern industries such as perfume, cosmetics, food, aromatherapy, and medicine industries. However, the volume of essential oil exports in recent years has decreased. The problem so far is the quality problem. The purpose of this study was to determine the chemical composition of citronella oil using the GC-MS (Gas Chromatography-Mass Spectroscopy) method with the treatment of material amount in the distillation tank (A = 40 kg; B = 50 kg; C = 60 kg; D = 70 kg; and E = 80 kg). The results showed that citronella oil from treatment A contained three main components, namely: citronellal (41.97%), geraniol (18.89%), and citronellol (12.91%), with the highest percentage compared to four other treatments. This refutes the society's stigma in the citronella plantation area of Padang Sarai, Lubuksikaping District, Pasaman Regency, which considers that the greater amount of raw material in refining tanks will produce better quality citronella oil. This research concludes that the increase in the amount of raw material in the refining tank decreases the percentage of three main components (citronellal, geraniol, and citronellol).

Keywords: essential oil, citronella oil, citronellal, geraniol, citronellol, GC-MS.

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Seed Treatment to Improve Seedling Establishment in The Anaerobic Conditions

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ABSTRACT

Limited farm labor in swampy area encourage farmers to apply direct seeding method, however land conditions with excess water causedun-germinated seeds. The purpose of this research was to obtain seed treatments to increase seedling establishment in anaerobic germination conditions. The first experimentwas a laboratory trial arranged in a factorial design with two factors: seed treatments and rice varieties. A total of 32 treatmentsto increase seed germination along with control were tested on three rice varieties: Inpara 9 (swampy variety), KHO (Anaerobic Germination/AG tolerant), and IR 42 (AG-susceptible). The results showed that treated seeds were faster germinated andhigher germination index. The second experiment was a greenhouse trial to confirm the 12 best seed treatments effectiveness from the first experiment.Water managements wereconducted in anaerobic and aerobic conditions. Seeds on anaerobic conditions decreased seedling establishment, shoot length, root length, shoot dry weight, and root dry weight for44.6%, 28.1%, 34.4%, 80.7%, and 74.2%, respectively. KHO showed a better performance in anaerobic conditions.Treated seedshad a betterseedling establishment and seed growth in anaerobic conditions, except for hardening Trichoderma treatment. The three best seed treatments in anaerobic conditions were hardening H_2O, thermo-treatment 80^oC+NaOCl, and hardening ascorbic acid.

Keywords: rice, seed treatment, anaerobic germination.

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Land Suitability Alternatives for Agricultural Commodity Based on Agroecological Zone on Coastal Area in Tegal District of Central Java Province Indonesia

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ABSTRACT

The Agroecological Zone (AEZ) is a form of information system to determine the potential of land resources. Land evaluation for agricultural commodity suitability is made easier using the AEZ information system. AEZ information system in Central Java's Tegal Regency has been prepared by Central Java AIAT (2003-2008) and has been supplemented with land resource data including land and climate. Based on the AEZ data, it is possible to evaluate the suitability of land for agricultural commodities and determine the need for land management technology.Evaluation of the land suitability of coastal areas in Tegal Regency was carried out using the matching method between the growing requirements for commodities and the land characteristics contained in the AEZ information system with reference to the FAO land evaluation standards. The land evaluation process uses the Automated Land Evaluation System expert system and the Land Suitability Assessment System (BBSDL, 2014).Tegal Regency has a coastal area spanning three sub-districts, namely Kramat, Suradadi and Warureja, with variations in agroecological zones as reflected in 3 land forms and 2 soil types on 2 types of land use. Agroecological zone identification results show that the coastal area in Tegal Regency consists of 3 zones, namely (1) Zone A, alluvial plains with Typic Endoaquepts and Aeric Endoaquepts soil types, (2) Zone B, Fluvio-marine plains with Typic Endoaquepts soil types, and (3) Zone C, coastal areas with Typic Udipsamments soil types. In general, coastal soil types have deep soil depth, neutral pH and poor soil drainage, except for Typic Udipsamments. The annual rainfall at this location is around 2,250 mm / year.
Based on the characteristics of the agroecological area, the coastal area of Tegal Regency has two types of land use suitability, namely for crops and fisheries. The results of land evaluation show that in the coastal areas there are several suitable agricultural commodities, namely (1) rice, water melon, sugar cane and jasmine, which correspond to class 1 (S1) for zones A and B, (2) red chilies and shallots, class 2 (S2) which is suitable for zones A and B. In contrast, zone C is identified as less suitable for food crops or horticulture. One of the alternatives for this area (zone C) is used for silviculture or fishing ponds. Some of the limiting factors in the coastal areas in Tegal Regency are (a) poor oxygen availability due to poor soil drainage, and (b) poor root conditions due to very fine or coarse soil texture. Based on the limiting factors, land management techniques should be focused on (a) improving the effect of soil texture with the use of organic fertilizers, (b) improving the effect of soil drainage with channels and organic fertilizers, and (c) using tolerant varieties of limiting factors.

Keywords : land suitability, agro-ecological zone, coastal area

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Land Suitability Alternatives for Agricultural Commodity Based on Agroecological Zone on Coastal Area in Tegal District of Central Java Province Indonesia

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Keywords : land suitability, agro-ecological zone, coastal area

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Effect of Botanical Insecticidesagainst Fall Armyworm *Spodopterafrugiperda* J. E. Smith (Lepidoptera: Noctuidae)

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ABSTRACT

*Spodoptera frugiperda*or Fall Armywormis aninsect pest that is highly polyphagous and considered to have greater damage than the other Spodoptera. Two botanical insecticides, i.e. aqueous extract oftobacco leaf (*Nicotiana tabacum*) and tuba roots (*Derris eliptica*) were examined for their effects in mortality(applied by contact and residue) and as a feed reduction.The mortality study was designed in a Completely RandomizedDesign with three treatments and thirty replications. One replication consists of one larva, so there are thirty larvae in onereplication. Feed reduction testing was carried out by usingformula by Atta *et al*. (2001). The results showed that the aqueous extract of tobacco leaf and tuba roots which were applied by contact gave mortality rates as much as 50.0% and 56.7% consecutively, whereas by residual application, the aqueous extract of tobacco leaf (40% mortality) was more toxic compared to aqueous extract of tuba root (23.6% mortality). Aqueous tobacco leaf and tuba root caused feeding reduction of FAW as much as 7.27% and 12.72%, respectively. This showed that these insecticides have the potential to be used in the field by farmers because of the simple way ofmaking them, namely only by water extraction.

Keywords: biopesticides, *Derris elliptica*, *Nicotiana tabacum*, *Spodoptera frugiperda*

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Keywords: biopesticides, *Derris elliptica*, *Nicotiana tabacum*, *Spodoptera frugiperda*

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Application of Soil Water Assessment Tool (Swat) in Selopamioro Catchment for Determining Soil and Water Conservation Strategy

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ABSTRACT

Selopamioro catchment area is part of Oyo watershed in Bantul Yogyakarta Indonesia. Selopamioro watershed is rough topography, rocky land, thin soil, less rainfall, and massive farming activities. Thus, Selopamioro catchment is high risk to ecosystem disaster such as flood, drought, and soil erosion. The purpose of this study was to apply the Soil Water Assessment Tool (SWAT) model in predicting surface runoff and erosion to determining the strategy of soil and water conservation in the Selopamioro catchment. The materials used were land use map in scale 1: 25,000, topographic map in scale 1: 25,000, and climate data for the period 1984-2013. SWAT modeling was applied to 2 catchments which have different agricultural land areas. Catchment 1 covers 83 hectares with 61% agricultural land, whereas catchment 2 was 83 hectares with 58% agricultural land. Validation SWAT model conducted by using rate of erosion in the tropics area. Both of catchments had a similar morphometry, elongated shape, low birufaction ratio, moderate drainage density and high slope gradient. SWAT model revealed surface runoff in catchment 1 was 333,660,000 liters/year and in catchment 2 was 316,920 liter/year. The erosion rate catchment 1 was 24.6 mm/year and in catchment 2 was 21 mm/year. Erosion rate in Selopamioro catchment was classified very high. Bench terraces with rock structure, retention basin, and the use of organic mulch were referenced to achieve sustainable agriculture in Selopamioro catchment.

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Soil Moisture Distribution Analysis of Subsurface Flow Constructed Wetland using Capacitive Soil Moisture Sensor and Its Relationship with The Growth Characteristicsof *Ipomoea aquatica Forsk.*

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ABSTRACT

Subsurface Flow Constructed Wetland (SFCW) is commonly used as the next treatment for septic tank output that using vegetation on it as a biofilter that makes the water cames out from this installation is more environmently friendly. This research aimed to study the distribution of soil moisture and its correlation with water spinach (Ipomoea aquatica Forsk.) growth characteristic in SFCW using Capacitive Soil Moisture Sensor (CSMS). This research was conducted with monitoring soil moisture value and water spinach growth parameters at the sand layer of SFCW in Srimartani Village, Piyungan District, Bantul Regency, Yogyakarta Special Region. This SFCW is connected with a septic system that used to maintain wastewater from one house with three family members. Soil moisture monitoring was using CSMS that covering 12 spots with two different depths variation (10 and 20 cm) in the 2 x 3 m^2 of the SFCW area. *Ipomoea aquatica Forsk* growth parameters that monitored were the length of the stem, total leaf, leaf area, and root length. The result of this research proves that soil moisture content at the spot that closer to the outlet pipe position was higher than the farter one. The other result shows that higher soil moisture content was affecting the *Ipomoea aquatica Forsk* growth parameters with accelerating the growth rate.

Keywords: soil moisture, sand layer, subsurface flow constructed wetland, *ipomoea aquaticaforsk.*, capacitive soil moisture sensor.

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Retention Basins and Their Roles in Land Water Balance: Case Study Longan (Dimocarpus Longan) Orchard in Selopamioro Village, Imogiri Sub District, Bantul Yogyakarta

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ABSTRACT

Longan is a fruit tree which needs a comprehensive maintenance, especially in fulfilling water requirement. "Rorak" (local name) or retention basin is a soil and water conservation techniques which collecting rainfall and may use them in dry season for irrigation. This study was conducted to determine the influence of retention basin on land water balance and to calculate irrigation requirement of longan orchard in Selopamioro village. The water balance approach was adopted in this study. The materials consisted of administrative and topographical map in scale 1:25,000, retention basin points, longan orchard boundary, and daily climate data (rainfall, humidity, net solar radiation, atmospheric pressure, and wind speed). The evapotranspiration reference (ETo) was calculated using Penman Monteith formula. Later, it applied to determine plant evapotranspiration (ETc). The longan coefficient (Kc) adopted from previous study. This study proved the average of ETo and ETc in a year was 5,2 mm/day and 1,52 mm/day, respectively. There were three rain retention basins in longan orchard that located at the top, middle,; and the bottom of the land. Three retention basins collected 3.689.871 liters water a year which play vital role to supply 43 % from the total irrigation water requirements of longan orchard.

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The Effect of Types and Moisture Contents of Soybeans (*Glycine max*) on Terminal Velocity

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ABSTRACT

Terminal velocity is one of aerodynamics properties needed to design machines or handle agricultural grains in pneumatics bulk handling systems. This research was aimed to investigate the effect of the types and moisture contents on terminal velocity of soybeans. Three different types of soybeans namely local, imported, and local black soybean in three moisture contents of 10%, 13%, and 16% (w.b) were investigated in factorial design 3 x 3 with three replications for each treatment combinations. Terminal velocities were investigated using self-constructed apparatus and the velocities were measured using hot wire anemometer. There were found that the types of soybeans and moisture contents significantly affected terminal velocity ($p<0.05$), but there was no significant interaction between them on terminal velocity. The higher the moisture contents, the higher would the values of terminal velocities. Imported soybean had the largest terminal velocity and local black soybean was the smallest ones. The relationship between terminal velocity and moisture content could be expressed in linear regression equations for both the three soybean types.

Keyword: soybean, types, moisture content, terminal velocity

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Enhancing Onion Agribusiness: The Needs of E-Planting Calendar and Production Allocation

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ABSTRACT

Onion farmers bargaining position should be improved. Therefore, Indonesian government established *Toko Tani Indonesia* (TTI) or Indonesian farmers shop to shorten the supply chain. A study conducted in 2018 in West and Central Java Provinces, data collected from LUPMs, TTIs and related institution trough in depth interview based on structural questionnaire. Results from qualitative analyzes: The existing supply chain from farmers to consumers involves 5-8 actors while TTI only 3 actors with 5 variation in different price range from IDR1 000 – IDR5 000 compare to market price. Problem faced by farmers, in the existing supply chain price at farmer level uncertain while through TTI guaranteed at least same to market price . Unfortunately through TTI, no schedule that can be adjusted to demand which caused damage of onion and weight loss (20%) during transportation. Conclusion, a calendar of planting system in each production center and marketing allocation according to the quantity and location should be developed. Policy strategy: a packet of technology " E-Planting calendar and production Allocation" should be developed to monitor the implementation of planting schedules and production allocation from production center as well as consumer areas directly and could be monitored by related institutions should be developed.

Keywords: Onion, supply chain, E- Planting calendar and production allocation

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The Influence of The Types and Moisture Contents on Sphericity and Geometric Means Diameter of Coffee Beans (*Coffea sp*)

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ABSTRACT

Moisture content and particle dimension of coffee beans are the two important characteristics which often needed in many postharvest handling processes. This research was intended to investigate the effect of the types and moisture contents on the changes of sphericity and geometric mean diameter of coffee beans. Three different types of coffee beans namely arabica, robusta, and liberica in three moisture contents of 9%, 14%, and 19% (w.b) were investigated in factorial design 3 x 3 with five replications. The dimensions of coffee bean were determined using ImageJ process and the values of sphericity and geometric mean diameter were then calculated. It was found that bean types, moisture contents, and the interaction between them strongly affected the dimensions, sphericity, and mean geometric diameters of coffee beans ($p<0.05$). Robusta was found to have the biggest sphericity and geometric mean diameter. As the moisture contents increased, tended to produce higher geometric mean diameter, while the same was not true for the sphericity. The relationship between moisture content and sphericity could be expressed as the second order polynomial equations while for geometric mean diameter as the linear regression equations for the three types of coffee beans.

Keyword: coffee bean, types, moisture content, sphericity, mean geometric diameter

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Faremer's Response to Improvement of Cropping Index (IP) through Intercropping of Maize – Soybean and Groundnut in Pemalang

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ABSTRACT

One of the efforts to increase the cropping index (IP), especially in rainfed lowland areas with limited water resources, is the intercropping system. This cropping pattern is that land can be planted with two or more types of plants at the same or almost the same time. Farmers who own narrow land feel the importance of this cropping pattern to obtain optimal farming profits. Farmers' adoption of this technology varies widely and is influenced by the response of farmers when this technology was introduced. This study aims to determine the level of response of farmers to the corn-soybean intercropping technology (turiman-jale) and the factors that affect the response of farmers to the application of intercropping technology at MT-II in Pemalang Regency, Central Java - Indonesia. The varieties used were Bisi 18 maize, Nasa 29 and Grobogan soybean varieties. This study method is descriptive quantitative, carried out by observation, interview and documentation. Respondents were 30 implementing farmers and farmers around the Turiman-Jale demo farm. The analytical method used to determine the level of farmer response is the Likert scale with the provision that the total value obtained is divided by the maximum value multiplied by 100%. Meanwhile, to determine the factors that influence the response of farmers, regression analysis is used. The results of the study showed that the response of farmers was high on land processing (69.57%), seed treatment (78.26%), spacing (95.65%), ease of planting corn (95.65%), ease of harvesting turiman-jale. (69.57%) and the ability of tourists to increase IP (65.22%). The variable of land area has a significant effect on the response to the turiman-jale system technology, with a p-value of 0.2 and linearly predicting an increase in farmer response for each addition of 0.88 hectares of land.

Keywords: Response, IP increase, intercropping

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Modelling the Respiration Rate of Mango (cv. Manalagi) During Storage Under Various Temperatures and Gas Compositions

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ABSTRACT

Infromation on the respiration rate in various temperatures and gas compositions is an essential parameter for designing the storage room for agricultural products. The present study aimed to measure the respiration rate of mango (cv. Manalagi) during storage under modified atmosphere storage. Respiration rate was measured with a closed system respirometer at storage temperatures of 10^{o}C,15 ^{o}C, and 28^{o}C and 21%, 10%, and 3% oxygen concentrations. The mango was stored for 21 days. The observed data were used to develop mathematical models based on Michaelis-Menten (MM) with four types inhibitions and Arrhenius equations. The results indicated that each treatment had a different aggrement with each type of MM. Treatment with 3% O_2 at 10 and 15^{o}C did not fit with any types of MM inhbition models. Whereas, all showed a good agreement with Arrhenius model with the determination coefficient values were closed to unity. Temperatures, O_2 concentrations, and times were analysed statisticaly using three-way repeated measure to identify the interaction between treatment on the respiration rate (RO_2 and RCO_2). The interaction were found to be significant among treatment for RO_2.

Keywords: Manalagi mango, respiration rate, mathematical modelling, Michaelis-Menten, Arrhenius

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Design of Bed Dryer for Sweet Corn Seeds (*Zea mays saccharata L.*)

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ABSTRACT

For many years, the drying process of corn seed was done by drying the corn seed under the sun immediately after harvest. The drying process is uneasy to maintain since temperature and humidity tend to fluctuate. Furthermore, there has been a risk of being contaminated due to dust, insects, birds, or other animals. The recent study compared the effect of two different floor materials of the sunlight drying process; tarpaulin mat and concrete base, as well as bed drying on its drying temperature and corn germination rate. The bed drying used in this study was a self-fabricated bed dryer, with a capacity of 500 kg. The statistical analysis showed that there was no significant difference between the drying temperature of the sunlight drying with tarpaulin mat, the concrete base, as well as bed drying. The germination rate of all samples has met the National standard for corn seed (SNI 01-03920-1995), which was 92%. The self-fabricated bed dryer has the potential to dry corn seed as good as using sunlight while retaining its quality.

Keywords: bed dryer, drying, sweet corn seed, product quality

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Seed Borne Fungal Species on Garlic Storage in Sembalun Highlands of Eastern Lombok, Indonesia

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ABSTRACT

Garlic (*Allium sativum* L.) is a horticultural commodity of very high economic value in Indonesia. It is used as a cooking spice and for medicines and cosmetic ingredients. West Nusa Tenggara (WNT) Province is one of the largest garlic producing regions in Indonesia. Garlic is mostly grown in irrigated highlands therefore domestic production is very limited and only supplies at most 5% of domestic demand. The Indonesian government is targeted to increase domestic production by increasing number of available certified quality seeds in the field. However, one of the main constraints facing in storage is seed borne fungal contaminants. This study aims to investigate fungal contaminants on garlic seeds in Sembalun Highlands of Eastern Lombok (1200 m above sea level), one of the largest garlic areas in Indonesia. This research was conducted in October – December 2018. Samples were collected from garlic storages in Sembalun Highlands, whilst laboratory analysis and identification were conducted at the Biology Laboratory, Faculty of Mathematics and Natural Sciences, Mataram University using Blotter on Test method. Results show that two main seed borne fungal species were isolated namely *Aspergillus* sp. and *Fusarium oxysforum*. It is well known that *F. oxysforum* is plant pathogenic fungi on garlic worlwide.

Keywords: fungi, garlic, pathogen, seed, storage

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Growth and Yield of Shallot (Allium ascalonicum) on Different Types of Media and Nutrient Solution on Hydroponic Wick System.

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ABSTRACT

Planting medium and nutrient solution are important for growth and yield of crop grown on hydroponic systems. The objective of this study was to find out whether there was interaction effect between planting media and nutrient solutions on the growth and yield of shallot on hydroponic wick system. The study was conducted from February to May 2020 in a screen house, Ledug Villages, Kembaran District, Banyumas Regency. The experimental design used was a randomized completed block design with two factors. The first factor was types of planting media ie sand, sand+husk charcoal, and sand+sawdust. The second factor was types of hydroponic nutrient solution ie AB Mix, fermented urine of rabbit, and fermented vermicompost. There were 9 combinations of treatments. There were 4 pots, each containing 1 plant, in each treatment unit and each treatment was repeated 3 times. The observed variables were height of plant, number of leaves, number of tillers, volume of roots, total length of roots, number of bulbs, fresh weight of plant, and dry weight of bulbs. The data were analyzed by F test, followed by DMRT at a 5% error level if there was significant effects. Results showed that There was no significant interaction effect between types of planting media and types of nutrient solution on all observed variables; shallot plant grown on sand+sawdust was the lowest, but types of media did not affect the others variables. Conversely, the types of nutrient solutions did not affect height of shallot plants, but other observed variables. Shallot plants supplied with nutrient solution from fermented vermicompost were the lowest.

ID: 958

The Influence of Variety and Explant Size on Garlic (*Allium sativum* L) Proliferation Using Murashige and Skoog Media.

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ABSTRACT

Tissue culture is an aseptic propagation and multiplication technique, it can also eliminate viral systemic conditions that already exist in the plant. *Garlic (Allium sativum* L) belongs to the genus *Allium sp*, which is propagated through the clove. The experiment was carried out in the tissue culture laboratory of the Indonesian Vegetable Research Institute / IVEGRI in April to August 2018. The purpose of the activity was to observe influenced explant souce (Meristem, shoot tip) and the cultivar of galic in proliferation . The media composition were used MS with supplement (Sucrose 30 g / l + IAA 2 mg / l + Kinetin 2 mg / l + GA_3 0.01 mg / l + gelgro 2 g / l, pH 5.7). The results were (1) culture contaminants are generally caused by bacteria and fungi from the explant (endogenous) or treatment of surface sterilization were not in proper. (2) percentage of proliferation in all varieties of explant shoot tip higher than meristem, (3) The abnormal growth for both types of explant were 15% - 35%. Plantlets were infected with OYDV, SYSV was 44.44% - 71.50%, With DAS ELISA

Keyword: Garlic (*Allium sativum* L), Variety, Meristem, Shoot tip.

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Experimental Study of Erosion Control in Various Surface Covers and Slope Gradients

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ABSTRACT

Erosion control is a substantial matter to be considered before making decision for land use or agricultural practice management. Erosion process as spatial and temporal variations make it a complex and dependent system to each eco-geomorphic and hydrological aspects of hillslope. This experimental study was carried out to understand how biotic and geomorphic factors influence erosion processes and rates. This study developed a small-scale erosion simulator with erosion pans and rain simulator. Standard small size erosion pan of 32 x 45 x 20 cm and slope of 10◦ and 20◦ was installed to simulate the erosion processes. The erosion pans were covered with four different coverages and exposed to artificial rainfall with intensity of 160 mm/hr. The study revealed that dense soil cover was able to reduce the erosion rates by one degree and surface runoff by 1.6 times smaller than plots without soil cover. Erosion rate on slope of 20^0 (0.14 mm/hr) was smaller than the erosion rate on slope 10^0 (0.69 mm/hr). This study shows that surface cover holds a vital role in erosion control. However, soil micro relief and aggregation during high intensity of rainfall might also greatly affects the process of infiltration, runoff, and erosion.

Keywords: erosion rate, erosion control, experimental study

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The Dormancy Breaking of Garlic Bulb Seeds through Thermal Shock Storage Methods and Addition of Gibberellin Acid

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ABSTRACT

Garlic bulb seed production is constrained by a long dormancy period, which is 5-6 months. The aimed of this study were to analyze the effect of thermal shock storage methods and soaking in gibberellin acid on the dormancy breaking of garlic bulb seeds. Raw material used in this study was garlic bulbs cultivar Sembalun. The experiment was conducted in randomized block design with treatments of storage temperature (low temperature/ 12-14ºC, high temperature/ 38-42ºC + low temperature/ 12-14ºC, high temperature/ 38-42ºC + room temperature/ 28-30ºC, and room temperature) and gibberellin acid concentration (0, 125, 250, 375 ppm), with two replications. Total storage duration was 4, 8, and 12 weeks. The results of analysis of variance (ANOVA) showed that storage temperature was significantly different of their germination ($p<0.05$). Storage of garlic bulb seeds by the thermal shock method can shorten the dormancy period from 5-6 months to 3 months. Germination capacity resulting from combination of high temperature (38-42ºC) storage for 6 weeks and low temperature (12-14ºC) for 6 weeks is higher than continuous storage of low temperature and room temperature without requiring the addition gibberellin acid.

Key words: dormancy, garlic, germination, gibberellin acid, thermal shock

ID: 961

The Effect of The Intensity of Endophytic Bacteria Application toward Some Types of Organic Fertilizer on Hot Pepper (*Capsicum ascalonicum*) Productivity

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ABSTRACT

This study aims to examine the interaction between the types of manure used as basic fertilizer and the intervals of giving endophytic bacteria consortium to support plant growth. And knowing the increase in the quality and quantity of harvested hot pepper. The research was conducted in Politeknik Pembangunan Pertanian (Polbangtan) Malang, Bedali Village, Lawang District, Malang Regency, with an altitude of ± 600 meters above sea level. The study was started in August 2019 to December 2019. The study was conducted using a completely randomized design. Experiment in factorial, the first factor is some types of manure (P) while the second factor is the application interval of endophytic bacteria consortium (N). Observation parameters were the growth of hot pepper including plant height and number of leaves; harvest quantity; includes the number of fruit and the weight. As result, it was concluded that there was an interaction between the type of manure treatment with the intervals of giving endophytic bacteria. The application of endophytic bacteria can increase the efficiency of the manure given. The most suitable recommendation to produce the best quality harvest of hot pepper is to use cow manure at intervals of 5 days of endophytic bacteria. The productivity of hot pepper reaches 19.5 tons per ha.

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Development of In-situ Detection Method of Chicken Meat Quality Using Gas and Color Sensors Equipped with Chemometric System

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ABSTRACT

Chicken meat has a high nutrient content, however its quality easily to be degraded. The degradation can be characterized by color changes and metabolite gases (NH_3 and H_2S) formation as deterioration biomaker. Sensors can be used to detect this phenomenon better than human senses. This study aimed to classify the meat quality based on color changes and gas formation during meat storage. Also to determine the order and constant rate of the Red Green Blue (RGB) color changes by kinetics analysis. Detection was carried out with a set of equipment consisting of Raspberry Pi, Metal-Oxide Semiconductor (MOS) gas sensor and TCS 3200 color sensor. The meat samples were placed in a dark colored container along with the sensors. Detection was carried out for 24 hours at room temperature with data collection every hour with three replications. Obtained data were sent to the database for quality classification using Principle Component Analysis (PCA). The results showed three classes of chicken meat quality generated from PCA analysis. PC1 explained 81.7% and PC2 explained 10.9%. The color change rate on chicken meat during storage time followed first order with constant rate value -0.0001, -0.0002, and -0.0003 for red, green, and blue colors respectively. Keywords: chicken meat, color sensor, gas sensor, quality

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Analysis of Rice Farming and its Marketing in DKI Jakarta

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ABSTRACT

Jakarta as a metropolitan area also has rice fields spread across three urban areas, namely North Jakarta, West Jakarta and East Jakarta. The planting of lowland rice in DKI Jakarta was carried out on land owned by developers who have not yet been utilized. Marketing was usually done directly at harvest time to collectors who come to the harvest location or sell to their hometowns in Subang or Indramayu. The purpose of the study was to examine rice farming and marketing in DKI Jakarta. The study was conducted in North Jakarta, West Jakarta and East Jakarta, using the survey method. The research respondents were 53 rice farmers with direct interview techniques to the respondent. Analysis of rice farming using cost and revenue analysis (Hendayana, 2016), while for marketing rice analyzed descriptively qualitatively. The results showed that rice farming in DKI Jakarta was still profitable with an R/C ratio greater than one (West Jakarta = 1,33; East Jakarta = 1,89; North Jakarta = 1,78). The marketing channels for rice in DKI Jakarta are generally very short, ie from farmers sold directly to large traders, only a small proportion sell to collectors or middlemen. As much as 90% of the grain is sold to traders and 10 % is used as seed. The selling price of grain is determined by traders, but it is quite good. The selling price of harvested unhulled rice ranges from Rp.4.200 – Rp. 4.500 per kg

Keywords: Farming, marketing, rice

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Development of Technology Adoption Model for Analysis of Integrated Crop Livestock Systems: The Case of Palm-Cattle Integration in Indonesia

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ABSTRACT

The Integrated Crop Livestock Systems (ICLS) is considered as an important strategy to increase diversity, improves environmental sustainability and fosters farmers' opportunity to boost productivity. The Palm-Cow integration, as an ICMS model is a form of mixed farming that utilizes crops and livestock in a way that they can complement one another through space and time. Evidence suggest that Palm-Cattle Integration provides multi-benefits which are aimed towards reducing the openness of nutrient cycles, following the rationale of industrial ecology, organizing land use and farming practices to promote ecosystem services, and increasing farm resilience to adverse climatic and economic events. However, adoption of Palm-Cow integration is still low due to various technical, institutional and socio-economic barriers. This paper aims to develop a technology adoption model that examines the determinants of adoption of Palm Cattle Integration. Using the framework of Matrix of Cross Impact Multiplications Applied to Classification (MICMAC) and Analytic Hierarchy Process (AHP), we examine the key strategic variables of the technology adoption system that focuses on performance expectancy, effort expectancy, social influence, and facilitating conditions. The empirical analysis uses information collected from selected provinces of Indonesia. This study will offer useful insights for policy makers and stakeholders to address the needs, issues and opportunities to accelerate adoption of Palm-Cow integration in the country.

Keywords: technology, farming system, palm-cattle, adoption

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Physiological Activity of Banana Coated with The Combination of Sago Starch and Cellulose Nanofiber Edible Coating

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ABSTRACT

Edible coating is one of the methods which is usually applied for the purpose of the extending shelf life of agriculture products. However, especially in Indonesia the availability of coating materials in the market is still very limited. In this following research, the combination of sago starch with cellulose nano fiber (CNF) was developed to produce edible films for coatings of agriculture product. This research aimed to evaluate the effect of concentration of CNF on sagoo starch edible coating for controlling the postharvest physiological activity to delay the deterioration of banana at room temperature. Produced coating materials based on sago starch with varies concentration of CNF (1%, 3%, 5%, 7% dan 9%) was applied to banana fruits. The effectiveness of coating materials was examined through the changes in fruit physiochemical parameters such as colour, total soluble solid, weight loss, and respiration. The results showed that edible coating based on sago starch blended with CNF could effectively delay fruit color change and decreasing content of soluble solid. Sago starch with 9% CNF coating material was found to be the most effective to extend the shelf life of banana fruit stored at room temperature.

Keywords : sago starch, cellulose nanofiber, edible coating, banana

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Evaluation of Watermelon Ripeness Using Self-Developed Ripening Detector

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ABSTRACT

To the date the evaluation of watermelon ripeness is done manually by tapping the surface of fruit or just visually evaluated from its appearance. However, these evaluations are subjective and inconsistent, therefore it is necessary to develop and use a reliable instrument for this purpose. This study aimed to develop a ripening detector apparatus based on acoustic impulse response and to be used for evaluating the ripeness stage of watermelon. Measurement of the acoustic impulses were directly carried out at the watermelon garden in Yogyakarta. Five different maturity ages of watermelon, there were 39, 43, 47, 51, and 55 days after planting were evaluated. The acoustic responses were recorded using Audacity 2.3.1, the dominant frequencies and magnitude were then analysed using Matlab R2014b. The acoustic parameters were related to soluble solids content to distinguish the different maturity stages of watermelon. The results showed that the dominant frequencies and the magnitudes were clearly related to the soluble solid contents. As the frequencies and the magnitudes decreased the soluble solids contents consistently increased during maturity period. This finding confirmed that the developed ripening detector was reliable to evaluate and successfully to be used to distinguish the different ripeness stage of watermelon.

Keywords: watermelon, detector, acoustic, frequency, response

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Combined Compost with Biochar Application to Mitigate Greenhouse Gas Emission in Paddy Field

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ABSTRACT

Crop production and environmental sustainability were threatened by environmental issues such as global warming, climate change and land degradation. Rice is a staple food of more than half of the world's population and the most important because of greenhouse gas (GHG) emissions. Rice production accounted for 36% of total emissions from agriculture. The use of organic material management in paddy fields is a potential to support sustainable agriculture. Biochar is reported to enhance soil carbon sequestration and soil productivity. This study aimed to know the effect of combine compost with biochar application on rice yields and greenhouse gas emissions in rainfed rice fields. The research was conducted for 3 years at research station of Indonesian Agricultural Environment Research Institute, Pati-Central Java. We measured CH4 and N2O emissions by using the closed chamber method. We used combined compost and rice husk biochar for organic fertilizer. The results of this study indicated that the application of combined compost with biochar in each planting season improved the grain yield by 17% and reduced global warming potential (GWP) by 5% compared to conventional practice. The combined compost with biochar application in paddy fields has the opportunity as GHG mitigation efforts on rice production.

Keywords: biochar, compost, greenhouse gas, mitigation

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Virulence of Five Anthracnose *Colletotricum acutatum* Isolates from West Java Against the Resitance of Hot pepper

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ABSTRACT

The most dominant disease attacked chili plantations, one of which is anthracnose (*Colletotrichum acutatum*). This disease can accompany both newly formed and ripe fruits, causing substantial losses in quality and quantity up to 20% - 90%. The purpose of this research is to select lines / varieties of chili that are potentially resistant to anthracnose (*Colletotricum acutatum*). This research was carried out at the Indonesia Vegetable Research Institute with heigh 1.250 meters above sea level. The study was carried out in two stages, namely in the field and in the laboratory from January to December 2018. Samples of anthracnose-infected chili were taken from chilli cultivation in several locations in West Java (Bandung, Ciamis, Tasikmalaya, Garut, and Sukabumi). Identification of *C. acutatum* isolates was done by PCR method. The results showed that: (1). The intensity of anthracnose disease is different in plantations in five districts (Bandung, Garut, Tasikmalaya, Ciamis and Sukabumi) ranging between 50% -73%. The high intensity of anthracnose symptoms depends on cropping patterns, the use of varieties, plant age, and plant conditions. (2). Based on the morphology of the isolate the white top looks white and gray, and beige, white, peach color for the colony looks down. (3). *C. acutatum* isolates from 5 districts in West Java were identified by DNA band PCR measuring 490 bp. (4). The isolates from Sukabumi were the most virulent compared to 4 other isolates (Pangalengan, Garut, Tasikmalaya and Ciamis). (5). The results of inoculation of 5 isolates from West Java on hot pepper were not obtained resistant lines / varieties.

Keywords: *Capsicum annuum* L., Virulence Isolates, Resistance, Antraknose, *Colletrotrichum acutatum*

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Net Assimilation Rate, Growth and Yield of Rice (*Oryza sativa L* cv Inpago Unsoed 1) with PGPR Application in Different Rate of Nitrogen

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ABSTRACT

Dependence on chemical fertilizers, especially nitrogen has caused nutrient imbalance, but nitrogen as macro nutrient is needed in all plant growth phase. An ecological approach to restoring soil fertility application of biological fertilizers in the form of a consortium. Therefore, the PGPR consortium application is expected to cut the need for chemical fertilizers and increase plant growth. The aims of this research was to study the net assilation rate, growth and yield of rice with PGPR application in different rate of nitrogen. The pots experimental was conducted in experimental farm of Agriculture Faculty of UNSOED Purwokerto from July until November 2020. The research was arranged by Randomized Block Design with three replication. The first factor was the PGPR consortium, and the second factor was the dosage of nitrogen fertilizer application. The observed variables were plant height, number of tiller, plant biomassa, leaf greenness, plant biomassa, net assimilation rate, relative growth rate and yield. The data were analyzed by anova and if significant different was continued by DMRT 95%. The results showed that the interaction of the PGPR consortium and N fertilization can increase the net assimilation rate of rice plants and the relative growth rate of rice plants and plant biomass. however, the PGPR consortium has not been able to increase plant height growth, number of tillers, root canopy ratio, width of openings and stomata density of rice leaves, and yield. The highes yield was achieved by application of nitrogen at 200 kg ha-1 reached 36.17 g plant-1.

Keywords: PGPR, nitrogen, net assimilation rate, growth, yield

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The Effect of Concentrations and Exposure Durations of Ethylene Gas on The Respiration Rate of Tomato Fruit (*Solanum lycopersicum*)

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ABSTRACT

Ethylene gas is often used in artificial ripening of fruit including tomato. One of the physical characteristics which is influenced by ethylene application is the respiration rate. This research aimed to find out the effect of ethylene concentrations and exposure durations on the respiration rate of tomato in the ripening process. Ethylene concentrations of 100, 150, and 200 ppm and exposure durations of 24, 48, and 72 hours were investigated in factorial design 3 x 3 with three replications in this study. Selected green mature tomatoes were exposed to ethylene gas, after exposure were then loaded in the respirometer and stored in room air. Oxygen and carbon dioxide changes were monitored using O_2 and CO_2 Gas Analyzer until the fruits were ripened. Using three way repeated measure analysis, it was found that the interaction effect of the treatments on the respiration rate only significant for time of measurements and exposure durations ($p<0.05$). These findings confirmed that exposure duration was a very important factor to be considered in the application of ethylene. It could also be reported that exposure duration of 24 hours was significantly differ with 48 and 72 hours, whereas these two later exposure durations were not different.

Keywords: ripening, ethylene, concentration, exposure duration, respiration

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Content and Potential of Rice Straw as a Mineral Source of Zinc in Animal Feed

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ABSTRACT

Zinc are essential for growth and cell division (mitosis and meiosis), sperm production, embryo development, and pregnancy (Widhyari 2012). This study aims to determine the Zn content of several rice varieties and their potential as ruminant feed. The research was done in Central Lampung in June 2020. Experiment used a randomized block design with 3 varieties and 3 replication. Each varieties (Inpari IR Nutrizink, Ciherang, Inpari 32) was planted in 50m2. The variables are plant height (cm), stump height (cm), straw height (cm), straw weight and grain (kg), straw weight /50m2 (kg), straw weight /ha (kg)) and the Zn content in straw. The data obtained were analysed by using R statistic. The results showed that Inpari 32 has the highest average plant height, stump height, straw height, and grain weight. While Inpari IR Nutrizink has the highest average of straw weight /50m2 (40.67 ± 5.8 kg) and straw weight/ha (7,970.67 ± 1135.84 kg). The zinc content of Inpari IR Nutrizink was also the highest at 49.85 ppm/10 grams, followed by Inpari 32 (35.40 ppm/10 grams) and the lowest was Ciherang rice (34.08 ppm/10 grams). So that Inpari IR Nutrizink has the potential as a healthy ruminant feed.

Keywords: straw, zinc

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Climate Smart Agriculture Implementation Facing Climate Variability and Uncertainty in Coffee Farming System

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ABSTRACT

Climate risk in agriculture indicates the potential of climate-related hazards to cause a negative impact on coffee production and quality. Climate Smart Agriculture (CSA) is defined as agricultural practices that sustainably increase productivity and agriculture system resilience. CSA builds on existing efforts to achieve sustainable agriculture such as Good Agricultural Practices (GAP). Smallholders have many best practices and knowledge to develop a climate risk management. However, the effectiveness is still low due to technical, institutional, and financial barriers. This condition affects farmers in constructing risk management that shields from the adverse effects of climate change, as well as improves farm yields and household incomes. The objectives of the study are to identify model options that serve both CSA goals and GAP requirements, analyze barriers in responding to climatic risks, and formulate the strategy to improve adaptive capacity and preparedness to cope with climate change. The analysis used Interpretative Structural Modeling for developing graphical representations of system composition and structure in CSA. Smallholder has a formal and informal mechanism in climate risk management that aligns with GAP in the form of climate risk reduction, mitigation, and coping. The strategies are divided into farm/household/community, market, and government level.

Keywords: climate, risk, GAP, model, strategy

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Optimization of Irrigation Water Allocation by Using Linear Programming: Case Study on Belitang Irrigation System

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ABSTRACT

The irrigation water requirement in the Belitang Irrigation System cannot be fulfilled during dry season, due to the limited water availability. Therefore, some agricultural land in the Belitang Irrigation System receive inadequate irrigation water. To solve this problem, it was necessary to optimize the allocation of irrigation water so that the existing land potential could be optimized. This study aimed to obtain optimal planting area and maximum benefits by optimizing the allocation of irrigation water based on the reliable discharge and existing land. The optimal planting area was obtained by making several alternative cropping patterns. The method used to analyze the optimization of water allocation was linear programming. The results showed that the allocation of water with a reliable discharge of Q = 100% obtained an optimum planting area of 58,671 ha, a planting intensity of 271.65% and a maximum profit value of Rp 1,765,104,705,000.00. From the results of these studies, the amount of irrigation water allocation or mainstay discharge greatly affected the optimum planting area compared to the unit price of production and the productivity of commodity planted.

Keywords: Optimization, Irrigation Water Allocation, Linear Programming, Belitang Irrigation System

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The Relationship of Soil Nitrate Distribution and Growth Rate of *Capsicum frutescens* in Subsurface Flow Constructed Wetland integrated with Household Septic Tank

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ABSTRACT

Domestic wastewater treatment unit consisted of a single chamber septic tank and Subsurface Flow Constructed Wetland (SFCW) was built in Yogyakarta, Indonesia. SFCW played a significant role as a secondary treatment of septic tank effluent. This study aims to analyze the soil nitrate content and its distribution in the sand layer of SFCW. The design of SFCW had a depth of 0.4 m, with 0.2 m and 0.2 m of coral and sand, respectively with two control pipes were installed in the depth of 0.3 m along the garden and planted with chili (*Capsicum frutescens*). Soil nitrate content of SFCW was analyzed in the laboratory for 8 weeks observation. Samples were taken in different direction, both vertical and horizontal. In vertical direction, samples were taken with three different depth (10, 15, and 20 cm) from the surface. Further, in horizontal direction samples were taken with three different distance from outlet pipe. The soil nitrate obtained from laboratory analysis in vertical direction was significantly different ($p<0.005$). The soil nitrate at the depth of 20 cm was higher than 15 cm and 10 cm. However, the soil nitrate obtained in horizontal direction was not significant ($p>0.05$) in all type of design. The soil nitrate has positive correlation with plant growth, the higher soil nitrate will increase the plant growth.

Keywords: soil nitrate, sand layer, Subsurface Flow Constructed Wetland, *Capsicum frutescens*

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The Potential of Seaweed Used as Hydroponic Solution on The Growth and Yields of Lettuce (*Lactuca Sativa* L.)

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ABSTRACT

Lettuce (Lactuca Sativa L.) is one the most popular leaf vegetable in Indonesia. Hydroponic systems do not require extensive land cultivation. The advantages of using hydroponic systems can produce higher and more advantages are efficient land use. Seaweed have been reported that can be used as a fertilizer.This study aims to determine the effect of various nutrient solutions on the growth and yield of lettuce plants with hydroponic wick system. This study uses a randomized block design (RBD), with treatments such as N1= OLF(organic liquid fertilizer) solution, N2= OLF solution + combine with spray, N3= Seaweeds extract solution , N4= Seaweeds extract solution+ POC solution, N5= AB mix (Nutriponik). Each treatment was repeated 4 times, so that there was 20 units of experiment were obtained. Each unit of experiment consist of 5 plants so that the total population was 100 plants. The results showed that the AB mix nutrient solution gave the growth response better then POC solution and seaweed extract solution treatments producing an average a plant height of 31.38 cm, number of leaves 12.45, total fresh weight of plant 70.13 g, and total dry weight of plants 1.12 g.

Keywords: vegetable, agriculture system, fertilizer, soilless

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Kinetics Analysis of The Effect of Types and Concentrations of Ripening Agents on The Physical Quality Changes of Banana Fruit (*Musa acuminata* Colla)

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ABSTRACT

Nowadays there are many fruit ripening agents available in the market, it is important to know the performance of those ripening agents in the real applications. This research aimed to study the effect of the type of ripening agents and applied concentrations on the physical changed of banana during ripening process. Ethylene, acetylene, and ethrel in three different concentrations of 0, 250, and 500 ppm were investigated in this research in factorial 3 x 3 with three replications. Green mature bananas were treated with those ripening agents in closed boxes, after being treated then stored in the open room until they were ripened. Soluble solid content, firmness, and weight losses of the samples were monitored every 12 hours until the samples were ripened. The results indicated that in both the three ripening agents the change of weight losses, soluble solid content, and firmness followed zero, first, and second order kinetics respectively. The values of constant rate of change for weight losses was the biggest and the lowest ones was for the firmness. The values of constant rate of change also differed according to the concentration but did not follow any certain patterns.

Keywords: ripening agent, banana, soluble solid, weight losses, firmness

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Value-Added Analysis of *Lactobacillus acidophilus* Cell Encapsulation Using *Eucheuma cottonii* by Freeze-Drying and Spray-Drying Methods

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ABSTRACT

The study objective was to determine the probiotic cell encapsulation process of Lactobacillus acidophilus. The data used were primary data from laboratory research. The encapsulation materials used were maltodextrin 20% (a0), Eucheuma cottonii 20% (a1) and E.cottonii 10% maltodextrin 10% (a2). The encapsulation methods used were freeze-drying (b0) and spray-drying (b1). There were 6 treatment variations which were repeated 3 times with the RBD method for cell numbers, cell viability, and yield between treatment analyses. Process and raw material costs were then analyzed. The scoring was carried out on the number of cells, cell viability, yield, processing costs, and raw materials parameters. Based on the scoring results, the encapsulation treatment with E.cottonii (a1) through the freeze-drying encapsulation method (b0) had a value of 19 (the biggest among the 5 other treatments). The added value of a1b0 treatment was analyzed using the Hayami and Kawagoe methods, based on the results it had an added value of Rp. 756) / gr with a value-added ratio of 45.4%.

Keywords: aded-value analysis, *Eucheuma cottonii*, encapsulation, Hayami and Kawagoe, *Lactobacillus acidophilus*

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Rice Cultivation Sustainability on Irrigated Paddy's Field in Upland Bengkulu Indonesia

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ABSTRACT

Sustainable agricultural paddy's fields determine food security and important to social equity, social prosperity, economical development, and environmental services. The main purpose of this research was to elaborate some perpectives on sustainability of irrigated upland rice cultivation in Bengkulu. The study was done in Lebong Regency, Bengkulu Province from January to April 2020. A scalable rapid appraisal multidimensional scaling (MDS) was used to examine sustainable status following to five dimensions of ecological, economical, socio-cultural, technological and institutional viewpoints consisting of 30 attributes. Accuracy of MDS analysis was analyzed with goodness of fit and Monte Carlo analysis while sensitive attributes was fitted with root mean square leverage analysis. Agricultural paddy's fields in upland Bengkulu moderately sustain with scale of 51.41. Land use change perception determined socio-culture dimensions to put agriculture paddy's field on less sustain at the scale of 47.85. A low financial support and government facilities put institutional and policies dimension on 45.40, the level of less sustain for cultivated rice field sustainability. Strengthening sustainability of cultivation upland paddy's field in Bengkulu initially should be supported by government budgeting and facility, and endorsement sustainable agricultural land policies.

Keywords: paddy's fields, multidimensional perspective, agricultural sustainability

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Utilization of Coconut Water Waste to Increase Cocoa Growth Seedling by Different Application Methods and Intervals

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ABSTRACT

Cocoa production in Indonesia is decreasing and one of the reasons is aging cocoa plants. Cocoa replantation requires a good and robust seedling. Such seedling can be achieved through growth nutrition addition. Addition of coconut water can enhance the growth of coconut seedling due to growth hormone contained that is essential for good plant growth. Giving coconut water can increase cocoa growth seedling, because coconut water contains nutrients and hormone that needed to plant growth. This experiment was conducted to study the growth response of cocoa seedilings towards the application of coconut water. The experiment was conducted from October 2019 until February 2020 in Ciparanje experimental field, Universitas Padjadjaran, Jatinangor with the altitude of 760 meter above the sea level. Experimental design used was randomized block design (RBD) with nine treatments and each treatment was repeated three times. The treatments consisted of control (urea 2 g every 12 days), coconut water application towards plant every 3, 7, 14, 21 days, and to the soil every 3, 7, 14, 21 days. The application of coconut water every 21 days to the plant and to the soil affected the seedling height at 12 WAA (week after application) and on the stem diameter in 8 WAA. Mentioned threatment showed similar result as 2 grams of urea/12 days application. Negligible differences were observed between application method and intervals with leaf count and chlorophyll index of seedlings.

Keywords: cacao seedlings, coconut water, application method, intervals

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The "PATBO SUPER" Technology Innovation to Increase Rice Production in Rainfed Rice Fields

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ABSTRACT

The area of irrigated paddy fields in Indonesia, especially on the island of Java, continues to decrease every year due to switching functions for non-agricultural purposes. Meanwhile, the need for food, especially rice, continues to increase, so that government efforts are needed to overcome the problem. One of the efforts that could be performed is to optimize the potential of rainfed rice fields resources which are quite extensive by developing the "PATBO SUPER" technology. The objectives of the study were: (1) To Evaluate the performance of the “PATBO SUPER” technology adapted in Sumedang Regency and Majalengka Regency and (2) To Design alternatives to accelerate the dissemination of “PATBO SUPER” technology in rainfed rice fields. The study uses qualitative methods to answer research problems that originate from the results of interviews, observations and documents extraction. Data analysis was performed descriptively and presented in the form of tables, graphs or pictures. The results indicated that the performance of the "PATBO SUPER" technology was very good in several study locations, such as Sumedang Regency (Ujung Jaya District) and Majalengka Regency (Sumberjaya, Palasah, and Sukahaji Districts), both during the 2nd and 3rd Planting Season. Rice productivity in Ujung Jaya District increased 33.51%, from 5.64 Ton/Ha with technology that commonly applied by farmers to 7.53 Ton/Ha with “PATBO SUPER” technology. Financially Farmers also benefited as indicated by the BC ratio of 1.49, and MBCR of 14.18. The implementation of “PATBO SUPER” technology could also increase the Cropping Index from two to three times in one year. Farmers' perceptions of “PATBO SUPER” technology innovation are positive. This positive perception is expected to provide a positive response so that positive action will be taken, such as adopting “SUPER PATBO” technology in their farm land. To accelerate the dissemination of “PATBO SUPER” technology, what could be done is to create a field laboratory through development programs from the central government as well as local government.

Keywords: PATBO SUPER, technology, rice production, rainfed rice fields

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Farmers' Perceptions of Soil Block Nursery Techniques on Shallot Seeds in Grobogan Regency, Central Java

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ABSTRACT

The research aimed to know the performance of seedlings and farmers' perceptions of Shallot seed nursery techniques using soil blocks. The research was conducted in Grobogan Regency from September - November 2020. The research method used 3 nursery techniques, namely a seedbed with soil block, plastic (oker), and plumbing. The data collected included technical data, namely data on the growth and productivity of shallots, and data on farmers' perceptions of nursery techniques obtained by interviewing 30 farmers. Technical data were analyzed descriptively an average value and t-test. Farmer's perceptions were evaluated using 11 attributes and 5 evaluation scales for the level of confidence, analyzed by scoring techniques on 5 interval scales. The results showed that the average shallot productivity obtained by the soil block nursery technique was higher than the other nursery techniques. Farmers have a good perception of soil block nursery techniques compared to other techniques because shallot seeds are very easy to grow, seedlings are very easy to move to the planting area, seedlings are very easy to grow in planted area, seedlings thrive in planted area and size of the resulting bulbs is very big. Soil block nursery techniques are an alternative to increasing shallot production.

Keywords: farmers' perception, nursery techniques, soil block, shallot seeds

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Farme Equilibrium and Kinetic Studies of Methylene Blue Biosorption by Sugar Plam Dregs

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ABSTRACT

The biosorption of methylene blue onto sugar palm dregs was studied in batch biosorption system to know the equlibrium and kinetics. The operating variables studied were initial of solution pH and biosorbent dose. The Langmuir and Freundlich isotherm models were used for modeling the biosorption equilibrium. The experimental was found that the increase solution pH would increasing of adsorption capacity from 1.72 mg g^{-1} at pH 2 to 15.71 mg g^{-1} at pH 8. The dye removal was from 54% to 93% for an increase in the biosorbent dose from 0.5 gL^{-1} to 2 gL^{-1} while adsorption capacity was reduced from 21.75 to 9.3 mg g^{-1}. The equilibirium studied well intepreted intepreted by the Langmuir model with monolayer sorption capacity (qm) is 23.866 mg g^{-1}. In kinetic studies the fits of pseudo-first order, pseudo-second order, ritchie and intraparticle diffusion kinetic models were investigated. It was obtained that the biosorption process followed the pseudo-second order rate kinetics.

Keywords: biosorption, methylene blue, sugar palm dregs, equilibrium, kinetics

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The Production Performance and Feasibility Studies of New High Yield Varieties in Tegal District

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ABSTRACT

Variety is one of the technological innovations that could contribute significantly to increasing production. The utilization of improved varieties could increase production by 5 - 16%, and when the varieties combined with other technology components could increase production by up to 75%. The objectives of this study are to analyze the performance of several high yielding rice varieties and its feasibility. The research was conducted in Banjaranyar Village, Balapulang District, Tegal Regency during the second Planting Season. The research method used was on farm research, namely comparing the introduction of new high yield varieties (Inpari 30, Inpari 32 and Inpari 33) and existing varieties (Mekongga). The results showed that the productivity of Inpari 32 was 5.97 tonnes/ha GKG or 1.01 tonnes/ha GKG higher than the productivity of the existing varieties (4.96 tonnes/ha GKG). The feasibility studies showed that the feasibility of new high yield varieties introduced were higher compared to Mekongga (1.14). However, among the new high yield varieties introduced, Inpari 32(1.41) is more feasible to develop compared to Inpari 30 (1.28) and Inpari 33 (1.39).

Keywords: new high yield varieties, productivity, paddy, income

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Study of The Effect of Plant Growth Regulator on Yield and Catechin Content of Tea (*Camellia sinensis* (L.) O.Kuntze)

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ABSTRACT

Catechins are one of the secondary metabolites contained in tea leaves. Good cultivation indirectly affect the shoot productivity and quality of tea yield. The use of growth regulators in mature plants is a new breakthrough in tea plant engineering as perrenial plant. This research use of BAP and GA at different levels of pruning and pruning height. The experiment was conducted at Tea and Quinine Research Center Gambung, began in June 2018 until October 2018. This study uses split split plot design consisted of three factors as followed: main factor (a) type of pruning (clean pruning and pruning); sub factor (b) pruning height (40 cm, 50 cm and 60 cm); sub-sub factor (h) plant growth regulator (0 ppm, 60 ppm BAP, 50 ppm GA, 60 ppm BAP + 50 ppm GA). The result showed that the level of pruning 60 cm and 60 ppm BAP in 3rd month significantly affected the chlorophyll content index (91,58I cci). There was interaction between the pruning height of 60 cm and 50 ppm GA on fresh shoots weight per bush on the 4th plucking. The pruning at different types and heights did not gave a significant effect on shoot dry weight. Based on the response curve that at clean pruning the optimum value was obtained with pruning height of 51.5 cm and 66,63 ppm BAP contributes to catechin content of 1.88% while at lung pruning the minimum value was obtained at pruning height of 50,73 cm and 7,238 ppm produced catechin content of 0,776%.

Keywords: cytokinin, gibberellins, levels of catechins, pruning

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The Synergy of Palm Oil Certification and the Regional Spatial Plan in Realizing A Sustainable Landscape

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ABSTRACT

The Regional Spatial Plan (RTRW) is considered a landscape management document. With a total area of 16.3 million ha, oil palm plantations are crucial in realizing a sustainable landscape. The South Tapanuli District is chosen for its high conservation value and the possession of a Sustainable Palm Oil Action Plan. The analysis is conducted descriptively using secondary data from Indonesian Sustainable Palm Oil (ISPO), Roundtable Sustainable Palm Oil (RSPO), RTRW for South Tapanuli District and the Long-Term Management Plan for Forest Management Units (KPH). The results show that both the RTRW and KPH conduct spatial planning based on area criterias and have determined the locations for each criteria. Similarly, the ISPO and RSPO have also determined the criteria for the areas and its relationship with spatial planning in their Principles and Criteria. However, the implementation of policies and programs is still sectoral and coordination between players is also weak. Vertical coordination between the national ministry staff and sub district authorities, as well as horizontal coordination between various agribusiness commodities need to be improved in order to realize a sustainable landscape.

Keywords: landscape, palm oil, sustainable, certification, spatial planning

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Shelf-Life Evaluation of Local West Java Sorghum Biscuits Enriched with Lactobacillus Acidophilus on Various Types of Packaging

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ABSTRACT

The objective of this study was to determine the shelf-life of local west java sorghum biscuits, which were enriched with Lactobacillus acidophilus probiotics in various food packaging materials. The sorghum biscuits were enriched with lactobacillus acidophilus encapsulated using the freeze-drying method. This was done as an initial step towards the downstream process of Synbiotic sorghum biscuits. The packaging materials used were polypropylene oriented plastic, aluminum, and metal-coated packaging. The shelf-life determining method used was the Arrhenius acceleration method with moisture, hardness, Aw, and the total number of lactobacillus acidophilus as its test parameters. Observations were made at 3 different temperatures, i.e 350C, 500C, and 700C until the total amount of lactobacillus acidophilus in biscuits was at the minimum required for probiotic products, i.e log 7cfu/g. The observation parameter that has the lowest activation energy value was the number of lactobacillus acidophilus cells so that this parameter becomes a critical parameter for determining the Kt value. Based on observations, sorghum biscuits have a shelf life of 10 months in metal-coated packaging, 7 months in aluminum packaging and 6 months in propylene oriented plastic packaging. Other characteristics of biscuits that were observed included sensory analysis, prebiotic content of biscuits, and in-vitro test for lactobacillus acidophilus in biscuits.

Keywords: arhenius, biscuits, packaging material, shelf-life, sorghum

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The Analysis of Household Income and Expenditure of Farmers in The Rain-Fed Areas of Boyolali District

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ABSTRACT

Farmer households usually work in various activities to obtain income and fulfill household demands. The objective of this study are to identify structures and factors influencing farmer households' income in the rain-fed areas This research was conducted in Tegalgiri Village, Nogosari Sub-district, Boyolali District from January to March 2020. The research methodology used survey technique to 30 farmers. Data were analyzed descriptively and quantitatively using multiple linear regression analysis. The results showed that the average household income of IDR 5,262,387/month with the largest proportion (65.31%) came from farm income and 34.70% came from non-agricultural income. Factors influencing household income are rice production and farmers' education. The average household expenditure is IDR 3,869,634/month consisted of food expenditure 30.17%, 23.94% for non-food expenditure, and 19.42% for farming cost. Factors influencing household expenditure are income and land area. To increase household income and welfare, farmers need to optimize the management of rain-fed lowland and upland fields.

Keywords: income, expenditure, household

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Inundation Land Conditions in Central Java Pantura and Inundation Tolerant Variety of Rice Productivity

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ABSTRACT

The condition of the irrigated rice fields in the pantura of Central Java has changed its function to become ponds. This incident will be anticipated by farmers by looking at inundation conditions, salt content and rice productivity. The cropping pattern in pantura rice fields is paddy-paddy with a cropping index of 500 and a productivity of around 3 tons of harvested dry grain / ha. The assessment activity was carried out in Purwokerto Village, Brangsong District, Kendal Regency, June to October 2018. Information on the estimated sea level each month is the basis for estimating nurseries, planting seeds and fertilizing. The assessment method was a split plot with treatment, a) inundation height (5 cm and 20 cm, b) ameliorant (humic acid, gypsum and zeolite) and c) rice varieties (Inpara 8, Inpari 30, Inpari 34 and Inpara 35). Observation of land conditions on 1, 13 and 25 August 2018. Agronomic and production observations were carried out when the flowers appeared on each rice variety. The results of observations on land conditions were only carried out at the 20 cm inundation height treatment. The highest salinity observations on August 1 (1.6 gr / kg) occurred at 20 cm inundation height with Inpari 35 gypsum ameliorant. 25 August 2018 has a value of 3.9 gr / kg. The deepest root depth was in the 5 cm puddle treatment of Inpara 8 (27 cm) variety. The shortest root depth was in the Inpari 35 (16 cm) pool of 5 cm. The observations of ubinan show that Inpari 30 has the highest productivity of 10 tonnes / ha in humic acid treatment in a 5 cm pool.

Keywords: Inundation land, Central Java pantura and puddle tolerant varieties

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Quality of Flour Prepared from Various Varieties of Potatoes

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ABSTRACT

The objective of this study was to determine the shelf-life of local west java sorghum biscuits, which were enriched with Lactobacillus acidophilus probiotics in various food packaging materials. The sorghum biscuits were enriched with lactobacillus acidophilus encapsulated using the freeze-drying method. This was done as an initial step towards the downstream process of Synbiotic sorghum biscuits. The packaging materials used were polypropylene oriented plastic, aluminum, and metal-coated packaging. The shelf-life determining method used was the Arrhenius acceleration method with moisture, hardness, Aw, and the total number of lactobacillus acidophilus as its test parameters. Observations were made at 3 different temperatures, i.e 350C, 500C, and 700C until the total amount of lactobacillus acidophilus in biscuits was at the minimum required for probiotic products, i.e log 7cfu/g. The observation parameter that has the lowest activation energy value was the number of lactobacillus acidophilus cells so that this parameter becomes a critical parameter for determining the Kt value. Based on observations, sorghum biscuits have a shelf life of 10 months in metal-coated packaging, 7 months in aluminum packaging and 6 months in propylene oriented plastic packaging. Other characteristics of biscuits that were observed included sensory analysis, prebiotic content of biscuits, and in-vitro test for lactobacillus acidophilus in biscuits.

Keywords: arhenius, biscuits, packaging material, shelf-life, sorghum

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Response of Growth Oil Palm Nursery with Application the Compost Made Out of Oil Palm Midrib, Organic Fertilizer and Humic Acid

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ABSTRACT

Oil palm plantations can produce biomass in the form of empty bunches, stems and midrib. Some of the waste has been utilized by plantations, however, the utilization of oil palm midrib is still rare. This research experiment was carried out in experimental farm Ciparanje, Faculty of Agriculture Padjadjaran University, Jatinangor, Sumedang District, West Java Province from December 2019 untill May 2020. The design of this experiment used a randomized block design. There were nine treatments and were repeated three times. The results showed that the mixture of compost made out of oil palm midrib with organic fertilizers or humic acid can substitute the usage of inorganic NPK fertilizers, making fertilization more environmentally friendly, especially in oil palm nursery. The optimal dose of compost made out of oil palm midrib is in the range of 800 - 1600 g per plant combined with 10 g of biological fertilizer or 25 g of humic acid. The dosage composition has a positive effect on height growth, stem girth, leaf number and leaf chlorophyll content of oil palm plants in the main nursery stage.

Keywords: oil palm nursey, compost made out of oil palm midrib, organic fertilizer, humic acid

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Identification of the accumulation of excess air temperature during one growing season as a basis for determining suitability for potato plant (*Solanum tuberosum* L.) in a tropical region

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ABSTRACT

High temperatures in tropical countries is a significant constraint for potato plant development. It is potent to identify the accumulation of excess air temperature between the region with low-temperature and high-temperature during one growing season, as a basis for determining the suitable area for potato plants in a tropical region. Two series of experiments have conducted, the first had carried out in two locations, (1) in the high-temperature area (380 masl) and (2) in the low-temperature area (1360 masl). The second experiment had carried out in a high-temperature area (600 masl). The potato cultivars tested were sensitive to high temperatures. The results of the first experiment showed that the difference between the minimum/maximum air temperature accumulation of one growing season between 1360 masl and 380 masl was 179.49/330.42˚C and the decrease in tuber yield reached -76%, resulting in unmarketable potato tuber. The results of the second experiment showed that the difference in the accumulation of minimum/maximum air temperature between 1360 masl and 600 masl was 18.8/188.4˚C, which decreasing in tuber yield about -10.3%. This study indicates, the temperature at 600 masl still exceeds the optimum temperature, nonetheless, the quantity and quality of the tubers produced were marketable.

Keywords: potato plant, high-temperature, tropical region

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Diversity of Arbuscular Mycorrhiza Fungi (Amf) In Rhizosphere of Sugarcane

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ABSTRACT

The use of Arbuscular Mycorrhiza Fungi (AMF) as a biological agent in several types of plants is now getting a lot of attention. To study the potential of an organism, the first thing to know is the existence and diversity of these organisms. Exploration of AMF types in sugarcane cropping areas is an important and necessary initial study to be able to isolate and identify specific types of AMF that exist. This activity is very important to obtain information about the diversity of AMF types as a source of important material for selection to obtain potential and effective AMF isolates, and be able to adapt to conditions of land and commodity specific. To study the potential of AMF, the first thing to know is the diversity of these organisms. With the data on AMF diversity, selection can be made to obtain potential and effective AMF isolates in increasing the growth and productivity of sugarcane. This study aims to identify the types of AMF in the rhizosphere of sugarcane. The research was conducted from June to October 2015, soil sampling was carried out in the community sugar cane garden in Ngemplak Plantation, district Pati (KP. Muktiharjo). While the isolation, identification and capture of spores is carried out in the Ecophysiology Laboratory and the greenhouse of the Indonesian Spices and Medicinal Crops Research Institute, Bogor. The identification results obtained 2 arbuscular mycorrhizal fungi in the sugarcane rhizosphere, namely Glomus sp, (3 species) and Acaulospora sp (1 species). The amount of initial spore density was 120-130 spores per 50 g of soil samples and after trapping, the number increased to 407 spores / 20 g soil samples or increased 6.8 times

Keywords: diversity, Arbuscular Mycorrhizal Fungi (AMF), sugarcane

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Increased Genetic Variability of Sugarcane Through Gamma Rays Irradiation

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ABSTRACT

Increased genetic diversity of sugarcane can be done through mutation induction using gamma ray irradiation. This research was carried out to determine the response and radiosensitivity of calli sugarcane variety (Kidang Kencana) to gamma ray irradiation, and knowing the diversities of phenotypic mutant of sugarcane. The research was conducted at BATAN and ICECRD, from August 2012 until March 2013. This research was arranged in Completely Randomized Design with 6 doses of gamma ray irradiation (0, 10, 20, 30, 40 and 50 Gy). Each treatment consisted of 10 replications. Each replication consists of 5 clumps of calli. The observed variables were calli fresh weight, percentage of regenerated calli, number of shoots, shoot height, leave number, root number and plantlets number, calli and mutant phenotype. The results showed that the ability of calli to regenerate and shoot growth decreased with increasing doses of gamma ray irradiation. Radiosensitivity (LD20-LD50) of sugarcane calli Kidang Kencana variety to gamma irradiation were in the range of 10 and 30 Gy doses. Gamma irradiation 10 and 20 Gy doses caused the variability mutant phenotype were very high. It means that gamma irradiation can be used to increase the genetic variability of sugarcane.

Keywords: induced mutation, lethal dose, physic mutagen, radiosensitivity, Saccharum officinarum L.

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In-Vitro and In-Vivo Selection of Sugarcane (*Saccharum Officinarum*, L.) Putative Mutant for Drought Stress

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ABSTRACT

To improve sugarcane varieties with drought-tolerant can be done by utilizing tissue culture technology through in-vitro selection followed by field testing. This research aims to find out mutant putative of sugarcane from gamma-ray irradiation. This study was conducted from March to December 2016 using embryogenic calli of BL, PS 862, and PSJT 941 varieties. Factorial randomized complete design with two factors with the first factor of irradiation dose (0, 5, 10, 15, 20, 25, 30, 35 gray) and second factor PEG concentration (0, 10, 20%) was used. Results showed that the irradiated calli selected by PEG media had changed colour from yellowish-white to brownish and blackish, and growth obstacle. The higher the dosage of radiation and the concentration of PEG, the more calli with growth obstacle. In vitro selection indicated an increase in drought tolerance in mutant callus derived from PS 862 and BL varieties irradiated with doses of 5 - 30 gray and putative mutants derived from PSJT 941 varieties irradiated with doses of 5-25 gray, either on PEG 10% and 20% selection. To recognize the mutant response further, it is necessary for in-vivo selection at the greenhouse and in the field.

Keywords: physical mutagen, selection agent, poly ethylene glycol, relative decrease index

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The Effect of Temperature and the Sodium Bicarbonate Addition on the Performance of The Microwave-Assisted Extraction of Phenolic Compound from Red Sorghum

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ABSTRACT

Microwave-Assisted Extraction (MAE) had been applied to enhance the extraction of phenolic compounds (PC) from intact red sorghum grain (RSG). The releasing PC that are strongly bound to pericarp cells were accelerated by using microwaves and the concentration of sodium bicarbonate (CSB). This research observed the effect of the SB addition and the temperature on the capability of water as a green solvent to extract the PC. The performance of MAE was observed at 50, 60, and 70 oC of temperature for 150 minutes. The effect of SB addition was evaluated in the concentration of 0, 1, and 2 % in aqua dest and 1:10 of solid-liquid ratio. The correlation between each factor in the MAE and the optimum condition were evaluated using Response Surface Methodology. The concentration of phenolics compounds in the aqueous extract was proportional to the temperature and time of MAE significantly, while the CSB had the inversely proportional correlation, significantly. This phenomenon can be explained by the reaction between phenolic compounds and SB to form compounds that are no longer detectable as phenolic compounds. So, although the presence of SB accelerated the release process, the increase of the concentration of the released compounds was not detected.

Keywords: temperature, sodium bicarbonate, microwave, phenolic, sorghum

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STUDY OF "PATBO SUPER" TECHNOLOGY INNOVATION PROMOTING THE IMPROVEMENT OF PLANTING INDEX AND PRODUCTIVITY OF RAINFED RICE IN WEST JAVA PROVINCE

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ABSTRACT

The water availability is becoming the major constraint in the rainfed rice fields farming. Farmers only cultivate once or twice annually because of the dependency on rainwater. The innovation technology studied were namely, water-efficient rice cultivation based on specific organic rainfed rice fields (PATBO SUPER) consists of 5 components: (1) Use the amphibian group of VUB, (2) Water management, (3) Use of organic materials on site, (4) Use of machinary, and (5) Weed control. The assessment was carried out in two locations, namely, in the villages of Keboncau and Sakurjaya, Ujungjaya Subdistrict, Sumedang Regency, West Java Province. The research was conducted in the form of adaptive research on 14 and 16 hectares of farmers rainfed rice fields in the Dry Season II (DS II) from July to December 2019. The research was conduct in the form of adaptive research on 14 and 16 hectares area of rainfed rice fields in the Dry Season II (DS II) from July to December 2019. The objectives of the study were: (1) to analyze the performance of the "PATBO SUPER " technology innovation in supporting the improvement of Planting Index (PI) and rice productivity on rainfed rice fields; (2) to analyze the level of farmers' adoption and perceptions of the "PATBO SUPER" technology innovation. Data were collected through, (1) observation, (2) direct measurements in the field; and (3) interviews. Data analysis was carried out descriptively and tabulated in the form of tables, graphs or pictures. The results of the assessment indicates that "PATBO SUPER" technology could increased planting Index up to 300 (farmers could cultivate 3 time annually). The average of rice productivity in the location were 7,62 dan 9,84 ton/ha and economically profitable with the 1,98 and 2,23 efficiency values of R/C. Farmer have positive respond to the "PATBO SUPER" technology application. The highest farmer adoption rate was on the confirmation stage with 76,2%, followed by the persuasion stage and the implementation stage with 62.3% and 57.6%, respectively.

Keywords: technology innovation, productivity, planting index

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EFICACY OF DIFFERENT DOSE OF FUNGICIDE MANKOZEB AGAINST PURPLE BLOTCH COMPLEX (*ALTERNARIA PORRI*) OF SHALLOT

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ABSTRACT

Shallot (Allium ascalonicum L) is one of the most important, delicious and vitamin rich vegetable crop. The crop is subject to attack by a number of diseases caused by fungi ,bacteria, and viruses which are the major constraints for higher production of the crop. Among the several diseases attacked of shallot, purple blotch disease of shallot caused by Alternaria porri (Ellis) Cif, is one of the most destructive disease causing accountable losses of about 57 percent. Present study was aimed to determine the efficacies of different doses of fungicide (Mancoceb) against Alternaria leaf blight of shallot. A field experiment for the evaluation of different doses of mancozeb was conducted at Subang, West Java. The research used randomized complete block design (RCBD), with 6 treatments and 5 replications. The treatments were various doses of mancozeb (3 g/L; 2,25 g/L; 1,5 g/L; 0,75 g/L; 0,5 g/L and 0 g/L of water) were applied after 7 days intervals. All Mancozeb doses reduce the disease severity of compared to untreated check. Among the different treatments, minimum disease intensity (13,33 %) was observed when the plots were sprayed with mancozeb 3 g/L followed by mancozeb 2,25 g/L (20,27%), mancozeb 1,5 g/l (20,53%), mancozeb 0,75 g/L (21,07%) and mancozeb 0,50 g/L of water respectively.

Keywords: Shallot, fungicide efficacy, purple blotch disease (Alternaria porri)

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STUDY OF SOCIAL INTERACTION BETWEEN INTERNAL ELEMENTS IN RUBBER COOPERATIVE THROUGH THE COMMUNICATION ASPECT IN RIAU PROVINCE

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ABSTRACT

This research was conducted on inactive and active cooperatives as a comparison. Kuantan Singingi and Kampar Regency as the largest rubber producer in Riau Province were selected as research location. The sample were consisted of 300 people representing 150 active and 150 inactive one, namely the members, management, supervisors and employees of a rubber farmer cooperative taken by purposive sampling. The data was obtained by structured and in-depth interviews. Communication was assessed with 14 indicators based on the interaction between cooperative elements. The results showed that the value of this parameter for active rubber cooperative has a good value with a score of 72.60% -76.36%. While inactive cooperatives have a bad-good enough value with a score of 23.77% -48.04%. The source of communication problems in inactive cooperatives is from interactions between members and employees (X3) because 13 indicators have bad values. Communication problems affect the development of cooperatives in Riau Province.

Keywords: Rubber cooperatives, communication, Riau Province

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APPLICATION OF NATURAL SILICA FERTILIZER TO ALLEVIATE THE STRESS CONDITIONS OF SHALLOTS PLANT (*Allium ascalonicum* L.) ON INCEPTISOL

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ABSTRACT

Silica is non-essensial nutrients, but It is now has a big attention due to its capability to improve the performance the plants in the abiotic and biotic stress condition. The objectives of this research is to evaluate the effect of natural silica fertilizer to the growth and yield of shallots on inceptisol under draught stress conditions. The research is a pot experiment with the experimental design was randomized completely block design (RCBD). There were two factors, namely the dosage of natural silica fertilizer with levels of 0; 10; 20; 30 and 40 g / pot and the second factor is the level of water content of soil, ie. 100%, 80%, and 60% water content of field capacity. The treatments combination were 15 with 3 replications, so that there were 45 total experimental unit. The observed variables were leaf length, number of tillers, fresh leaf weight, dry leaf weight, number of tubers, fresh tuber weight, dry tuber weight and tuber diameter. The results showed that the application of natural silica fertilizer increases the number of leaves, the number of tillers, the fresh weight of the leaves, and the fresh weight of the tubers. The draught stress decreased the tube diameter and leaf length. The silica fertilizer was able to alleviate the effect of draught stress condition which was represented with the increasing number of tubers, tuber fresh weight, and diameter of the tubers.

Keywords: Silica, draught stress, bagasse Charcoal , Zeolites, Shallots

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EFFECT OF NATURAL SILICA TO ALLEVIATE SALINITY STRESS OF TOMATOES (Lycopersicum escullentum Mill.) ON ENTISOL

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ABSTRACT

Salinity is one of big factor reducing production of crops along the coastal area. Silica is one of the nutrient which are capable to decrease the effect of salinity to the growth and production of crops including tomatoes. The aims of this research are; 1) to know the effect of silica fertilizer (Si) on the agronomic characteristics of tomato plants on Entisol soil, 2) to know the effect of salt stress on the agronomic characteristics of tomato plants on Entisol soil, and 3) to find out the interaction of Si fertilizer and salt stress on the agronomic characteristics of tomato plants in Entisol soils. The experimental design of the research was a factorial randomized complete block design (RCBD) with 2 factors experiments i.e. level of conductivity, namely K0 = 0 ds / m / pot, K1 = 1 ds / m / pot, K2 = 2 ds / m / pot, and K3 = 3 ds / m / pot, and doses of Si fertilizer, namely S0 = 0 g / pot, S1 = 5 g / pot, S2 = 10 g / pot, and S3 = 15 g / pot. The treatment combinations were 16 with 3 replications, so that there were 48 total of experimental unit. The variables observed were plant height (cm), number of leaves (strands), chlorophyll content (units), flowering age (dhst), number of flowers, number of fruits, fruit weight (g),and fruit volume (ml). This resulted showed that application of Si fertilizer increased the number of tomato flowers. Salinity stress reduced plant height and weight of tomatoes. The result also showed that the interaction of silica fertilizer (Si) and salt stress influences the number of leaves and the number of flowers. The highest number of leaves was at the dose of KCl 1 ds/m/plant and silica fertilizer 5 g/plant, while the highest number of flowers was at the dose of KCl 3 ds/m/plant and silica fertilizer 10 g/plant.

Keywords: Salinity, tomatoes, silica

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USE OF ORGANIC FERTILIZERS VARIATIONS TO INCREASING UPLAND RICE PRODUCTION IN MINAHASA

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ABSTRACT

The determining factor as well as the constraint in upland rice cultivation on dry land is soil fertility. This study aims to obtain variations in the use of organic fertilizers in increasing upland rice production in Minahasa. The study was designed using a split plot design with a combination of 4 treatments of organic and inorganic fertilizers, with 3 upland rice varieties (Inpago 8, 12 and local). The results showed that the use of organic fertilizers could increase rice yields by 21% compared to without the addition of organic fertilizers. Inpago 8 varieties produced the highest yield compared to Inpago 12 and local varieties. The development of upland rice in the future still requires technological assistance for sustainable management.

Keywords: upland rice, organic and inorganic fertilizers, production

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THE CONTRIBUTION OF JAJAR LEGOWO SUPER TECHNOLOGY IN ACHIEVING DIY FOOD SOVEREIGNTY DURING THE COVID-19 PANDEMIC

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ABSTRACT

The irrigated lowland rice cultivation technology is expected to be able to increase rice productivity which in turn will contribute to the achievement of food sovereignty in the Special Region of Yogyakarta. The cultivation technology that has been proven to be able to increase the productivity of irrigated rice is jajar super legowo technology. Jajar legowo super technology is a rice cultivation technology package consisting of several technology components, namely: 1). The use of microbes (biological fertilizers) as a seed treatment, 2). The use of microbes as decomposers of organic matter, 3). Planting new superior varieties Inpari 30 sub 1 Ciherang, Inpari 33 and Inpari 43 GSR, 4). Based on the application of jajar legowo super technology at Kulon Progo district in 2018, the new superior variety Inpari 30 sub 1 Ciherang showed the same plant growth and number of tillers as the new superior varieties Inpari 33 WBC and Inpari 43 GSR. However, the highest productivity was obtained from the new superior variety Inpari 43 GSR, which was 11.39 tons of GKP per hectare, equivalent to 9.5 tons of GKG per hectare, which was significantly higher than the productivity of the Inpari 33 WBC variety, which was 10.03 tons of GKP per hectare or equivalent to 8.3. tons of GKG per hectare. The lowest productivity was obtained from Inpari 30 sub 1 Ciherang, as 8.3 tonnes of GKP per hectare, equivalent to 7.04 tonnes of GKG per hectare. The productivity of Inpari 30 sub 1 Ciherang, Inpari 33 WBC and Inpari 43 GSR is significantly higher than the Ciherang variety cultivated with farmer's practices (without jajar legowo super technology) which is 6.6 tonnes of GKG per hectare. Thus, this jajar legowo super technology has a big potential to be developed in rice agro-ecosystems to increase productivity. It is suggested that DIY rice production will increase and give a contribution in the achievement of food sovereignty, especially during the Covid-19 pandemic.

Keywords: new superior varieties of rice, covid-19, food sovereignty, jajar legowo super

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CONTRIBUTION OF AGRICULTURAL MACHINARY TO ACHIEVE FOOD SOVEREIGNTY IN YOGYAKARTA SPECIAL REGION

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ABSTRACT

Optimalization and dissemination of the use of agricultural machinery to achieve food sovereignty in the Special Region of Yogyakarta is carried out through a direct assistance program through demonstration plots to farmer groups at several villages in three districts from 2017 to 2019. Jarwo transplanter machine for planting and combine harvester for harvesting were assessed in both technical and economic aspects. Regarding technical aspect, jarwo transplanter and combine harvester are suitable to be developed optimally in an irrigated rice agro ecosystem that has a soil depth of less than 30 cm. Concerning economic aspect, jarwo transplanter saves labor and speeds up planting time, while combined harvester saves harvesting labor, post-harvest handling and accelerates harvesting process. Rice planting using jarwo transplanter requires 2 labors for planting rice in 5 hours covering 1 hectare area. It is much more efficient than manual planting which requires 10 labors in 2 days for planting 2 hectares. Combine harvester reduced labor, as 2 people in 6 hours for harvesting 1 hectare of rice, compared to manual harvest which requires the 10 labors in 10 hours for 1 hectare of rice fields. With labor and time efficiency, agricultural machine was suggested to support synchronous cropping and synchronous harvesting of irrigated rice field which in the end contributes food sovereignty achievement.

Keywords: planting machine, harvesting machine, jarwo transplanter, combine harvester, efficiency.

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TECHNOLOGY TRANSFER FOR THE EMPOWERMENT OF COCOA FARMERS AND SMALL-SCALE CHOCOLATE INDUSTRIES IN RURAL AREA: A CASE STUDY IN GUNUNG KIDUL

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ABSTRACT

Gunung Kidul, well-known as a tourist destination, is a cocoa-producing region in Yogyakarta. Producing high quality chocolate products from local cocoa is highly important as an alternative income for the people in Gunung Kidul. However, till date, chocolate produced by small-scale industries in Gunung Kidul is considered as low quality and thus is not competitive in the market. This work aims to identify the problems regarding the cocoa farmers and the cocoa small-scale industry in Gunung Kidul. The study was done by interviewing the stakeholders of cocoa farming and chocolate manufacture. The results show that in one of cocoa farmer groups namely Kelompok Tani Kakao Sido Dadi has 61 members who manage around 11 Ha cocoa land with more than 10.000 cocoa trees. The cocoa farmer group produces around 400 kg dried cocoa beans per week. However, most of the cocoa beans were sold as a bean, not as a product with added-value such as chocolate. Small amount of cocoa beans is processed into chocolate and named with a brand of "Joglo Cokelat". Nevertheless, the the quality of the chocolate still needed improvement in term of texture, mouthfeel, flavour and appearance. The main problems in the cocoa farming and the chocolate industry in Gunung Kidul were: (1) the lack of on-farm and processing facilities; (2) lack of knowledge in the agro- and food technology. To overcome the problems, the following activities are needed: (1) technology transfer in cocoa farming; (2) technology transfer in post-harvest treatment of cocoa and in processing of cocoa bean; (3) training on entrepreneurship and food industry management. That actions can accelerate sustainable rural development in Gunung Kidul.

Keywords: cocoa, chocolate, Gunung Kidul, farmers, empowerment

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EFFECT OF ORGANIC FERTILIZER, BIOCHAR AND HORMONE TO THE FRAGRED BULBS IN CULTIVATION OF TRUE SHALLOT SEED

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ABSTRACT

The study aimed to analyze the effect of organic fertilizer, biochar and hormone to the bulb splitting in cultivation of true shallot seed. The research conducted in Grobogan Regency, in January-July 2019 applied experimental design of Split Plot with three replications. The main plot treated with organic fertilizer (P) consisted of P1=5 t/ha, P2=10 t/ha, and P3=20 t/ha, the subsidiary plot treated Biochar (B) marked B1=without Biochar and B2=Biochar 12.5 t/ha, and the sub-subsidiary plot was treated with Hormone (H); H1=without hormone, H2=with hormone; altogether were 12 treatment combinations and 36 experimental plots. Parameters observed were plant height, number of leaves, number of plants/clump, number of bulbs/clump, the number of fragred bulbs, the diameter of a bulb, and escape dry bulb weight/clump. Data were analyzed statistically using ANOVA, and if there was a significant difference between treatments, it was tested with the Duncan Multiple Range Test at a 5% level. The results showed that the provision of biochar as many as 12.5 tones/ha positively affected the growth components and the yield components of true shallot seed (number of plants/clump, number of bulbs/clump, the number of bulb splitting, bulb diameter, and escape dry bulb weight/clump).

Keywords: true shallot seed, organic fertilizer, biochar, hormone

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GROWTH AND PRODUCTION OF SEED BULBS FROM TRUE SHALLOT SEED PLANTED ON DRY LOW LAND ON RAINY SEASON

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ABSTRACT

The aim of the study was to analyze the growth and production of seed bulbs from true shallot seed planted on dry low land on rainy season. The study was conducted from November to December 2014 in Grobogan Regency, Central Java, Indonesia. A group of G0 bulbs called Trisula and Tuk Tuk varieties consisting of small (Ø 1-1,5 cm, weight 2-5 g) and large (Ø >1,6 cm, weight >7 g) was planted in a-2 factorial RBD with 4 replications. The results showed that an interaction between varieties and bulb size on variables of plant height, number of tillers, number of bulbs per clump, weight, size, and bulb productivity took place. The G0 bulbs of Trisula variety, both large and small, had high potential as a source of seeds in the rainy season with which its productivity was >20 tones ha-1 and the number of rejected bulbs was <0.5% (0.08 tones ha-1). Meanwhile, the Tuk Tuk variety, although having high productivity, had a percentage of bulbs rejected of 34.22% (9.79 tones ha-1); therefore, this variety would be more suitable to be used as seed bulbs in the dry season.

Keywords: seeds, true shallot seed, rainy season

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APPLICATION OF SPECTROSCOPY FOURIER TRANSFORM NEAR-INFRARED (FT-NIR) FOR DETECTION ADULTERATION IN PALM SUGAR

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ABSTRACT

Powdered brown sugar or palm sugar is made from coconut extract (Cocos nucifera) or palm extract (Arenga pinnata Merr). Palm sugar form palm extract has a relatively high economic value to which makes palm sugar is vulnerable to adulteration. Adulterations can be carried out by adding substances which have low quality or low price to the main material for economic reasons. In this research, palm sugar regarded as the main material was adulterated with coconut sugar regarded as the adulterant. The aim of this research was to detect adulteration in the palm sugar by coconut sugar using FT-NIR spectroscopy using two chemometric methods namely partial least squares regression (PLSR) and principal component analysis (PCA). The absorbance spectra were taken using the FT-NIRFlex-500 Solid at wavenumber of 4000–10,000 cm^{-1}. Several spectral pre-processing methods used were 1st Savitzky Golay Derivative, Normalization, Standard Normal Variate (SNV), Multiplicative Scatter Correction (MSC), and Baseline. Coconut sugar as adulterant with various concentration ranging from 0 to 100% were added to the palm sugar. A total of 77 spectra of both pure and adulterated palm sugar samples were divided into two groups in which 51 samples used for developing calibration model and 26 samples used for developing prediction model. The spectral obtained were pre-processed and analyzed using The Unscrambler X version 10.4. The best transformation of PLSR was MSC which resulted in the coefficient of determination (Rc^2) of 0.93 and the root mean square error (RMSE) of 0.07% for calibration. By using prediction data sets, the model resulted in coefficient of determination of prediction (Rp2) of 0.91 and a root mean square error of prediction (RMSEP) of 0.09%. The PCA model was able to group samples based on adulterant concentration.

Keywords: FT-NIR, palm sugar, adulteration

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THE EFFECT OF COCONUT SAP AND SKIM MILK CONCENTRATION TO PHYSICOCHEMICAL AND ORGANOLEPTIC PROPERTIES OF COCONUT SAP DRINK YOGURT

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ABSTRACT

Coconut sap drink yogurt is a fermented product based on coconut sap and skim milk that made through fermentation using lactic acid bacteria of Lactobacillus bulgaricus and Streptococcus thermophillus. This study aims to determine the effect of the concentration of coconut sap and skim milk on physicochemical and sensory characteristic of coconut sap drink yogurt. The medium fermentation consists of 5% and 10% of skim milk and 0%, 10%, 30% and 50% of coconut sap. 10% of lactic acid bacteria was inoculated into media and it incubated for 6 hours, 37oC. The pH, total acid, total sugar, and sensory characteristic of the product were determined. The results showed that the concentration of the coconut sap and skim milk affected to pH, total acid, reducing sugar, total sugar, viscosity and sensory characteristic of coconut sap drink yogurt. The combination of 10% skim milk and 50% of coconut sap produce the better characteristic of coconut sap drink yogurt than other combination. The product showed similar characteristic with commercial yogurt.

Keywords: coconut sap drink yogurt, skim milk, *Lactobacillus bulgaricus, Streptococcus thermophillus*
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DETERMINATION OF THERMAL DIFUSIVITY OF CORN KERNEL AND MILLED CORN KERNEL USING NUMERICAL

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ABSTRACT

Drying and storage activities are often related to heat transfer processes, both within the material and between the material and its environment. Heat diffusivity is one of the physical properties related to the heat transfer processes in the material or is defined as the rate at which heat is diffused out of or into the material which naturally distributes heat to all parts of the product. This parameter is usually needed to estimate the rate of change in material temperature so that the optimal energy or time requirements for material handling activities can be determined. This study aims to measure the thermal diffusivity of shelled corn kernels, milled corn kernels passed mesh 6, milled corn kernels passed mesh 8, and milled corn kernels passed mesh 16 (corn flour) fed by a heat source of 50 oC and 70 oC from a water bath. The LM35 temperature sensor is used to gauge temperature history and is installed at 9 points in the test cylinder containing the sample corn kernels. The heat diffusivity is calculated from the temperature distribution data using numerical method. From the calculation results, the heat diffusivity of shelled corn kernels, milled corn kernels passed mesh 6, milled corn kernels passed mesh 8, and milled corn kernels passed mesh 16 (corn flour) are respectively (1.35, 1.38, 1 , 69, and 2.30) x10-7 m2 / s at heat source of 50 oC and (1.39, 1.42, 1.72, and 2.36) x10-7 m2 / s at heat source of 70 oC. The smaller the size of the corn kernels and the larger the heat source provided, the heat diffusivity will increase.

Key words: corn kernels, heat source, heat diffusivity, numerical method

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EVALUATION OF FLUSHING EFFICIENCY AT A SAND TRAP: A CASE STUDY OF PENGASIH WEIR, SPECIAL REGION OF YOGYAKARTA

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ABSTRACT

A sand trap is a part of the main building in an irrigation system. Its function is to settle the sediment that is carried away from a river stream. A sand trap needs to be flushed periodically with an optimal and efficient mechanism. The purpose of this research is to evaluate the flushing efficiency of the sand trap of the Pengasih Weir. The data used are the samples of bedload along the channel and the existing mechanism data of the sand trap flushing. The result showed that the bedload varies from medium sand to silt. The upstream left part had the highest uniformity coefficient (*Cu*); the value was 2.686, which showed the most uniform sediment. It also had a gradation coefficient (*Cc*) of 1.050, which was included in a good gradation. The flushing mechanism was divided into two steps. The first step was the combination of 1.06 m/s flow velocity and 1.1 m flow depth, and the second step was the combination of 1.59 m/s flow velocity and 0.35 m flow depth. Both two steps were efficient in flushing the sand trap of the Pengasih Weir. It was apparent from all the bedload moves based on the concept of Shields.

Keywords: sand trap, flushing, efficiency, bedload, Shields

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INDUCED RESISTANCE AGAINST *CORYNESPORA CASSIICOLA* BY HEAT SHOCK IN CUCUMBER

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ABSTRACT

Disease resistance was successfully induced by heat shock treatment against C. cassiicola (Cc). Cc is one of the most dangerous pathogens in Japan that cause Corynespora leaf spot (CLS) on cucumber's leaf. However, there are few effective pesticides, and the emergence of chemical resistance has been also reported. Utilization of acquired resistance of plant is expectable method to substitute fungicides. In this study, preventive effect of heat shock treatment (HS) was compared with non treatment (NT) and a plant activator; 1,2-benzisothiazol-3(2H)-one 1,1-dioxide (BIT). Aerial part of cucumber seedlings at the two leaves stage were dipped into hot water at 50°C for 20s. Mycelium disc of Cc was inoculated on the first leaves of cucumber seedlings. The diameter of mycelium disc was measured at 10 days after treatment. Lesion of Cc in HS were smaller than BIT and NT, significantly. Thus, it was suggested that HS induced resistance against Cc, effectively. Furthermore, gene expression analysis of some PR genes is now being carried out to clarify molecular mechanism of defense response.

Keywords: Corynespora leaf spot, environment stress, heat shock-induced resistance, inoculation test

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THE NUTRITIONAL VALUE OF AGRICULTURAL WASTE FORAGES FED TO RUMINANTS AS AFFECTED BY AGROECOSYSTEM ON GROBOGAN REGENCY

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ABSTRACT

The nutritional composition of tropical agriculture waste forages fed to cattle, sheep and, goats, explaining the nutritional variation between forages depending on dryland agroecosystem and irrigation land agroecosystem. The agricultural waste that the ruminants feed is rice straw, corn and soybeans. Agricultural waste feed ingredients are arranged in a complete feed formula. The nutritional value of complete feed includes crude protein, crude fiber, crude fat, energy and ash. Making complete feed for ruminants as feed stock if the dry season decreases availability.

Keywords: nutritive value, agricultural waste, ruminants, agroecosystem

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MORPHOLOGY CHARACTERISTICS OF ORCHIDS SPECIES IN BUKIT BARISAN, BENGKULU PROVINCE

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ABSTRACT

The species orchid is one of the rich local genetic resources of Bengkulu Province. Information on the diversity of orchid species in Bengkulu has not been widely disclosed, so characterization is needed. This study aims to identify and characterize orchid species based on morphological characters. The study was carried out in Bukit Barisan, Central Bengkulu, Kepahiang, Rejang Lebong and Lebong from April to December 2018. The orchid data collection was carried out by exploration methods and direct observation of orchid plants in situ and exitu. In-situ observations were made on all orchid species found in their habitat and were flowering or fruiting, while the external observations were made on orchids that were not flowering and bearing fruit in their habitat. The samples of these orchids are collected and maintained beforehand until they grow flowers and fruit. Observations were made on morphological characteristics, namely the growth pattern of stems, pseudobulbs, leaves, flowers and fruit. Determination of the types of orchids identified in accordance with orchid guidelines. There are 15 genera consisting of 34 types of orchids with various forms of stem growth, pseudobulbs, leaves and flower colors.

Keywords: identification, characterization, morphology, orchids

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THE ROLE OF ANTAGONIST MICROBIA IN DISEASES CONTROL FOR INCREASING RICE PRODUCTION

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ABSTRACT

Rice plant disease control technology is expected to be able to save rice production which in the end will play a real role in the achievement of food sovereignty in Kulon Progo district which in turn becomes a buffer for the availability of food reserves (rice) in the Special Region of Yogyakarta and nationally. Symptoms of disease reported in a large area attack in Yogyakarta with blast caused by Pyricularia oryzae and bacterial leaf blight caused by Xanthomonas oryzae. The antagonist microbial as biological agents were applied to Inpari 9, Inpari 43 GSR and Ciherang varieties in the form of Azotobacter sp., Pseudomonas cepacia, Trichoderma sp., Aspergillus sp, and Trametes sp. This research was conducted in Kalibawang sub district, Kulon Progo district on the first planting season I (October 2018 - January 2019). The experimental design was randomized block design (RAKL) with 4 replications. Results showed that bacterial leaf blight intensity was lower in varieties applied with the antagonist microbial compared to control. However, the intensity of neck blast disease was not different between control and the applied varieties. Based on Duncan's 5% test, the intensity of bacterial leaf blight in Inpari 9 (5-10%), Inpari 43 GSR (<5%) and Ciherang (5-10%) applied with antagonist microbia was lower than control (10-20%), however the intensity of neck blast disease in Inpari 9 (5-10%), Inpari 43 GSR (<5%) and Ciherang (10-20%) were not significantly different between controls and those given the antagonist microbia.

Keywords: bacterial leaf blight, neck blast, inpari 9, inpari 43 GSR, antagonist microbia

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EFFECT OF VARIOUS DRYING METHODS ON THE PHYSICAL CHARACTERISTICS OF ARROWROOT POWDER

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ABSTRACT

Arrowroot (*Maranta arundinacea*) is a large herb, found in rainforest habitats. In Indonesia, Arrowroot (or known locally as *garut*) is not a staple food source but often be planted in yards of rural area, as a food reserve especially in a lean season. Arrowroot also usually be consumed as a side dish or processed into a powder. One important process of making arrowroot powder is drying. In this study, the effect of various drying methods on the characteristics of arrowroot powder were evaluated. The drying methods used were solar drying (SD), cabinet drying (CD), and pneumatic drying (PD). The pneumatic dryer used was self-fabricated with a total dimension of 1600 x 500 x 2500 mm. It was made from stainless steel plate with 3 mm thickness, and equipped with heater, blower, screw feeder, cyclone, and drying chamber (heater fins of 4,500 watt). From the moisture content analysis, it was found that CD sample has final moisture content of 3.33 ± 2.1 %wb, while PD sample has final moisture content value of 12.78 ± 0.64 %wb. Meanwhile from the FM analysis, the lowest FM value was obtained from CD sample, which was 0.10 ± 0.00. The arrowroot powder from SD sample has the lightest color, with lightest value of 88.43. In conclusion, arrowroot with the best physical characteristics is obtained from the cabinet drying method (CD), in terms of moisture content and FM value.

Keywords: drying method, powder, quality, Arrowroot

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INDONESIAN SUGARCANE SEEDING SYSTEM PERFORMANCE: AN ASSESSMENT FROM THE PERSPECTIVE OF INSTITUTIONAL AND TECHNOLOGICAL INNOVATION SUPPORT

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ABSTRACT

Provision of plant seeds involves various stakeholders in a relatively complex supply chain, starting from tracing the source of superior seeds, producing, storing, and distributing to the end user. Research on the performance of the Indonesian sugarcane seed system from the perspective of institutional and technological innovation, was conducted from March to October 2018. The survey method with snowball sampling and the multidimensional scaling analysis is used in this study. The results showed that the performance of the Indonesian sugarcane seed system was categorized as "pretty good" with a range of performance indexes in each dimension 54.23 - 73.13 and an average index of 65.89. The highest performance is achieved in the organizational dimension, while the lowest is in the dissemination dimension. The dominant leverage factors from an institutional perspective are seed producers in the organizational dimension, laboratories in the infrastructure dimension, and tariff regulation in the regulatory dimension. Meanwhile, from the perspective of technological innovation are propagation technology in the technological dimension, seed sources and technical guidelines in the logistics dimension, and licensing cooperation in the dissemination dimension.

Keywords: multidimensional approach, innovation, leverage factor

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SELECTION AND EVALUATION OF 3RD MUTANT CHILI GENERATION FOR RESISTANCE TO PEPPER YELLOW LEAF CURL VIRUS (PEPYLCV)

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ABSTRACT

Sixty-four plant individuals of 2nd mutant chili generation (M_2) had been selected for resistance to Pepper Yellow Leaf Curl Virus (PepYLCV). Nevertheless, they all should be continually evaluated. The research purposes were to obtain the selected M_3 chili which not only resistant to PepYLCV but also had high yield and good quality. The research was conducted at the virology laboratory, screen house, and research field at Indonesian Vegetables Research Institute (IVEGRI), Lembang (1,250 m sal) from May to December 2017. The augmented design with three replicates for each control genotype was used for assessment. The research result showed that M3 chili genotypes were still low uniformity in some morphology. There was a segregation transgressive phenomenon in several individual M3 plants, so the performance was different from their parents (M0). Finally, thirty-eight M_3 chili genotypes were selected due to their AUDPC values. Besides that, their yield and fruit's character had been already matched with consumer's preference. Those selected M3 chili genotypes had to be evaluated for the next generation to obtain a new mutant variety that resistance to PepYLCV.

Keywords: AUDPC, begomovirus, chili, gamma rays irradiation

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IMPACT OF PANDEMIC COVID-19 ON FOOD SUFFICENCY IN BANTUL YOGYAKARTA – INDONESIA

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ABSTRACT

Bantul is one of regencies in Special Region of Yogyakarta Indonesia which prone to geological disaster such as earthquakes and tsunami. Bantul likewise risky regency to pandemic Coronavirus disease 2019 (COVID-19) due to the immense tourism and student urbanization. This study was aimed to explore the supply and demand behavior of rice (staple food) during the Pandemic COVID-19 period in Bantul regency. Dynamic modeling software (Powersim 10) was applied in this study. The modeling used series data 2010 to 2019 produced by Statistic Agency of Bantul which include rice production, population, urbanization, and rice field area data. The pandemic COVID-19 was assumed taken place throughout 2020. The validation model adopted MAPE (Mean Absolute Presentage Error). This study proved the rising of the rice demand in 2020 was 147,215 ton while the production was 116,710 ton. So, Pandemic COVID-19 caused Bantul regency was deficiency of rice 30,000 ton since the gaining of consumption rates and the decreasing of production. The surplus of rice reoccurs in 2021 to 2025 and Bantul was deficiency of rice 192 ton in 2026. The MAPE was 1.62% which indicated that the dynamic modeling of rice availability in Bantul was excellent. The modeling could be used to determine the best scenario of self-food sufficiency in Bantul.

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CLIMATE STRESSES AND ITS IMPACT TOWARDS FOOD SUFFICENCY: A CASE IN BANTUL REGENCY YOGYAKARTA – INDONESIA

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ABSTRACT

Biomass production is greatly influence by climate, soil, and water. The most uncontrolled factor is climate. Climate change increases the hazard of hydrometeorological disasters such as flood and drought which influences the harvest area an agricultural commodity. This study was purposed to identify and to analyze the impact of climate stress towards food sufficiency in Bantul regency special region Yogyakarta. Later, it was applied to recommend a strategy in achieving food sufficiency in Bantul. Here, the dynamic modeling was applied to simulate supply and demand of food. Rice is staple food in Indonesia, so it was voted in simulation of food sufficiency in this study. The modeling used rice production, population, urbanization, and rice field area data which released by Statistic Agency of Bantul. The range of data was 10 (ten) years i.e., 2010 to 2019. MAPE (Mean Absolute Presentage Error) used to validate the model. This study identified that food sufficiency in Bantul would finish in 2026. The increasing of planting index from 2.34 to 3.00 could extend period of the food sufficiency up to 10 years. The MAPE was 2.77%, so the modeling of climate stress impact towards food sufficiency was accepted.

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THE APPLICATION OF THE 'JARWO SUPER' COMPONENT TO INCREASE THE CROPPING INDEX OF RICE FIELDS IN THE SPECIAL CAPITAL REGION OF JAKARTA-INDONESIA

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ABSTRACT

Jakarta, which is the nation's capital of Indonesia, still has 414 hectares of rice fields. The fields generally owned by developers that have not been used/idle land. In general, the existing cropping index of the land is only 1-2, which actually has potential to be improved. The main of this researchwas to obtain a model of agricultural technology innovation package to increaserice productivity and field cropping indexin Jakarta throughtthe application component of 'Jajar Legowo (Jarwo) Super' technology.The observation data consisted of primary and secondary data on the characteristics of cropping patterns for a year.The data were processed using descriptive and economic analysis tested based on the Revenue Cost Ratio (R/C). The results of research showed that the application package or component of Jarwo Supertechnologyshowed an increase in the planting index by 0.3-0.8 and also an increase in productivity ranging from 5 t/ha to more than 7 t/ha. Based on the R/C analysis, known that the application of component of Jarwo Super's technology package increases the cropping index from 1.83 to 2.32. Thats it mean that the introduced cultivation technology can improve farm efficiency every planting season and increase farmer income every years.

Keywords: planting index, urban rice cultivation, water resources, planting calendar, jarwo super.

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THE EFFECT OF TECHNIQUES AND FERMENTATION TIME ON THE COCOA BEANS QUALITY (*Theobroma cacao*, L.).

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ABSTRACT

This research was conducted to the effect of techniques and fermentation time on the quality of cocoa beans. The experiment was conducted at the Indonesian Center of Agricultural Postharvest Research and Development, Bogor, from October until February 2016. Experiment conducted by two variables and three replications. Variable A was fermentation techniques with two factors; there were spontaneous fermentation; and restrained fermentation. Variable B was fermentation time with three factors; there were 72 hour; 120 hour; and 168 hour. Cocoa quality is determined by physical quality test consists of testing the temperature during fermentation, the quality requirements of common beans and the quality requirements of special beans in accordance with SNI 2323 number: 2008. Chemical test for cocoa quality is determined test of fat, water, ash, protein, carbohydrates and pH. The research used nested design with analysis of variance (ANOVA) and then it processed by using the SAS application program. When the ANOVA test results indicating a real difference then continued with Duncan test. Results showed that fermentation techniques had significantly different to temperature, contents of fat, ash, and pH. Furthermore, fermentation time had significantly different to temperature, contents of fat, water, ash, starch and pH. Best variable is cocoa beans with controlled techniques for 72 hours. This variable had temperature 44,67°C, contents of fat 31,46%, water 2,97%, ash 1,99%, starch 39,37% and pH 5,69. This research could be continued with using different microorganism (heterofermentatif) to get the quality of cocoa beans better.

Keywords : acao bean, fermentation, quality

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ESTIMATING OF SOIL MOISTURE USING SHETRAN MODEL AT THE CISANGGARUNG CATCHMENT AREA

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ABSTRACT

Soil moisture is one of the essential controls over the hydro-climatology processes. Soil moisture value can be used as an indicator of soil fertility so that it has a vital role in increasing agricultural and plantation production. Understanding soil moisture variability on a spatial-temporal scale is very interesting in many practical applications such as drought prediction and agricultural modelling. The purpose of this study is to estimate the values of soil moisture where are distributed in space and time in the Cisanggarung River Basin with the spatial resolution of 500m x 500m and daily temporal resolution. The method used for this study is the Shetran physical-based hydrological model by utilizing hydro-climatological data derived from the remote sensing measurements from 2001 to 2017. The Shetran model input data consists of the digital elevation model, land use land cover, TRMM rainfall data, evaporation data, and soil properties data. The results of this study indicate that the Shetran hydrological model is reliable to be used to estimate soil moisture in a watershed. This soil moisture values are then validated with the historical data of drought disaster.

Keywords: soil moisture, drought, shetran model, remote sensing

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ENVIRONMENTAL CAUSE OF POSTHARVEST ENLARGEMENTIN CUCUMBER FRUIT

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ABSTRACT

Postharvest enlargement with etiolation of blossom end is beingrecognized as a serious logistics matter in Japanese summer cucumber production. Previous studies suggested there was aninfluence of cultivating condition, additionally to transportation temperature. In this study, relationship between postharvest enlargement and environmental factors were analyzed. Cucumber seedlings 'Taibo I' were transplanted at outdoor field in Ibaraki University on May 31, 2019. Over defoliation treatment was compared with conventional management. Fruits were harvested from June 19 till August 23. Harvested fruits were sealed in the plastic bag and stored at 28°C. Incidence of enlargement was scored 6 days after harvest. As the result, the incidence of enlargement was positively correlated with field air temperature and cumulative sunshine duration from flowering to harvest. Number of harvest days after flowering tended to be short under higher temperature and longer sunshine duration. Over defoliation reduced the incidence probably because of increased number of harvest days from flowering. Based on these results, juvenile of harvested fruit was suggested to be one cause of this phenomenon.

Keywords:*Cucumis sativus* L., defoliation, deformation,growth analysis, juvenile

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DESIGN OF WIRELESS SOIL MOISTURE PROBEBASED ON INTERNET OF THINGS FOR SANDY LAND

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ABSTRACT

One essential aspect of cultivation on sandy land in the coastal areas is the effectiveness of wateruse for optimum plant growth to keep the water availability for plants.It is necessary to monitor soil moisture continuously as the basis for watering time.However, it is hard for farmers to be in the field frequently to monitor the land humidity, even using an instrument to measure it at the site. It is needed a monitoring technique that can conduct the land humidity remotely.This paper presents a design of wireless soil moisture measurement based on internet of things for sandy land. We built a low-cost probe as a sand soil moisture sensor coupled with an ESP32 WIFI which built-in ADC functionfor reading analog sensors output and establishing a wireless connection to the internet network. A 12 volt battery with solar panel system is used as power supply. The ESP32 was programmed using Arduino software. And, we made a user interface using the Node-Red browser which is a programmable platform to show soil moisture and storethedata into a spreadsheet cloud file.

Keywords: soil moisture probe, wireless sensor, IoT, ESP32, arduino

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EVALUATION OF THIRTY INDONESIAN CHILI VARIETIES FOR RESISTANCE TO *PHYTHOPTHORACAPSICI*

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ABSTRACT

The disease caused by *P. capsici* can attack all tissue and growth phases of the chili plant with the yield losses up to 100%. The research aims to evaluatedthe resistance response of thirty Indonesian chili varieties against*P.capsici* that have been carried out at the IVEGRI research station, Lembang, West Java, Indonesia from April to July 2020. The selection method was carried out using the artificial inoculation. A total of 10 ml of zoospores with a density of 10^6were inoculated on chili seedlings five weeks after sowing. The observations were carried out by scoring symptoms that appeared (score 0 to 5) five times. The observation was made at 7 to 35 days after inoculation with intervals of 7 days. The observations were carried out by scoring the symptoms that appeared on plants with score 0-5. Based on disease intensity (IP), the resistance of varieties were group into three levels, namely resistant (IP <20%), moderately resistant (20% <IP <50%), and susceptible (IP> 50%). The results showed that there were variations on symptoms, scoring, and the time of symptom appearance in and between the varieties tested. The evaluation results showed thatthere were 24 varieties were resistant, 5 moderately resistant, and 1susceptible to *P. capsici.*

Keywords: *Capsicum annuum*, oomycetes, disease intensity

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EFFECTIVENESS OF BOTANICAL PESTICIDES AGAINST THE RHIZOME FLIES *MIMEGRALLA COERULEIFRONS* MACQUART (DIPTERA: MICROPEZIDAE) IN RED GINGER

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ABSTRACT

Mimegralla coeruleifrons Macquart is a major pest on red ginger. The use of chemical pesticides for controlling *M. coeruleifrons* is not proper solution due to the fact that the chemical pesticides are not environmentally friendly, kill natural enemies and have negative impacts on human health. The aim of this study is to determine the effectiveness of the botanical pesticides consisting of citronella and eugenol which have been formulated and packaged into a product to control *M.coeruleifrons*,namely Nano Biopestisida (citronella 100-200 nanometer), Bio protektor (eugenol+citronella+geraniol), Asimbo (citronella+salicylicacid), and Sanfidor (chemical pesticide) that commonly used by the farmer as a comparison. Around 10 ml of each botanical pesticides and 2 ml of chemical pesticide were dissolved in 1 liter of water. The treatment was conducted by using direct spray. The adults were sprayed and then infested onto ginger plants. Insect mortality was observed at 1; 2; 3; 4; 5; 6 and 7 hours after applications. The results show that the botanical pesticide which contain eugenol+citronella+geraniol (Bio protektor) was able to effectively control of *M. coeruleifrons* pest in red ginger plantation.

Keywords: citronella, eugenol, geraniol, mortality, rhizome flies

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PRODUCT DEVELOPMENT OF COCONUT SUGAR TEA DRINK WITH QUALITY FUNCTION DEPLOYMENT

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ABSTRACT

Tea drinks products that made from tea and sugar cane is being favored by consumers. Increasing consumer awareness in consuming healthier products opens up opportunities for developing tea drinksproducts using coconut sugar. The first step that can be done is to know the consumer's want for coconut sugar tea drink product and get the proper production process. The objectives of this study were: 1) to know the attributes of consumer requirements for coconut sugar tea drink, 2) to know the technical parameters for making coconut sugar tea drink, and 3) to know the priority of consumer requirements and technical parameters that must be met in the development of coconut sugar tea drink. The research was conducted in Banyumas Regency, in 3 stages which include: identification of customer requirements attributes by interview method, identification of technical parameters with literature study and prioritization of customer requirement attributes and technical parameters by compiling a House of Quality matrix based on the Quality Function Deployment method. Attributes of consumer requirements that are prioritized in the development of coconut sugar tea drinkare the distinctive aroma of tea, inclusion of expiration date on the label, inclusion of the halal logo on the label, inclusion of nutritional value on the label, inclusion of composition/ingredients on the label. The technical parameters that have the highest priority are mixing liquid bitter tea with sugar syrup, making bitter liquid tea, adding jasmine / jasmine flavoring, preparing raw materials, and labeling.

Keywords: coconut sugar tea drink, quality function deployment

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EFFECTS OF DIFFERENT HEATSHOCK TREATMENT METHODS ON THE ISOLATION AND PURIFICATION OF STRAWBERRY ACTIVE INGREDIENTS

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ABSTRACT

In this study, 2-3 g strawberries with a surface redness of 0% were used as raw materials, and the effect of different levels of heat shock treatment on the content of ellagic acid in strawberries was studied using LC-MS-MS measurement methods. The results showed that 20S treated with hot water at 50°C not only increased the fruit weight of strawberries, but also increased the content of ellagic acid. The ellagic acid content was increased in strawberries that were heat-shocked 10 times at 50°C/20 S, but the content of ellagic acid was sharply decreased in the strawberries that were heat-shocked 16 times. After the strawberry fruit was heat treated at different levels, it was stored in -30°C for 15, 30 and 45 days, and as the storage time increased, the content of ellagic acid gradually decreased. It was shown that the content of ellagic acid in strawberries could be effectively increased, but excessive heat shock treatment could reduce the content of ellagic acid.

Keywords: heatshock, ellagic acid, LC-MS-MS, strawberry

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ANALYSIS OF CONSUMER PREFERENCE OF RAMBUTAN FRUIT AS A LEADING COMMODITY IN LANGSA CITY

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ABSTRACT

Rambutan is one of the exotic fruits that are spread throughout Indonesia. Rambutan is one of the leading fruits with the second largest production in Langsa City. the aim of this research to know information on consumer preferences that will make producers produce fruits with the quality that consumers want so that production can be absorbed into the market and can increase regional income and economy. This research was conducted in Langsa City Market with a sample of 60 consumers through the accidental sampling method. The method of analysis used is the factor analysis method to see consumer preferences of rambutan fruit. The results showed that four aspects were formed, where the aspect of fruit appearance became the aspect with the greatest diversity value and the aroma and fruit maturity variables became the biggest consumer consideration variables.

Keyword: rambutan, preferences, consumer, leading commodity

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GROUND WATER DEPTH PREDICTION USING SHETRAN MODEL IN CITARUM RIVER BASIN

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ABSTRACT

Drought is a natural disaster that lasts a long time and affects a wide range of things that can seriously affect human life, the economy, agricultural production and also the ecological environment. In Indonesia, floods and droughts become annual disasters that regularly occur and are difficult to avoid, even in big cities. Drought cannot be considered a trivial problem because its impact is very detrimental to every aspect of life. Drought can be seen from several indicators. The depth of groundwater can be the main indicator in determining drought.
The purpose of this study is to predict the depth of groundwater in the Citarum River Basin. This study uses a spatially distributed Shetran model. The Shetran model was developed by the Civil School of Engineering and Geosciences at Newcastle upon Tyne University.
The data used in the Shetran model research are hydro-climatological data from satellite measurements from 2001 to 2017. Input data in this study consist of a digital elevation model, TRMM rainfall data, evaporation data, soil properties, and the data of land use land cover change.
From this research, it was found that in the span of 17 years the land use types in the Citarum watershed experienced significant changes. This land use change affects the depth of groundwater in the Citarum watershed.

Keywords: Groundwater Depth, Drought, Shetran Model, Citarum

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EFFECT OF AUXIN TYPE AND CONCENTRATION ON THE INDUCTION OF ALTERNANTHERA REINECKII ROOTS IN VITRO

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ABSTRACT

Alternanthera reineckii is an aquatic plant that is used as an aquascape plant. This commodity is in great demand so that its needs continue to increase. To meet market demand, technology is needed that can produce large quantities of seedlings in a short time. In vitro propagation is a technology that can be used to produce uniform plants with a relatively high level of multiplication. The aim of this study was to obtain the appropriate type and concentration of cytokinins for the in vitro induction of Bacopa caroliniana shoots. In this study, a factorial completely randomized design was used. The first factor is the type of auxin (IBA, NAA and IAA) and the second factor is the concentration of auxin (0, 0.5, 1.0 and 1.5 mg / l) with 10 replications. The results showed that the best auxin for Alternanthera reineckii root induction in vitro was IBA at a concentration of 1 mg /l.

Keywords:

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APPLICATION OF PATH ANALYSIS TO DETERMINE FACTORS RELATIONSHIP AFFECTING IRRIGATION WATER SUFFICIENCY IN TERTIARY LEVEL OF BELITANG IRRIGATION SYSTEM, INDONESIA

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ABSTRACT

Tertiary is the lowest level in irrigation system which distribute water to agricultural land. The objective of this research was to develop linkage among irrigation aspects and to measure the linkage strength of the respected aspects to the irrigation water sufficiency. This study was conducted in Belitang Irrigation System in South Sumatera Province, Indonesia. Data was collected using questionnaires for water users' association as well as walk through survey to assess infrastructure condition. The state of each aspects was measured using Likert scale according to the predetermined variables. The variables were water availability, infrastructure condition, management, institution, and human resources as intervening variable. The dependent variable was irrigation water sufficiency to fulfil planting area target. This research resulted in three models, which showed that management has a great influence in mediating the relationship of institution and water availability to water sufficiency in tertiary systems of Belitang Irrigation System. Institution and water availability showed better performance to water sufficiency through management than their direct influence to water sufficiency. This implied that the development of management in tertiary level may improve water sufficiency in tertiary level.

Keywords: path analysis, sufficiency, tertiary, Belitang Irrigation System

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PHYSICAL PROPERTIES OF DRIED-GROWOL MADE WITH VARIATION OF CASSAVA VARIETY AND FERMENTATION TIME

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ABSTRACT

Growol is a staple food made from cassava and was processed with fermentation stage, so that growol has typical sour taste. However, growol is an intermediate moisture food, therefore, it was important to preserve by drying. The problem was that the growol producers always used a mixture of several cassava varieties in making growol and fermentation duration just 2-3 days, whereas the composition of cassava were varied. The purpose of this study were to evaluate the chemical characteristics of fermented cassava and physical characteristics of dried-growol that made by various cassava varieties and fermentation duration. The cassava used for this study were local varieties of Martapura, Meni, Ketan, Lanting and the fermentation with variation of 2 and 4 days. Each variety fermented cassava were analyzed their moisture content, starch and amylose, and then was steamed for 15 minutes. The fresh growols were dried at 50oC until the moisture content was about 10% and then the dried-growols were tested their texture and color. The results showed that cassava veriety and fermentation time effected the chemical properties of fermented cassava and the physical properties of dried-growol. The starch content of fermented cassava between 18.25-34.03% and the highest was in the Martapura variety. The amylose content between 7.50-18.30%. The growol color was bright in the Martapura variety and the texture was a little hard.

Keywords: cassava 1, growol 2, staple-food 3, preservation

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INSECTS IDENTIFICATION WITH CONVOLUTIONAL NEURAL NETWORK TECHNIQUE IN THE SWEET CORN FIELD

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ABSTRACT

Image recognition for automatic identification is one of the popular methods used these days especially with the advanced development of computer and artificial intelligence. Some insects are harmful for plant growth which can cause losses for farmers or plantations, but some others are beneficial for plants. Therefore, a method to identify type of insects in order to obtain accurate and precise results is of importance. Nowadays, with increasing computer technology, an automatic object identification system with increased accuracy, improved speed, and less cost have been developed. Deep learning is a popular method recently in the image recognition since it can increase the effectiveness of object identification. However, it requires large image data which can be solved by using a Convolutional Neural Network (CNN) technique. The implementation of CNN for image identification or classification can be done by collecting a large-scale dataset that contains hundreds to millions of images for network training because of the need for learning many parameters involved in the network. This research is conducted to develop and apply the CNN model to identify eight species of insects in the sweet corn field in Thailand. Those insects were *Calomycterus* sp., *Rhopalosiphummaidis*, *Frankliniellawilliamsi*, *Spodopterafrugiperda*, *Spodoptera litura*, *Ostriniafurnacalis*, *Mythimna separata*, and *Helicoverpaarmigera*. The CNN model in this research was built with four convolutional layers, which consisted of Conv2D, batch normalization, max pooling, and drop out sublayer, also one flattens layer. A total of 5568 images were trained with 10 trials and different train attempts for each trial, then tested with 40 images. The result of this research shows that the CNN model has succeeded in identifying images of sweet corn insects with 86,39% and 88,57% of train accuracy and 67,5% of prediction accuracy.

Keywords: deep learning, CNN, insects, image classification

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THE INCREASE OF RICE CROPPING INDEX SUPPORTED BY RIVER DAM IRRIGATION IN DRY LAND

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ABSTRACT

The expansion of agricultural land in Gunungkidul D.I Yogyakarta Regency is difficult. The increase in rice production is carried out through the cropping index. The research was conducted in the dry land of Dengok Kidul, Pacarejo, Semanu, Gunungkidul, D.I. Yogyakarta, February - Juli 2019. Soil type is Mediteran. Increase of rice cropping index utilizes supplementary irrigation from river dam to maintain soil moisture. Rice plant replace peanut-corn plant in the second growing season. The research used rice varieties of Inpari 24, Inpari 30, Inpari 32 and Inpari 33, complete with a package of technological components. Rainfall was only 107 mm with 11 rainy days during the rice planting period. The result showed 107 mm of rainfall, with 11 rainy days, so that the most of crop water requirements came from river dam irrigation. Inpari 24 gave the highest grain yield of 442.8 kg/1,000 m^2. B/C 1.04, farmers profit of Rp. 889,000/1,000 m^2. Carbon absorbtion 503.8 kg/1,000 m^2, consisting of carbon in grain 207.4 kg/1,000 m^2, straw 218.6 kg/1,000 m^2 and root 77.9 kg/1,000 m^2, different from other varieties ($p<0.05$).

Keywords: cropping, increase, index, rice

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IMPACT OF LAND USE CHANGES ON THE WATER AVAILABILITY IN THE CIWULAN WATERSHED, WEST JAVA

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ABSTRACT

Changes in Land Use Land Covers (LULC) can have an impact on the environment, such as increasing direct surface runoff and reducing infiltration for groundwater recharging when rainfall occurs. As a result, the lack of water availability during dry seasons can have more frequent. The purpose of this study is to examine the impact of land-use changes in the Ciwulan River Basin Tasikmalaya on water availability at the river, especially during the dry season for drought disaster detection. The method used for this research is the Shetran physical-based hydrological model by utilizing hydro-climatological data derived from remote sensing observing from 2001 to 2017. Input data used include land use and cover changes, digital elevation model, soil property data through Harmonized World Data Bases, rainfall, and evaporation data. The results of the study show that the most significant land-use changes occurred in the category of arable land with an average annual increase of 7% from the area of 48 hectares in 2001 to 162 hectares in 2017. In contrast, forest tended to decline from 1850 Ha to 1612 Ha. The smallest change occurred in urban land, which tends to be stable in the range of 96 Ha. The reduction in the area of the infiltration area has an impact on the decreasing availability of water in the Ciwulan river, especially during the dry season. The river discharge in the dry season tends to decrease from year to year.

Keywords: LULC, drought, shetran model, remote sensing

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FAT CONTENT AND PREFERENCES OF SALTED DUCK EGG ENRICHED WITH PEPPER

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ABSTRACT

The current study aimed to determine fat content differences and preferences of salted duck egg enriched with black pepper (L) and white pepper (P). Experiment was conducted in two stages including duck egg salting and preferences testing of salted duck egg. The experimental design was completely randomized design (CRD) with 2 factors. The first factor was concentration of black pepper and white pepper (10%, 15% and 20%). While the second factor was length period of salting which are 7 and 10 days. The fat content of salted duck eggwith pepper addition tend to decrease along with the duration of immersion. The preferences level of white egg and yolk colour, taste of saltiness, aroma and gritty texture of salted duck egg enriched with pepper were determined by using 5 points of hedonic scale test. The mean of overall acceptability of salted duck egg with 10%, 15% and 20% black pepper in 7 days salting period were 3.21, 3.52 and 3.34 respectively, whereas in 10 days salting period were 3.43, 3.38 and 3.55 respectively. Furthermore, the mean overall acceptability of white pepper salted duck egg in 7 days salting period were 3.79, 3.65 and 4.00 respectively, while in 10 days salting period were 3.64, 3.60 and 3.86 respectively. Moreover, the salted duck egg with addition of 15% black pepper and harvested in 7 days was the most preferred. However, in 10 days of salting, the salted duck egg with 20% black pepper was the most liked. Whereas the 20% white pepper salted duck egg was the most preferred both in 7 and 10 days of salting period. Level of preferences obtained in the current study was in between neither like nor dislikeand like.

Key words: pepper, duck, salted egg, preferences

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PREDICTION OF THE VELOCITY OF AIR FLOW BY DIMENTIONAL ANALYSIS FOR DRYING APPLICATION

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ABSTRACT

Drying is a process that is widely used in the food processing industry. There are several factors that influence during the drying process, one of which is the speed of air flow in the dryer unit. The greater the air flow rate, the faster the drying rate will be. The air flow velocity inside the drying unit can occur by forced airflow and natural airflow. Forced air flow is a flow of air created by providing a boost to the airflow by adding a blower as thrust energy. Natural air flow is the flow of air that is created due to the difference in pressure caused by differences in temperature and air density, so there is no thrust by the blower.This study aims to estimate the natural airflow velocity in the modeling system unit. This modeling system unit has a source of heat energy that can be used to adjust the room temperature level of the heat generator, and is equipped with a chimney that has an adjustable height and diameter.This research was conducted experimentally, through empirical mathematical model development using dimensional analysis. The variables measured include: heat generator room temperature (TS), system outside air temperature (TL), chimney diameter (d), chimney height (H), exhaust air flow velocity (V). The results of this study obtained the following mathematical model of airflow velocity. :

$$V = 10^{-1,054}\left(\frac{HT_L}{dT_S}\right)^{0,531}\left(\frac{T_L}{T_S}\right)^{-2,754}(dg)^{0,5}$$

Deviation (error) of measurement (observation) and estimation (prediction) results of 14,65 %

Keywords: air flow, dimensional analysis, mathematical model, drying

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COMPOSITION OF PESTS AND PREDATORS IN THE EARLY GENERATIVE PHASE OF RICE CULTIVATION IN TWO DIFFERENT CONDITIONS

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ABSTRACT

The early phase of growth is the most vulnerable for the survival of rice plants. However, this is influenced by many factors, such as the presence of pests and predators as natural enemies. This study aimed to determine the composition of pests and predators in the generative phase of rice plants in rice fields close to forests, and rice fields close to settlement / urban areas. The research location was determined by purposive random sampling method. Arthropod species and populations were observed directly from 08.00-11.00 AM. Data on safety results were processed and calculated using Excel 2016. Based on the results of observations in the initial generative phase of rice plants, there were 687 Arthropods. This number consists of 28 species belonging to 22 families of 8 orders. At the species level, the most abundant main pest was *Nilaparvata lugens* (11.76%) and the most abundant predator was *Lycosa pseudoannulata* (27.6%). Based on the overall calculation, predatory Anthropods have the largest composition, namely 72.32%, while pests were 27.06%. Based on the type of rice field conditions, Arthropods in the rice fields bordering the mountains have a higher composition, both pests (15.88%) and predators (41.18%) compared to rice fields that are near settlement/ urban areas, namely 11.18% pests and predators 31.18%.

Keyword: forest, *Nilaparvata lugens*, *Lycosa pseudoannulata*, pest management, urban area.

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CHARACTERISTIC OF BANANA FLOUR PRODUCED FROM THE VARIETY OF "RAJA LAWE" AND "RAJA LABU"

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ABSTRACT

Banana variety of "Raja Lawe" and "Raja Labu" are found mostly in Banjarnegara, Central Java. Banana is an agricultural commodity that is quickly deteriorating due to its inherent characteristic. Therefore, it is necessary to apply an appropriate technology to process bananas into food products that increase added value and extend their shelf-life. One of the alternatives is processing of bananas into flour. Banana flour has several advantages over fresh ones: longer shelf-life, higher value, and raw materials for various kinds of food products. This study aims to determine the effect of blanching and immersion in several types of solutions on the sensory and physicochemical characteristics of flour made from a banana variety: "Raja Lawe" and "Raja Labu". This study used an experimental method with a randomized block design. These factors consist of a variety of banana (A), the effect of blanching (B), and the soaking solutions (C). The type of banana (A) consists of Banana variety "Raja Lawe" (A1) and Banana variety "Raja Labu" (A2). The factors of blanching influence consist of non-blanching (B0) and blanching (B1). The immersion factor consisted of sodium chloride (C1), sodium meta-bisulfite (C2), citric acid (C3), and water (C4). The results showed that blanching affected the brightness intensity and the degree of acidity of flour made from a banana "Raja Lawe" and "Raja Labu". Meanwhile, the combination of blanching treatment and soaking solutions affected the ash content, color, texture, and aroma of banana flour.

Keywords: banana, flour, quality, blanching, soaking

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EFFECT OF ORGANIC FERTILIZER AND APPLICATION OF CHARCOAL ON QUALITY OF POTATO TUBER CULTIVAR ATLANTIC

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ABSTRACT

During the last decade, the consumption of processed potato in Indonesia increased due to high demand, mostly for producing French fries and potato chips. Import of potato tubers or frozen one is conducted to provide sufficient supply throughout the year because the widely cultivated tuber in Indonesia is Granola. The tuber of Granola is appropriate for table potato and not for processing one. Therefore, the cultivation of potato cultivar Atlantic that is suitable for processing should be increased to minimize imports. To balance the benefit between high productivity and respect to the ecosystem, therefore, this research aimed to examine the quality of potato cultivar Atlantic with organic farming and compare their properties with a conventional system. In addition, charcoals were also applied during fertilization to know its effect on the tuber's characteristics. Potato tuber cultivar Atlantic was cultivated with conventional and organic fertilizer. Fertilization was performed following the practices of the local farmers. Three types of charcoal produced from wood, husk, and coconut shell were applied at three different concentrations. The cultivation was conducted in the greenhouse located in the area of potato cultivation, at 1,300 m above sea level. Selected quality parameters of potato tuber regarding the processing and nutritional properties were determined: the content of dry matter, ash, ascorbic acid, starch and sugar as well as a processing-grade tuber, brightness of flour, and oxidative potential. The present study shows that organic fertilizer and charcoal application could contribute to the quality of potato tuber cultivar Atlantic. However, application of conventional fertilizer produce tuber with better processing properties compared to other tubers. Further research for cultivation in the field is required to confirm this result.

Keywords: potato, processing, organic, charcoal, quality

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PHYSICOCHEMICAL QUALITY CHARACTERIZATION OF DEHYDRATED STRAWBERRY FRUIT PRODUCTION IN TROPICAL ENVIRONMENT

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ABSTRACT

Development of strawberry fruit from fresh condition to processed fruit condition such as dehydrated fruit was important as alternative ways to increase shelf-life and valued of the fresh fruit. Objective of the research was to identify characterization of physical and chemical quality of the dehydrated strawberry fruit that produced in the tropical environment through osmotic dehydration method. Strawberry fruit were depth immersed with concentrations of 30-50 °Brix, then using dehydrator for hot air drying processing with temperature of 50-70℃ and drying time for 6 hours. Physical quality parameter of the dehydrated strawberry fruit were color (L, a b and ΔE) that measure using chromameter and texture of the dehydrated strawberry fruit that measured using fruit hardness tester. Furthermore, proximate analysis and vitamin C were also measured. Characterization of color from dehydrated strawberry fruit were have good lightness (L*) from the treatments sixth, Redness (a*) value have a good color from treatments first and yellowness (b*) and color change (ΔE) value from treatments second. On the other hand, texture of dehydrated strawberry fruit was good conditions on treatments eighth. Furthermore, proximate analysis have a good results for ash and energy, also for vitamin C. Based on this research, optimum condition for dehydrated strawberry fruit production need to be conducted in the next production.

Keywords: dehydrated fruit, osmotic dehydration, physicochemical, quality, strawberry

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DETERMINATION OF PRODUCTION FACTORS OF DEHYDRATED STRAWBERRY BY USING TAGUCHI METHOD APPROACH

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ABSTRACT

Processed fruit condition such as dehydrated fruit was important as alternative ways to increase shelf-life and valued of the fresh fruit. However, high temperature during drying could be decreasing nutritive value of the strawberry fruit, and it is important to know good approach for this processing. Objective of the study was to know the optimal combination for treatments of material and process for production dehydrated strawberry.Taguchi method was used to identify the optimal processing of the dehydrated strawberry fruit. Combination from orthogonal array and signal to noise ratio from taguchi method with several control variable of processing of timing and concentration during immerse in osmotic solution (30-60 minutes) and (30-50 ^{0}Brix) and also drying temperature (50-70 ℃) were applied in this processing. Several quality parameter of dehydrated fruit were determined such as color of skin fruit, texture, water content, vitamin C, total phenol, acidity, and total suspended solid were also measured using standard method.
Based on result using taguchi method we found that optimum condition for timing and concentration during immerse in osmotic solution were 60 minutes and 50 ^{0}Brix, respectively, then drying temperature was 70℃. Drying temperature was highest factor that affected quality of the dehydrated fruit processing(93,46%), then osmotic solution concentration (5,34%) and immersing time (1,20 %). Physical characterization of dehydrated strawberry fruit were skin drying with softly flesh of fruit, dark red color of fruit, and chemical characterization sweet taste, low acidity and high vitamin C and phenol.

Keywords : dehydrated fruit, osmotic dehydration, quality, strawberry, taguchi method

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ANOMALY WEATHER AND ITS IMPACT ON THE GROWTH OF MAIZE (*Zea mays*)

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ABSTRACT

Maize is one of the main commodities in Indonesia which productivity is determined by weather conditions. The quality and quantity of maize production can decrease due to anomaly weather phenomena. Weather anomaly happened because of climate changewhich is indicated by the increasing number of extreme events. Extreme events in a region such as extreme rainfall give bad impact for maize cultivation. It caused maize get less or more water than they need, so it will affect maize growth and productivity. This study aimed to determine the impact of anomaly weather on the growth and productivity of maize in various varieties. Plant height, number of leaves, leaf length, and yield were measured to identify the growth of maize. Extreme rainfall will be analyzed with extreme precipitation indices using CLIMDEX project that is developed by the Climate Change Research Centre (CCRC), University of New South Wales (UNSW). This analysis will give the number of consecutive days when extreme rainfall occurs and the amount of rainfall during an extreme event. The analyzed data will be used as a treatment for the experiment. The results of this experiment are still under further research.

Keywords: climate change, anomaly weather, extreme rainfall,maize growth, maize productivity.

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PREDICTING THE IMPACT OF CLIMATE CHANGE ON INDONESIA'S FIVE MAIN HORTICULTURE COMMODITIES

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ABSTRACT

Global climate change has enormous impact on agriculture, including horticultural commodities. Banana, oranges, shallot, chilies, and potatoes are among the main horticulture commodities for Indonesian. This study employs a multimarket model of partial equilibrium analysis to investigate the impact of global and environmental climate change on those Indonesia's five horticulture commodities, 2019-2030. The study appraises the impact of climate change by looking at changes in the production and consumption in the aggregate national and household level, and net trade at national level. The study revealed that all scenarios showed negative impact on national aggregate level of productions and consumptions, however those scenarios can be lower or higher at regional and household levels under climate change compared to a no-climate change scenario in the short and medium term. Import will increase, and all commodities will be as net imported. As an implication, types and characteristics of commodity and regions and households should be strongly considered in research, extension, and development program with improving adaptation and mitigation to climate change. With its unique characteristics,morecomprehensivestudies for these commoditiesarerecommended. Awareness of the impact of climate change, horticulture subsector needs to be treated in a consistent, comprehensive, and systematic ways.

Keywords: climate change impact, horticulture, Indonesia, multimarket model

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IN VITRO TEST OF GINGER RHIZOME TISSUE ORIGINATED-ENDOPHYTIC BACTERIAL AGAINST2ND-STAGE JUVENILE OF ROOT-KNOT NEMATODE, *MELOIDOGYNE* SPP.

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ABSTRACT

Plant parasitic nematodes often restrict the ginger production, quality, and export. The use of endophytic microbial was promising alternative technology in eco-friendly nematode control method. The research was aimed to explore the endophyticbacterialin ginger rhizome tissue potentially used as control agent of the root-knot nematode. Isolated endophytic bacterial were selected based on their ability to cause mortality the 2nd-stage juvenile (J2) of *Meloidogyne* spp., and to inhibit the nematode egg hatching in *in vitro* test, and to promote theginger seedlings growth in greenhouse test. Mortality test was performed by submerging the nematode J2 in 1% bacterial culture filtrate suspension for 3 hours. Plant growth induction test was performed by 24 hours sub-merging the rhizome seed in and drenching the bacterial suspension on 2 month-ginger seedling plants. Significancy of the difference among treatments were analyzed by T test. The most effective endophytic bacterial isolates were identified molecularly by method of Srinivasan *et al.* (2015) and Evvyernie*et al.* (2000). Sixty (60) endophytic bacterial isolates were obtained from the exploration activities. Significant higher J2 mortality were shown on culture filtrate of IKIAN3.2.2R isolate (81,18%, α= 0,01), andJC2.1.2R isolate (60,57%, α= 0,01) in compared to control (0,0%);and significant lower egg hatching percentage (0,0% for IKIAN 3.2.2R and 30,16% for JC 2.1.2R isolate) in compared to water control (60,56%). Two isolates ofIKIAN3.2.2R and JC 2.1.1R shown the highest plant growth percentage (93% and 80%) in compared to control (66%); andplant fresh weight (3,093 g and 2,0666 g) in compared to control (0,933 g). PCR amplification at 16 S rDNA using Primer 27 F : 5`- AGA GTT TGA TCC TGG CTC AG - 3` and Primer 1492 R : 5`- GGT TAC CTT GTT ACG ACT T - 3`indicated that Isolates of IKIAN3.2.2R was *Bacillus aerius* strain 24K, and of JC 2.1.2Rwas *Stenotrophomonas maltophilia* strain IAM 12423. Further research could be done on those endophyiticbacterialsformulation applicationfor eco-friendly nematode control in ginger plantation.

Key words: endophyticbacterial, root-knot nematode, ginger, nematode antagonist.

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THE HOUSEHOLD WELFARE OF HORTICULTURE FARMER: A CASE IN PENGALENGAN SUB-DISTRICT, BANDUNG REGENCY, WEST JAVA

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ABSTRACT

Bandung Regency is a sizeable horticultural supplier for West Java and DKI Jakarta, Indonesia.Horticultural farming faces the constraints of expensive input prices and price fluctuations.This can reduce the welfare of farmers.This study aims to determine the welfare level of horticulture farmer households in Pengalengan Sub-District, Bandung Regency, from June - September 2019. The research method is a survey. Respondents were taken 5% of the population, i.e. as many as 50 people. The welfare level is measured based on eleven BPS 2012 indicators, namely income, expenditure, living conditions, housing facilities, household member health, the ease of obtaining health services, the ease in education services, and obtaining transportation facilities, religious life, taste safe, and exercise ease. The poor criteria according to World Bank 2010 standard is household expenditure of less than 2 USD per capita per day. The results show that the household income of respondents is 54-100 million per year, and the expenditure of household potato farmers is 25-50 million per year. All responses in the non-poor criteria with expenditure above 1.9 USD per capita per day. The welfare level of respondents is indicated as high.

Keywords: farmer, horticulture, welfare

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COMPETITIVENESS EFFECT OF THE UPSUS PROGRAM ON RICE PRODUCTION IN WEST JAVA PROVINCE, INDONESIA

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ABTRACT

The sustainability of rice self-sufficiency and export is expected from the implementation of the UPSUS Program on rice and the attention to the issues affecting the rice competitiveness become very important. Using rice farm household survey data, the study employed thePolicy Analysis Matrix (PAM) and Kernel Density Estimation method of analysis. The study aimed to analyze the effects of the UPSUS Program on the global competitiveness of rice production,and estimate the proportion of rice farms that produce competitively and the proportion of the total production that is produced competitively resulting from the implementation of the UPSUS Program in West Java.Rice farming in the study sites was both financially and economically profitable before and after the implementation of the UPSUS Program, and showing the slight decline in competitive and comparative advantages after the program. In 2020-2025, to increase rice competitiveness and achieving the target, the government should: (1) Maintain the area of rice planting and give more focus on higher productivity target; (2) Improve the adequacy and effectiveness of the various components of the program; and (3) Improve the provision of other services outside the program components that affect competitiveness of rice production.

Keywords: UPSUS program, rice, competitiveness, effect, west java

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FOOD SECURITY IN THE DISASTER-PRONE AREA: AN EMPIRICAL STUDY FROM THE RURAL AREA OF INDONESIA

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ABSTRACT

Natural disasters affect food insecurity. Securing food needs is a top priority when a disaster occurs. Villages are producers of agricultural products. Natural disasters disrupt food production. This study aims to identify the food security status of a village located in disaster risk areas and formulates village development plans to reduce the risk of food insecurity. The case study area is Kaumrejo Village, Malang Regency. This village was one of the most affected villages from the Kelud volcanoeruption. This research employed a food security analysis based on the Ministry of Agriculture regulation regarding food security measurement and literature study. We measured food security status in 2015 and observed village development from 2015 to 2020. The results showed Kaumrejo village achieved food security a year after the disaster occurred. The status of this village's food security quickly recovered even though even local food production was hampered. The farmlands were covered by material from the Kelud volcano eruption. One of the factors that support the recovery of food security in this village was the high import of food stocks from other regions. During the disaster response period, this village received huge support from the volunteers and the government. Upon disaster response period ended, village communities struggled to achieve their food security status. Farmland needs time to recover. The villagers need to establish alternative income generators to buy food supplies. Alternative income generators should less dependent on natural resources such as cattle raisers and support micro and small-scale enterprise. Because villagers of this village also work as cattle raisers. This village has more traders than other villages in the districts.

Keywords: disasters, food security, villagers, rural area, food production.

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GROWTH ANALYSIS OF SOME CULTIVARS ON WEEDY CONDITIONS

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ABSTRACT

The existance of weed will affect to the growth and development of maize. This purpose of the research is to study the influence of weed on the growth process of some maize cultivars. The research was held in the experimental garden of Gadjah MadaUniversity Yogyakarta from March to July 2016. The field research using split plot based on Randomised Completely Block Design. The subplot was the maize cultivars and the main plot was weed presence. Cultivars of maize as sub plots consist of Bisi 18, Bisi 2, Pertiwi 3, NK 22, NK 33, DK 959, P23, DK 771, DK 95, Bima 19 Uri, Bisma, and Sukmaraga. The presence of weed as a main plot consists of unweedy and weedy. Each treatment is repeated three times. Observation data was analyzed using variance analysis, followed DMRT on a 95% level. The results showed that there was an interaction between maize cultivar and weed presence to the leaf area index and specific leaf weight on 6 WAP (week after planting). Weed doesn't decreasenet assimilation rate in the period 4-6 WAP and 6-8 WAP, specific leaf weights of 4-6 WAP, and 6-8 MST. Weed were reduce leaf area index on 6 WAP and 8 WAP, cropgrowth rate on 4-6 WAP and 6-8 WAP and dry plant weights on 6 WAP and 8 WAP.

Keyword: growth analysis, maize cultivar, weed

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THE EMPIRICAL ANALYSIS OF FARMER'S INCOME: A CASE OF POTATO FARMING IN WEST JAVA, INDONESIA

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ABSTRACT

Potato is a food source that can support the food diversification program in Indonesia. This study aims to analyze the income of potato farmers and the factors related to the income. The survey was conducted on 100 potato farmers in potato production centers in West Java, namely in Garut District. Data analysis was performed using income analysis and ordinaryleastsquares model. The results showed that potato farming in Garut District has a cost-return ratio greater than one which means it is profitable and feasible to develop. Furthermore, the results showed that the variables of age, education and farm size had a significant relation to the potato farming income.

Keywords: garut, income, Indonesia, potato farming

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THE EFFECT OF EXTREME WEATHER ON RICE GROWTH AND PRODUCTIVITY

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ABSTRACT

During the last few periods, climate change has affected many agricultural areas and caused more agricultural areas and caused more food security problems. The most affected commodity isrice. One of indicator of climate change is extreme weather, which causing plant and growth failures. So, it isnecessary to observe rice growth and productivity extreme weather. Extreme weather characterized by erratic rainfall. Global climate indices, which is represented by Southern Oscillation Index (SOI) data obtained from the Bureau of Meteorology (BOM), Australia and Sea Surface Temperature (SST) were obtained from the National Oceanic and Atmospheric Administration (NOAA), USA. Global climate indicesis used to determine the intensity that tends to increase and the initial shift and length of the season which are deviating or extreme from normal conditions.Monthly rainfall data were obtained from the Meteorology, Climatology and Geophysics Agency (BMKG). The result shows any significant correlation among SOI and SST with rainfall, then the growth and productivity of rice was influenced by extreme weather.

Keywords: global climate index, rainfall, extreme, rice growth, rice productivity

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THE INFLUENCE OF CROPPING PATTERN OF PEPPER WITH LEMONGRASS AND CITRONELLA ON THE DIVERSITY AND POPULATION OF INSECT PESTS

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ABSTRACT

Lemongrass and Citronella contain essential oils which are repellent against insect pests. Research on the cropping pattern of pepper with lemongrass and citronella was conducted to determine the effect of the two essential oil plants on the diversity and population of insect pests of pepper plants. The research was conducted at the Sukamulya Experimental Garden, from 2018 to 2020 on a 3000 m2 planting plot. The treatments of the cropping patterns tested included 1. Climbing pepper, 2. Climbing pepper + Shrub pepper, 3. Climbing pepper + Citronella, 4. Climbing pepper + Lemongrass, 5. Climbing pepper + Shrub pepper + Citronella, 6. Climbing pepper + Shrub pepper + Lemongrass. Each treatment was repeated twice. Observation parameters include the diversity of insects and insect pests, the level of pest attack, and the number of plants attacked. The results obtained 66 species of insects from 46 families and 9 orders. The insects associated with the pepper cropping pattern ecosystem were relatively evenly distributed in all treatments, except for treatment 3 only 4 types of insect pests were found. Pests, especially Thrips, were distributed in all treatments, but in the combination treatment with citronella and Lemongrass, the population of Thrips sp. relatively less.

Keywords: pepper, cymbopogon nardus, cymbopogon citratus

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PHYSICOCHEMICAL AND SENSORY PROPERTIES OF COOKIES PRODUCED FROM THE FLOUR OF BANANA VARIETY OF "RAJA LAWE" AND "RAJA LABU"

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ABSTRACT

In Indonesia, banana is one of the important commodities. One of the banana-producing regions in Indonesia is Banjarnegara. Banana is the second-largest horticulture plant produced in Banjarnegara Regency. Bananas that grow a lot in the Banjarnegara area are Pisang Raja Lawe and Pisang Raja Labu. One of the banana's utilization is as a raw material for producingcookies. Cookies products are selected as processed products of banana flour because cookies have a long shelf life. The purposes of this research are to the best treatment combination between varieties of bananas with the proportion of banana flour and wheat flour on the physical, chemical, and sensory characteristics of cookies. This research uses Completely Randomized Design (CRD). Factors studied were varieties of bananas consisting of Raja Lawe banana flour and Raja Labu banana flour; the proportion of banana flour: wheat flour consisting of 20:80%, 40:60%, 60:40%, 80:20%, and 100: 0%, arranged in factorials with 3 replicates and there is a control treatment (100% wheat flour) in each replication. The observed variables consisted of physical and chemical variables, including swelling potential, hardness, brightness intensity (L*), redness intensity (a*), yellowish intensity (b*), moisture content, ash content, and coarse fiber content. Sensory variables consist of color, banana scent, texture, taste, and favorite.The results showed that Raja Lawe banana flour produces cookies with a higher score in brightness intensity (L*), color, and texture, but lower score in hardness and banana scent than cookies with Raja Labu banana flour. The higher the proportion of banana flour will increase the intensity of redness (a*), ash content, texture score, and aroma score, but decrease the intensity of brightness (L*), yellow intensity (b*) and the color score of banana flour cookies. The best treatment combinations based on effectiveness index test are Raja Lawe banana flour on the proportion of banana flour: wheat flour = 40: 60% and Raja Labu Banana flour in the ratio of banana flour: wheat flour = 80: 20%.

Keywords: banana, flour, cookies, quality,

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THE ROLE OF PHOSPHATE SOLUBILIZING BACTERIA FROM RHIZOSPHERE OF UPLAND RICE IN THE GROWTH AND YIELD OF UPLAND RICE ON ULTISOL SOIL

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ABSTRACT

Bacillus proteolyticus GT2, *B. paramycoides* SR1, and *Acidovoraxdelafieldii* PA1 were isolated from rhizosphere of upland rice. All three are phosphate solubilizing bacteria (PSB). Observation of the roles of the three needs to be carried out in supporting the growth and yield of upland rice cultivated on ultisol soils. The aim of this study was to determine the role of *B. proteolyticus* GT2, *B. paramycoides* SR1, and *A. delafieldii*PA1 in the growth and yield of upland rice grown on ultisol soil, determine the best bacteria that showed the best upland rice growth and yield, and determine the interactions between bacteria and upland rice varieties. The research was conducted in a greenhouse, PasirLor Village, Karanglewas District, Banyumas Regency, Central Java from December 2019 to June 2020. The research used a factorial randomized block design consisting of two factors. The first, the bacteria consisting of control (B), *B. proteolyticus* GT2 (B1), *B. paramycoides* SR1 (B2), and *A. delafieldii* PA1 (B3). The second,the upland rice varieties consist of INPAGO UNSOED 1 (V1), INPAGO UNSOED PARIMAS (V2), and INPAGO 8 (V3). Each combination was repeated three times. The results showed that PSB played a role in increasing the number of productive tillers, root volume, and root dry weight. *A. delafieldii* PA1 was the best bacteria in increasing the number of productive tillers, while *B. paramycoides* SR1 was the best bacteria in increasing root volume and dry weight. The results showed that there was no interaction between PSB and upland rice varieties.

Keywords: *B. proteolyticus, B. paramycoides, A. Delafieldii, INPAGO UNSOED 1, INPAGO UNSOED PARIMAS, INPAGO 8*

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THE IMPLEMENTATION ANALYSIS OF POTATO PRODUCTION IN WEST JAVA, INDONESIA

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ABSTRACT

Potato is the fourth main food commodity in the world after rice, wheat and corn. One of the problems in potato production is the fluctuation in production that can be caused by less optimal cultivation, such as not applying cultivation techniques as suggested. This study aims to analyze the implementation of potato production in West Java. The survey was conducted on 200 potato farmers in potato production centers in West Java, i.e. in Garut and Bandung Districts. The data were processed using statistics descriptive analysis. The results showed that potato production carried out by most potato farmers was in accordance with the cultivation technical guidelines. However, there were several cultivation activities that have not been optimally carried out yet by the farmers, both in the soil tillage, fertilization, planting, maintenance, and harvesting stages.

Keywords: Indonesia, potato production, west java

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ANALYSIS OF MEAT PRICE VOLATILITY: IMPLICATIONS FOR FOOD SECURITY IN INDONESIA

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ABSTRACT

Indonesian meat consumption has 40 percent deficit which was covered by importing. Meat price in international market tend to fluctuate. The gap between domestic demand and supply meat also the imported price fluctuation causes instability of domestic price. This researc his conducted to analyze the volatility of meat price which implicated to food security in Indonesia. ARCH-GARCH model isused to estimate meat price volatility in Indonesia. The Augmented Dickey-Fullerand cointegration test have been used for testing the presence of unit root and cointegration in the series. Langrange multiplier has been utilized to detect the presence of autoregressive condition aleffect. Daily meat prices used are national average price which obtained from the Indonesia Ministry of Trade. This study reveals that meatprice in Indonesia has highvolatilitywithincreasingprice over theresearchperiod. The empirical model alsoshowsasymetryeffect. The resultsrecommendthat Indonesia should apply comprehensive managed import such as not only import on fresh meat and ready to cut bovine but also on breeding bovine. By the fulfilling production and stock, meat price can be more stable. By the price stabilization, food security concept will be reached so that every layer society can consume meat.

Keywords: ARCH – GARCH, food security, meat, price, volatility

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STUDY OF INDONESIAN GARLIC VARIETIES TO FLOWERING

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ABSTRACT

Garlic is propagated asexually plant. While, sexual propagation is possible. Indonesia successfully to make True Shallot Seed. Moreover, want to successfully to make True Seed of Garlic. This aim of study was to know effect of temperature and time of vernalization from several varieties of Indonesian garlic to flowering. This research was conducted at farmer field at Wonosobo, Central Java, Indonesia since March until November 2016. The experimental design was used a Complete Randomized Block Design with two factors (vernalization temperature (0, 5, 10^0 C) and vernalization duration (20, 40, 60 days)) on twelve garlic varieties/clones. Cloves of garlic was vernalizated on cold storage according to the treatments and planted. The results showed that all varieties success enter to generative phase (bolting), although not produce flower yet. All varieties were categorized incomplete bolting varieties.

Keywords: Allium sativum L., *incomplete bolting, flowering*

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PHYSICOCHEMICAL CHARACTERIZATION OF COCOYAM (XANTHOSOMASAGITTIFOLIUM) STARCH FROM BANJARNEGARA HIGHLAND AS A LOCAL SOURCE OF CARBOHYDRATE

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ABSTRACT

Cocoyam (*Xanthosomasagittifolium*) from Banjarnegara highland (and then called busil), was low utilized as a starch source even though this was easily found and locally was used as a snack food. The objective of this study was to determine the physicochemical properties and suitable utilization recommendations of busil starch. This research was conducted in two steps, first was busil starch extraction, and the second was the physicochemical characterization and utilization recommendations. Busil had 14% yield of starch amount, contained 13.7% amylose, and 72.5% amylopectin with 88.1% on whiteness index. Scanning electron microscopy (SEM) showed that they mostly round, and granule size was about 11.8 □m. The analysis by RVA showed that busil starch had 74.30oC on pasting temperature. X-ray diffraction studies showed that all the arrowroot starch exhibited A-type diffraction pattern. Native busil starch was suitable to make amorphous and crispy food texture. It was also ideal for thickener or filler agents. Apart from being used as native starch, busil starch also potential to being modified and can be used more widely.

Keywords: Cocoyam, busil, starch, carbohydrate

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BIOMASS GROWTH OF RED SPINACH IN PLANT-FACTORY SYSTEM UNDER THREE KINDS OF LED LIGHT SOURCES

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ABSTRACT

The plant factory system mostly used LED as light source. The power saving property of LED made it important to reduce cost. As the light source use for photosynthetic activity is said to be blue and red light, the research is trying to observe the on red spinach (Amaranthus Tricolor L) plant. Controlled growth chamber, or plant-factory were installed and divided into three compartements. Each compartements were given three different light sources, that were ; Red-Blue LED (treatment A), Multi-Color LED (treatment B), and White LED (treatment C). The energy of each light sources A, B, and C were 192 Watt, 92 Watt, and 8 Watt, respectively. The research were took place on March 2018 in Agriculture Techology Laboratorium, Jenderal Soedirman University, Indonesia. The growth parameter measured were plant height, biomass, and number of leaves. Result showed that there were significant difference of growth parameters of treatment A compared to treatment B, and C. Shierary Model were used to study the mechanism of growth parameter difference. It calculates the input that were radiation energy that were affected by leaves development, that called the intercepted radiation. The result of the model showed that the intercepted radiation influenced growth parameters. Treatment A, which is generates commonly used light wave for photosynthetic, caused better growth. The influenced of the heat emerged from the light sources were seemed to create better micro climate for photosynthesis

Keywords : Plant-factory, artificial lighting, growth parameter, plant biomass, micro climate

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VEGETATION COVER MODELLING FOR SOIL EROSION CONTROL IN AGRICULTURAL WATERSHED

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ABSTRACT

Vegetation has an important role for surface runoff and soil erosion control. Deforestation especially in the upstream area of watersheds has been increasing land degradation problems mainly in the form of soil erosion. This study was performed to investigate the effectiveness of vegetation cover for soil erosion control in an agricultural watershed. Soil erosion was calculated by using the RUSLE model in a Geographic Information System (GIS)tool of Arc GIS 10.3. Five parameters such as rainfall erosivity (R), soil erodibility (K), length-slope factor (LS), crop management factor (C) and conservation practices factor (P) were used for soil erosion assessment in the existing condition. Those parameters were presented in grid cells of land units with 30 meters resolution. Five scenarios of vegetation cover such as 10%, 15%, 20%, 25% and 30% were used for the modelling. The result showed the increase of vegetation cover from the existing condition 4% to 30% can significantly reduce soil erosion into tolerable value (15 ton/ha/year). Preservation of about 30% vegetation cover in the upstream area of the watershed, enables farming practices with a low risk of soil erosion. The findings of this study provide a fundamental basis for conservative farming concept development.

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IMPACT OF VIBRATION ON THE QUALITY OF TOMATO PRODUCED BY SIMULATED TRANSPORT

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ABSTRACT

Globally, tomato (*Solanum lycopersicum* L.) production has experienced a large increase over years due to its nutritional and economic values etc. Despite the enormous benefits of tomato, postharvest losses due to transportation is one of the major problems that need to be considered. Vibration generated during road transportation by vehicles is one the main issues that cause critical surface damages to transported postharvest tomato. Color is one of the most significant visual quality attributes in tomato which can determine the consumers acceptance at market level. Firmness and total soluble solids (TSS) are essential characteristics in tomato that can affect tomato quality. The aim of this paper is to investigate the potential effect of vibration on weight loss, color changes, firmness and total soluble solid of tomato during simulate transport and to evaluate the effect of storage on vibrated tomato. Vibration shaker was used to simulate the transport vibration and accelerometer was fixed on different locations inside the container. Tomato were divided into 2 groups where the first one stressed to 2 hrs vibration duration at frequency of 2.5Hz and the other was without vibration stresses were set as control. Tomato with and without vibration were stored at 10 and 22°C for 10 days. Weight loss, firmness total soluble solids (TSS) were all measured. RGB acquisition system was used to measure color changes on tomato affected by transportation and storage and analysed by image J software. Lightness, redness, yellowness, purity, saturation, color change and some color indices of tomato were all calculated. Analysis of variance (ANOVA) and regression analysis were used to analyse all obtained data. This research can approve that the quality measurements of tomato like color, weight, firmness and total soluble solids could be changed due to vibration stresses, storage temperature and storage duration. Different advanced methods and technologies need to be studied regarding temperature storage managements and transportation facilities to reduce the rapid changes in color and other quality characteristics.

Key words**:** Color, Firmness, Storage Tomato, Transportation, Vibration

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CROP STAGE CLASSIFICATION USING SUPERVISED ALGORITHM BASED ON UAV AND LANDSAT 8 IMAGE

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ABSTRACT

Agriculture irrigated area have been decreasing since last decade from 8,06 million ha to 7,4 million ha in Indonesia. Surface irrigation system with scheduling method performed predominantly due to water irrigation limitation and different plant cultivation.Information of plant type and growth phase is important for efficiency and appropriate water irrigation delivery.The objective of this research is to compare land use classification (LUC) from Landsat 8 and Unmanned Aerial Vehicle (UAV) with minimum distance algorithm. The UAV recorded form 100 m above ground, snap photo on 90 degree with 20-mega pixel of each photo and 10 mission in the Bondoyudo Irrigation District (176,3 ha). Supervised method, i.e. minimum distance algorithm, was applied for image processing by QGIS 2.18 and AgisoftPhotoscan. The result showed six LUC from UAV, i.e.: vegetative stage of dry crop (39%), ripening stage of dry crop (23%), vegetative stage of paddy (15%), tillage (15%), bare land (7%), and paddy nursey (6%). On the other hand, we found five LUC from landsat 8 image, i.e.: vegetative stage of dry crop (10%), ripening stage of dry crop (17%), vegetative stage of paddy (5%), tillage area (62%), bare land (6%). Standard error based on UAV and landsat 8 image data were 0,1-0,6 and 0,2-1,7, respectively. Thus, supervised method appropriate for UAV image for crop stage classification in small irrigation district.

Keywords:Crop stage classification, landsat 8, minimum distance algorithm, and unmanned aerial vehicle.

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THE THICKNESS OF THE MICROCAPSULE LAYERS OF THE SPI NANOFIBRILS

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ABSTRACT

Multilayer microcapsules are micro-sized capsules composed of several layers. Multilayer microcascules can be made from Soy Protein Isolate (SPI) nanofibrils using the Layer by Layer (LbL) method. The thickness of the microcapsule layer is one of the physical characteristics that need to be studied for the application of multilayer microcapsules in the fields of health, food, industry and agriculture. The thickness of the microcapsule layer can be determined based on the diameter of the microcapsule layer. The diameter of the microcapsules can be measured using a zetasizer. The measurement results of the microcapsule layer diameter showed that the diameter of the first layer (droplet) was 3121.5 ± 207.5 nm and the seventh layer was 14250.0 + 2240.0 nm. The equation of the microcapsule layer diameter to the number of microcapsule layers is y = 1899x + 560.78, with a value of R^2 = 0.98. The average thickness of the microcapsule layer is 927.37 nm.

Keywords: Multilayer microcapsules, SPI nanofibrils, microcapsule diameter, microcapsule layer thickness

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ANTIOXIDANT AND SENSORY PROPERTIES OF COFFEE-GINGER BEVERAGE BASED ON DECAFFEINATED AND NON-DECAFFEINATED ROBUSTA COFFEE BEANS ON VARIOUS FORMULAS

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ABSTRACT

Coffee is one of the most popular beverages in the world, including Indonesia. Coffee contains several antioxidant and fairly high caffeine compounds. Excessively high caffeine levels can have a negative impact, especially for coffee connoisseurs who have a low tolerance to caffeine, so it is necessary to attempt to decrease caffeine levels (decaffeination) in coffee. In this research, robusta coffee bean processed products is diversified by making coffee-ginger beverages. The addition of ginger extract is expected to increase the antioxidant activity of the product. This research was conducted to know the influence of different formulas on the content of total polyphenols, melanoidin brown pigments, antioxidant activity and sensory properties in decaffeinated and non-decaffeinated coffee-ginger beverages. The coffee-ginger beverages were made by 50 ml and 40 ml of decaffeinated and non-decaffeinated robusta coffee extracts, then added with 20, 15 and 10 ml ginger extract respectively. The results showed the formulation of coffee: ginger (50 ml: 20 ml) with non-decaffeinated coffee beans had total polyphenol (2.69 mg GAE/ml), melanoidin brown pigment (1.31 AU) and antioxidant activity (0.43 mmol TE/ml) contents is the highest compared to other formulations. Decaffeination treatment can reduced the contents of total polyphenols, melanoidin brown pigments and the antioxidant activity of the product. The addition of higher ginger extract results in increased levels of total polyphenols, melanoidin brown pigments and antioxidant activity in the product. The coffee-ginger beverages that most favored by panelists as a whole is in the formulation of coffee: ginger (40 ml : 10 ml) with non-decaffeinated coffee bean. The decaffeinated coffee-ginger has a faded brown color and strong flavor, so it is less preferred. The high addition of ginger extract is also less preferred because it has a too strong flavor and pungent taste.

Keywords : Antioxidant, coffee, coffee-ginger beverages, decaffeination

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THE EFFECT OF ANTRACTANT PRODUCTION FACTORS ON CURLY RED CHILI FARMING (*Capsicum annum* L.) (A CASE IN PASIRWANGI SUBDISTRICT, GARUT DISTRICT)

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ABSTRACT

Curly red chili (Capsicum sp) is a commercial horticultural commodity that has a major problem in its cultivation, namely the attack of Plant Pest Organisms (PPO). One type of pest that often damages chili plants is fruit flies (Bactrocera spp) where one of the ways to control it is by using attractants. The use of attractants is estimated to reduce production costs and ultimately increase farmers' income. This study aims to analyze the factors that influence yields. production of curly red chilies with and without using attractants This research was carried out in Pasirwangi District, Garut Regency, using a survey method on 72 curly red chili farmers. The data were analyzed using multiple regression of a function production where one of the dummy production factors was the antractant and the non-antractant. The results showed that: Land area, seeds, urea fertilizer, Za fertilizer, KCl fertilizer, NPK fertilizer, organic fertilizer, labor, attractants have a positive effect on the production of curly red chilies, while other pesticides have a negative effect.

Keywords: Production Factor, Attractant, Curly Red Chili

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SUPPORTING INSTITUTIONAL AND INDEPENDENCE ECONOMIC DEVELOPMENT FOR SMALL-SCALE FISHERS

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ABSTRACT

There is still a need for the best formula worldwide for broad social and economic institutions for fishers. This article focuses specifically on the institutional implications for small-scale fishers, including the sector's marketing and processing aspects, and the southern coastal fishing communities of Central Java. As a result of the current Covid-19 pandemic, negative consequences to date include stopping some fishing activities, indirect economic impacts from market disruptions, increased health risks for fishers, processors, and communities, additional implications for marginalized groups, exacerbating vulnerability to social stressors and other environments, and an increase in illegal fishing. Although most of the results have been unfavorable, there have been some positive outcomes such as reducing fishing pressure in some places, sharing activities, reviving local networks, increasing local sales, collective action, and a collaboration between communities and government. While the pandemic is still ongoing, there is an urgent need to coordinate, plan, and implement effective short and long term responses. Therefore, it requires the role of academician, the business sector, government, and communities (development organizations, NGOs, and donors) to move quickly to support small-scale fishers, coastal fishing communities and organizations, and suggest actions that can be taken by each to help these fishing groups.

Keywords: institutional economics, economic development, reviving, communities, small-scale fishers

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THE HARDNESS ANALYSIS OF NOODLES MADE FROM MODIFIED CASSAVA FLOUR, SPIRULINA (*SPIRULINA PLATENSIS*) AND BASIL LEAVES EXTRACT (*OCIMUM SANCTUM L.*)

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ABSTRACT

Noodles is one of the most popular foods in Indonesia resulting high in demand for wheat as a raw material. This condition receives huge attention to researcher to find the reduction for utilizing wheat by mocaf flour (modified cassava flour) substitution. However, mocaf flour could not be replace wheat entirely due to low gluten and protein content. Therefore this research was objected to use natural ingredient such as spirulina to increase protein content and improve the appearance of noodle. In order to enhance the flavor, basil leaf was also used. The analysis was done for the chewiness, hardness and strong beside the photograph was also provided. As results, it was found that basil and spirulina in specific concentration both, in combination or single treatment might enhance the chewiness, dense and strong in noodle. The picture was also provided clearly to explain the data. As conclusion, spirulina and basil leaf might be used in noodle manufacture using mocaf.

Keywords: mocaf, basil leaf, spirulina, chewiness, hardness, strongness.

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STUDY OF COLOR DEVELOPMENT FROM D-PSICOSE AND METHIONE MAILLARD REACTION PRODUCTS (MRPS)

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ABSTRACT

Maillard reaction products is produced by maillard reaction but it is specific to utilized sugar and protein. Methionine was known as reactive compound and in the maillard reaction using D-psicose was rarely obtained. Therefore, this research is aimed to analyze color development of maillard reaction involving D-psicose and Lysine in the beginning of heating process. Maillard reactions were conducted at 50° C for 16 hours. Color development was analyzed using chromameter to obtain the value of L* a* b* for every hour and then it was calculated kinetically against non maillard reaction. The result showed that the elevation was clearly appeared in the last heating process and it had a specific value for kinetic analysis. As conclusion, the heating process of D-psicose and Methionine provide development on color appearance against time of heating.

Keywords: Maillard reaction, d-psicose, rare sugar, lysine.

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THE RISK VULNERABILITY ANALYSIS OF SUPPLY CHAIN VEGETABLES IN COASTAL FARMING LAND

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ABSTRACT

Supply chain vulnerability is the exposure to a disruptive event in the supply chain. Because of the complexity and interconnected nature of supply chains and their effect on disruption propagation, it is essential to understand the structure of the supply chain and its vulnerability to disruptions. The research aimed to identify risks, evaluate risks and vulnerabilities of the vegetable supply chain in the coastal farming land. The analysis of this study is based on the Rapid Agricultural Risk method. This method started from mapping vegetable products and identifying the risk factors. Research result showed there were 14 products of vegetables from coastal farming land. Shallot and red chili had a high level of risk vulnerability. The risk factors of farmers were weather, natural disaster, biological and environmental, production technology, markets, delivery and transportation. Those categories of the risk were high, moderate and low vulnerability.

Keywords: vulnerability, risk factor, supply chain, vegetable, coastal farming land.

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IN VITRO SHOOT PROPAGATION OF WHITE TURMERIC (*KAEMPFERIA ROTUNDA* L.) AT VARIOUS TYPES AND CONCENTRATIONS OF CYTOKININ

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ABSTRACT

In vitro propagation can overcome the scarcity of high quality white turmeric seeds in large quantities and pathogens free. Availability of superior seeds produced *in vitro* depends on the type and concentration of cytokinin added to the culture media. The aimed of this study was to determine the type and concentration of cytokinins that give the best effect on the growth of white turmeric (*Kaempferia rotunda* L.) shoots *in vitro* culture. The experiment was conducted from December 2019 to April 2020 at Seed Technology Tissue Culture Laboratory of Agriculture, Universitas Padjadjaran. The experimental designed used Completely Randomized Design (RCD) with 10 treatments and 3 times. Medium was used Murashige and Skoog (MS) with different type and concentration of cytokinin : *Benzyl Amino Purine* (1.5; 3.0; 4.5 ppm), 2-*Isopenteniladenina* (1.5; 3.0; 4.5 ppm) and *Thidiazuron (*0.15; 0.30; 0.45 ppm).The result showed that there was different effect in stimulating the appearance number of shoots, plant height, and root length in propagation of white turmeric *in vitro.* Thidiazuron 0.45 ppm gave the best number of shoots.

Keywords: propagation, *Kaempferia rotunda*, cytokinin

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THE EFFECT OF ACCELERATED AGING OF ROUGH RICE WITH HIGH-TEMPERATURE STORAGE ON COLOR AND QUALITY OF MILLED RICE

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ABSTRACT

The quality of milled rice can be improved through the aging process. Conventional aging takes a long time, so it needs to be accelerated. The purpose of this study was to evaluate the effect of temperature and duration of accelerated aging of rough rice on the color and quality of milled rice. Accelerated aging was carried out at room temperature, 40, 50, and 60 °C, and duration 4, 8, 12, 16 and 20 days. Weight loss and moisture content of rough rice during accelerated aging were recorded, while color, degree of milling, total rice yield, and head rice yield of milled rice were analyzed. The results showed that the temperature and time of accelerated aging had an effect on the color and quality of the milled rice. The optimal conditions for improving the color and quality of the milled rice were obtained from the accelerated aging at 40 °C for 16 days.

Keywords: accelerated aging, degree of milling, head rice yield, rice color, total rice yield

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PRICE VOLATILITY OF STAPLE FOOD USING ARCH-GARCH MODEL

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ABSTRACT

Staple goods are vulnerable to inflation. The fluctuating of the price of staple food is an interesting study for regions wishing to control the inflation rate. The purpose of this study is to estimate the level of price volatility and the factors that influence it. This study uses time series data, namely the daily prices of staple food for the last five years. The econometric model used in this study is the Autoregressive Conditional Heteroscedasticity-Generalized Autoregressive Conditional Heteroscedasticity (ARCH-GARCH) model and Error Correction Model (ECM). The ARCH-GARCH model is used to estimate the volatility of the price of the community groups. Staple food price volatility effect on macroeconomic indicators are analysed using ECM. Staple food studied in this study included 9 items, namely rice, chicken, beef, eggs, red chilies, shallots, garlic, sugar, and cooking oil. The results showed that the prices of the nine goods were volatile and influenced by several macroeconomic indicators. Therefore, it is important for local governments to know how to maintain the daily price of staple foods so that inflation can be controlled.

Keywords: staple food, price volatitilty, ARCH-GARCH

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AGROINDUSTRIAL DEVELOPMENT OF STRATEGY FOR CARDAMOM COFFEE AGROFORESTRY FARMER GROUP IN SUMBERJAMBE SUBDISTRICT, JEMBER DISTRICT, EAST JAVA, INDONESIA

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ABSTRACT

To increase the added value of coffee, the Santusa II Forest Farmers Group has developed cardamom coffee as a herbal coffee drink. This condition opens up opportunities for the realization of coffee agro-industry startups that will increase farmers' income in Sumberpakem Village, Sumberjambe District, Jember Regency. This study aimed to analyze internal and external conditions and formulate and recommend a cardamom herbal coffee agro-industrial business development strategy for the Santuso II Forest Farmers Group in Jember Regency. The method used in this research is the interview method using a questionnaire. The interview data were then analyzed to obtain a strategy formulation using the analysis of Strengths, Weaknesses, Opportunities, Threats (SWOT). Furthermore, a business model is designed using the Business Model Canvas (BMC) with nine business components for business development and continued using the Quantitative Strategy Planning Method (QSPM). The results showed that there were 8 (eigth) strengths, 12 (twelve) weaknesses, 6 (six) opportunities, and 3 (three) threats. The weighting and rating results show that the weighted value for the Internal Factor Evaluation (IFE) matrix is 2.89 and the External Factor Evaluation (EFE) matrix is 3.45. This value indicates a strong position in the Internal-External (IE) matrix with an intensive strategy or an integrative strategy. Based on the QSPM matrix analysis, the alternative priority strategy is promotion effectively and intensively by looking at broader opportunities through the marketing channels for similar products (herbal coffee) which are very rare in the market.

Keywords: Strategy, agroindustry, cardamom coffee, herbal coffee

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EFFECT OF PRUNING AND FERTILIZATION ON CONTENT OF SOME MACRONUTRIENTS AND HORMONES IN LEAVES OF REWATERED CITRUS TREES

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ABSTRACT

Rewatering or re-hydration is very important to continue the flower induction of citrus trees after a period of drought stress. There are some changes in the rewatered citrus trees, among others are content of nutrients and hormones. An experiment was conducted to study the effects of pruning and fertilization on content of some macronutrients and hormones in leaves of rewatered citrus trees. The research was conducted in a citrus orchard in Purbalingga, Central Java, Indonesia from June until October 2018. There were two observed factors , namely pruning intensity (0, 5, 10, and 15% of total number of branches each tree) and doses of fertilization (0, 2, and 4 % of weight of harvested fruits at previous season). The research used Randomized Completely Block Design and three replications. Observed variables were content of N, P, K, IAA, GA3, and C/N ratio. The result of research showed that pruning intensity of 5% increased content of total K, IAA, and C/N ratio. This increase was related with flower induction of citrus after rewatering. High content of K and IAA, and high C/N ratio were required to induce the flowering of citrus trees. Doses of fertilization did not influence all observed variables.

Keywords: citrus, rewatering, macronutrients, hormones

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CHARACTERIZATION AND DISTRIBUTION BANANA BUNCHY TOP DISEASE ON SUMATRA WILD BANANA AT BENGKULU

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ABSTRACT

Banana Bunchy Top Virus (BBTV) has been constraining greatly on banana production worldwide. In the field, this virus infection is mostly found in edible banana, but not yet reported in the wild one. This study was aimed to know the cultivar of wild type banana which could be infected by BBTV either on natural and artificial infection. Survey has been done in Bengkulu Sumatra Island in order to collect the banana wild type which showed the BBTD symptom and to collect their seed. Artificial inoculation has been done to confirm their susceptibility. The result showed that based on the morphological symptom in the wild, *Musa acuminata* cv. *sumatrana* was found naturally infected by BBTV. The BBTV was 98% closed to BBTV Taiwan, Philippine, Sumatera and Indonesia. Artificial inoculation has been done using BBTV isolate from cultivar Mas (AA). It showed that *M acuminata* cv. *longipetiolata* and *M acuminata* cv. *malaccensis* could be infected by BBTV and showed the specific symptom of BBTD on 3 weeks after inoculation (40%) and 11 weeks after inoculation (20%) respectively. *M acuminata* cv. *anonymous* infected on the week 13th meanwhile *M acuminata* cv. *halabanensis* was free from BBTV up to 13 weeks after inoculation.

Keywords: BBTV, BBTD, Wild Banana

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EVALUATION OF CHILI CULTIVARS FOR RESISTANCE AGAINST *THRIPS* SP. (THYSANOPTERA: THRIPIDAE)

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ABSTRACT

Thrips parvispinus Karny (Thysanoptera: Thripidae) is one of chili pests that can cause significant crop damage by 12-74% and be even more harmful due to its ability to transmit virus. The use of resistant variety is one sensible strategy to control this pest attack. Thirty chili cultivars were evaluated for resistance by weekly counting of the number of pest dan and recording leaf damage. The evaluation was conducted in the Research Field Station of Indonesian Vegetable Research Institute, Lembang, West Java from March to July 2020. Ten of the 30 cultivars had very little leaf damage and were considered to be used for resistant chili breeding program to *Thrips* sp.

Keywords: *Capsicum annuum* L., *Thrips* sp.

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OPTIMIZATION OF SIMPLE SUGAR EXTRACTION OF NAGARA BEAN (*Vigna Unguiculata ssp. Cylindrica*) ON CONCENTRATION AND PROPORTION OF ETHANOL

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ABSTRACT

Nagara bean, the native bean in South Kalimantan, is not only contains carbohydrates and protein, but also contains oligosaccharide fractions such as raffinose and stachiose which can cause flatulence. Raffinosa Family Oligosacharide (RFO) is an undigested carbohydrate that is naturally found in beans. The presence of the oligosaccharide fraction can be identified through the reducing sugar and total sugar content in nagara bean. The yield of this fraction really depends on the type of material and the extraction method used, such as the type of solvent, solvent concentration, contact time and extraction temperature used. This study was aimed to optimize the extraction of simple sugar fractions on nagara bean at the concentration of ethanol and the ratio of nagara bean flour to ethanol using the Response Surface Methods (RSM). Optimization was carried out at the center point ethanol concentration of 50% and the ratio of nagara bean flour and ethanol of 1: 10. The optimization results of the extraction process were obtained at a ethanol concentration of 50.88% and a ratio of nagara bean flour to ethanol of 1: 10.08, this condition is not much different from the center point set. At this point of extraction conditions obtained the reduction sugar content of 3.25%, the total sugar of 3.92% and the degree of polymerization of 1.25.

Keywords: nagara bean, optimization, reducing sugar, total sugar, Respon Surface Methods.

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EVALUATING FARMERS' KNOWLEDGE, PERCEPTIONS AND PRACTICES IN MANAGING INPUTS OF MAIZE FARMING IN MAJALENGKA

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ABSTRACT

Majalengka is one of the corn-producing centers in West Java, but the average maize production in Majalengka is only about 8.5 tons, while the optimal corn production can reach 10-12.5 tons. This shows that the use of production inputs is still not optimal, this can be seen from the low actual production compared to potential production. This research was conducted using a structured questionnaire to 150 maize farmers to evaluate the knowledge, perceptions, and management practices of the use of production inputs. The results showed that the planting area, spacing, number of seeds, fertilizers, and labor had a significant effect on maize production, but in terms of the use of the variables of planting area, use of seeds, spacing, and fertilizers was still not optimal while the use of labor and drugs. not optimal. Therefore, it is necessary to develop the expansion of the maize planting area followed by an increase in labor and a reduction in the use of medicines to optimize the use of inputs and encourage increased productivity of maize. Besides, it is also seen that in the use of input, farmers are still guided by hereditary farming activities from the family and not on the use of standard maize farming needs. Besides, the use of production inputs also greatly affects the input price and the availability of farmer capital.

Keywords: Maize, farmer perception, production, inputs

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PHYSICAL QUALITY CHANGE IN ORANGE FRUIT (RGL VARIETY): EFFECTS OF DIFFERENT TEMPERATURES IN STORAGE

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ABSTRACT

RGL citrus fruits are a superior horticultural commodity in Bengkulu Province. Horticultural commodities generally have a short shelf life and are easily damaged. Furthermore, special treatment is needed so that the quality does not decrease and remains fresh to consumers. This study aims to study the proper storage temperature to extend the shelf life of RGL oranges. The assessment was carried out from May to June 2019 at the Bengkulu BPTP Postharvest Laboratory. The design used was a factorial Completely Randomized Design (CRD) consisting of a combination of washing treatments (washing with water, washing with fruit washing liquid), storage time (5, 10 and 15 days) and storage temperature (room temperature and 10oC) with three repetitions. The parameters observed were changes in weight loss, diameter and height of RGL oranges during storage. Data were analyzed using ANOVA and continued with the DMRT level of 5%. The results showed that the washing treatment and storage temperature had a significant effect on weight loss of RGL oranges at the 95% confidence level ($P < 0.05$). Furthermore, the interaction between washing treatment and storage temperature had a significant effect on weight loss of RGL oranges during storage but did not significantly affect the height and diameter of RGL oranges at the 95% confidence level ($P < 0.05$). Based on the Duncan analysis, washing treatment with fruit washing liquid solution and stored at 10oC could inhibit the weight loss of RGL citrus fruit more effectively than other treatments, sequence 8.58% and 13.06% at storage for 10 and 15 days.

Keywords: RGL Citrus, Physical Change Quality, Different Temperature, Storage

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ESTIMATING SOWING DATE AND YIELD OF RAINFED RICE IN LOMVOK ISLAND OF WEST NUSA TENGGARA PROVINCE USING WERISE (WEATHER-RICE-NUTRIENT INTEGRATED DECISION SUPPORT SYSTEM)

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ABSTRACT

WeRise stands for ***We**ather-**Ri**ce-nutrient integrated decison **s**upport syst**e**m* which is a computer based tool that developed by IRRI (*International Rice Research Institute*). WeRise is useful to estimate sowing date and potential yield specific for rainfed rice. Objective of this study is to assess usefulness of WeRise recommendation on timing for sowing and yield of Gogo Rancah yield on Central Lombok rainfed. Experiment conducted during Gogo Rancah season from October 2018 to April 2019 with four different sowing date that was 15 November (T1), 25 November (T2), 5 Desember (T3), dan 15 Desember (T4). Rice var. Inpari 39 sown in Randomized Block Design arrangement that replicate to three farmers fields. In results, yield of Inpari 39 was 3.53 t/ha, 4.01 t/ha, 2.91 t/ha, dan 5.08 t/ha for T1, T2, T3, and T4 respectively. Accuracy of that yield was close to WeRise's estimation at 96.30%, 93.99%, 67.63%, and 80.76% for each sowing date. All in all, WeRise was accurate in estimating sowing date and potential yield of gogo rancah rice at Central Lombok rainfed. Further assessment on WeRise accuracy is important to explore, mainly for series of seasons and in another rainfed location.

Keywords: Gogo Rancah, WeRise, Sowing Date, Prediction, Rainfed

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DETERMINANTS OF FARMER BEHAVIOR IN USING INPUT PRODUCTION: EMPIRICAL STUDY ON RED CHILI FARMING

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ABSTRACT

The use of inputs that are in accordance with the farm scale will certainly be able to provide optimal red chili farming productivity. This study tries to identify the application of the use of production inputs in accordance with standard operating procedures (SOP) and the factors that influence farmer behavior on the implementation of the use of production inputs. Data were collected using a survey method of 150 red chili farmers in Garut Regency. The results showed that the level of input application in accordance with standard operating procedures (SOP) was still low. There are several main factors that encourage farmers to use input, namely habits, farmer perceptions (expectations of production results), the role of extension workers, risk-taking, and self-confidence, while inhibiting factors include input availability, input prices, education and age. Support for extension activities is needed to increase farmers' knowledge and skills in cultivating red chilies in accordance with standard operating procedures (SOPs) so that optimal productivity can be achieved and increased farmer market opportunities.

Keywords: red chili, behavior, input production, SOP

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DEVELOPMENT OF SHORT-TERM EVAPOTRANSPIRATION FORECASTING MODEL USING TIME SERIES METHOD FOR SUPPORTING THE PRECISION AGRICULTURE MANAGEMENT IN TROPICS

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ABSTRACT

Open field tropical horticulture production is highly affected by the uncontrollable environment. Nowadays, climate change intensifies unpredictable weather and unstable climate distribution. The precision farming approach was introduced by the utilization of on-site environmental monitoring system to support the decision-making process for the daily operations. Evapotranspiration (ET) is the sum of evaporation and transpiration from the soil surface and plant tissue that can be used to assess the water loss behavior in open-field cultivation. In order to support the daily farm management, it is necessary to have a short-term evapotranspiration forecasting to predict n-hour step ahead. The objective of this study was to develop a short-term evapotranspiration forecasting model using time series method. The model is based on the Seasonal Autoregressive Integrated Moving Average (SARIMA). The environmental data of air temperature, relative humidity, and solar radiation, observed at Rejeki Tani Home Farming Yogyakarta on January to August 2014, were used for the data-sheet. The ET was estimated using the FAO56 Penmann-Monteith. A suitable parameter of non-seasonal autoregressive order (*p*), the degree of differencing (d), moving average order (q), and their seasonal parameters (*P, D, Q*) were investigated to predict 12-hour ahead of ET. As the result, the suitable parameter was SARIMA (2,1,2) (1,1,1) 24. From the six months model validation with the different monsoon, the MAE and RMSE were ranges from 0.035636 to 0.063419, and 0.045893 to 0.079961 respectively. The R2 was between 0.8045 and 0.85902. The developed forecasting model can be used to predict the hourly evapotranspiration with the acceptable error and accuracy.

Keywords: precision farming, short-term forecast, time series, sarima, tropical agriculture

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REVIEWING PORTRAITS OF COASTAL USER COMMUNITIES IN THE SEGARA ANAKAN AREA

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ABSTRACT

The change in the landscape in Segara Anakan is due to the long-standing sedimentation process. Until now, the area of Segara Anakan waters continues to decrease. The sedimentation process also affects the life habits of Segara Anakan residents. The livelihoods of residents who were previously based on capture fisheries have turned into rice farmers. Other changes also occur in terms of the "status" of land ownership, which was originally shared by utilizing aquatic resources, because of the emergence of new heap / agricultural areas, ponds, and settlements, the "status" changes to private property. At present, the waters of Segara Anakan are used by residents to catch fish together. As a "jointly owned" fishing area, fishers from Segara Anakan jointly catch fish, without thinking about the environmental impact. Fishers in this area use Apong nets as fishing gear. Although this fishing gear is a type of passive fishing gear, the Apong net material is made of small diameter trawl nets so that various types and sizes of aquatic animals can be trapped by this tool. Competition and negotiation between the actors and the community of resource users subsequently lead to differences in obtaining benefits between actors as natural resources users without having to control or own property.

Keywords: fishers, farmers, coastal user, communities, property

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ANALYSIS OF CONSERVATION INDEX AND ECONOMIC DEVELOPMENT OF NORTHERN BANDUNG AREA

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ABSTRACT

The area around the North Bandung Region (KBU) in the West Java Province's Regional Spatial Plan is positioned as a Provincial Strategic Area that plays a vital role in handling the environment and recharger area. In fact, along with the development of activities in KBU, there have been changes in land use, commercial economic activities, and settlements. The higher the interventions of economic activities, crop cultivation, and the development of built residential areas, the higher growth and high acceleration creates dynamics and complexity of regional innovation. This article analyse the carrying capacity of the environment, the level of land suitability, and the conservation index of the KBU region, and the agriculture economic developments that have emerged in this region. The results of the study found that the lower the conservation index of the area, the higher the condition of the degraded land area, in line with the increased activity of built land and economic growth in the region. Changes the conservation index and economic growth in KBU have implications for the handling of agriculture cultivation, and spatial control seriously in order to overcome environmental degradation, land use change, and local economic distortion. The study recommend a spatial use program, action plan, and spatial control instrument of KBU include consideration of aspects of environmental sustainability, local wisdom, and local economic benefits.

Keywords: conservation-index, economic, growth, spatial, sustainability

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EFFECTS OF GAMMA IRRADIATION ON CITRUS BUD SPROUT TO PRODUCE NEW GENOTYPES

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ABSTRACT

This research aimed to evaluate the effects of gamma irradiation on bud sprout of four citrus varieties subjected to obtain mutations induced in citrus with improved genotypes. This study was carried out during two successive seasons (2019 and 2020). The experiment site was arranged in a factorial randomized complete block design with four replications. Tawangmangu, Siam Madu, Trigas and Rimau Gerga Lebong (RGL) bud sticks of about 20 cm of length obtained from the new flushes including 5 – 7 buds were selected from a five years old plant. The Cobalt-60 type was used as gamma cell source and the dose level were 0 (control) and 6 grad. Radiated bud sticks were grafted onto Chokun as rootstock. Its effects were evaluated through the response of the different measurement, such as : survival %, lethality %, internode length (cm), internode number, leaf number, leaf area (cm^2), and leaf greeness. The result revealed that all mutant had lower survivol % and higher lethality % than that of non-radiated one. There were 54 Mutants; consisted of 6, 17, and 31 mutant derived from RGL, Trigas and Tawangmangu varieties, respectively. Gamma radiation resulted in the decrease of all vegetative growth with one except internode number.

Key word: mutant, citrus, gamma radiation, bud sprout

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EFFECT COMBINATION OF CHEMICAL FERTILIZER AND ORGANIC FERTILIZER ENRICHED WITH FUNCTIONAL MICROBES ON THE GROWTH AND YIELDS OF SHALLOT (*Allium Cepa* L.)

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ABSTRACT

The shallot plant is an important vegetable crop in Indonesia. In an effort to increase production, it is common for farmers to use chemical fertilizers and organic fertilizers. Most farmers prefer to use chemical fertilizers because of their significant effect on plant growth. Long term use in high amount of chemical fertilizers can caused serious impacts on the environment. The aim of this research is to determine the proper dosage of organic fertilizers which can reduce chemical fertilizers. The research was conducted in the land of farmers in Tawangargo village, Karangploso district, Malang Regency. The organic fertilizers tested were organic fertilizers powder enriched with N-fixing bacteria and P solvent bacteria. The research used a randomized block design with the treatment being a combination of organic fertilizers and chemical fertilizers. The dose of organic fertilizer enriched with functional microbes is set at 2 t / ha, while the dose for chemical fertilizer is a combination of 600 kg / ha NPK + 200 kg / ha SP36 + 400 ZA + 100 kg / ha ZK (total amount 1300kg / ha). Combinations were prepared by arranging organic fertilizers enriched with functional microbial and chemical fertilizers at ranges of 100%, 75%, 50% and 25% of the standard dosage. As a comparison, local farmers used organic fertilizer from cow manure and without fertilization as a control treatment. The effect of the treatment was concluded by means of a 5% analisis variance, different treatments were arranged by using Duncan's multiple range test at 5% level. The effectiveness of fertilizer combinations was assessed by RAE which is the ratio of yields on each treatments minus yields of standar treatmen divided by yield on standard treatment minus yields on control treatment. The results showed that 2 t/ha of organic fertilizer enriched with functional microbes combined with a reduction in chemical fertilizers of 75% (equivalent to 975 kg / ha of chemical fertilizer mixture) and 50% (equivalent to 650 kg / ha of chemical fertilizer mixture) resulted in plant height, number of tillers, number of leaves, number of tubers, yield of wet and dry tubers are the same as the standard 100% dose of chemical fertilizers. Reducing the dosage of chemical fertilizers by 25% from the standard dose will reduce the growth and yield of red bawnag plants. Standard dose 100% chemical fertilizer (1300 kg / ha) + 100% standard dose (2 t/ha) microbial enriched organic fertilizer increased RAE 2% compared to farmer control. With a dose of 2 t/ha of organic fertilizer enriched with functional microbes, it is able to provide results equivalent to local organic fertilizer of 10 t/ha. Organic fertilizers enriched with functional microbes are more effective than local organic fertilizers from cow totoran. The combination of chemical fertilizer 75% standard dose + organic fertilizer enriched with functional microbe 100% dose has a RAE value of 88% classfiied as high but still below combination of chemical fertilizers and 100% micro-enriched organic fertilizers.

Keywords: shallots, growth and yield, organic fertilizers, chemical fertilizers, RAE

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GROWTH AND YIELD OF SHALLOTS (ALLIUM ASCALONICUM L.) LOKANANTA IN VARIOUS DOSES OF NITROGEN FERTILIZERS AND NUMBER OF PLANTS PER HOLE ON COASTAL SANDY LAND

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ABSTRACT

The purpose of this research is to: 1) determine the effect of various doses of N fertilizer on the growth and yield of shallots, 2) determine the effect of the number of plant per hole on the growth and yield of shallots, and 3) determine the effect of interactions between various doses of N fertilizer and the number of plant per hole on the growth and yield of shallots. The research is conducted from August until November 2019 in the coastal sand land of Karanganyar Village, Adipala Districts, Cilacap regency. The research design used a Randomized Complete Block Design (RCBD) with two factors. The first factor is various dosis of N fertilizer (P) consisting of 3 levels, P1= 90 N kg/ha, P2= 180 N kg/ha, and P3= 270 N kg/ha. The second factor is the number of plant per hole (T) consisting of 4 levels, T1= 1 plant/hole, T2= 2 plant/hole, T3= 3 plant/hole, and T4= 4 plant/hole. The variables observed were plant height, number of leaves, leaf area, chlorophyll content, stomata opening width, stomata density, fresh and dry leaf weight, fresh and dry root weight, fresh and dry tuber weight, fresh and askip tuber yield, root length, number of roots, number of tubers, and tuber diameter. The data obtained were analyzed using F test if there is diversity followed test by Duncan Multiple Range Test (DMRT) of 5% level. The results showed that: 1) Giving a dose of N fertilizer up to a dose of 180 kg/ha was able to show higher growth of plant height and density of morning and evening stomata, with plant height growth of 25.78 cm, density of morning stomata 71.86 /mm², and evening stomata density 67.03 /mm². Effect of dose of N fertilizer on fresh tubers yield of 8.48 t/ha. 2) The number of plants per hole shows different growth and yields. The number of 1 plant per hole shows a higher yield of tuber diameter of 4.68 cm, the number of 2 plant per hole shows a higher growth of plant height of 25.67 cm, and the number of 4 plant per hole shows a higher growth toward the number of leaves is 9.38 strands, the number of roots is 73.56 strands, and the number of tubers is 4 pieces. The effect of the number of plant per hole on fresh tubers yield of 8.48 t/ha. 3) The interaction between the dose of N fertilizer with the number of plants per hole has not been able to show the growth and yield of shallot plants.

Keywords: Shallot, doses og nitrogen fertilizer, the number of plants per hole, coastal sandy land.

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EFFECT OF LIMING TO THE HERB AND QUERCETIN YIELD OF *Sonchus arvensis* L.

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ABSTRACT

Sonchus arvensis L. is an Indonesian traditional medicinal plant, commonly used as a medicinal diuretic herb and to kidney stones problems. The aim of this research was to obtain optimal yield of sonchuz herb (simplicia) and flavonoids (quercetin), cultivated on Cimanggu Latosol soil (245 m asl.) as an acid soil, in Bogor, West Java, through the application of dolomite. Randomized block design was used with single factor, repeated 5 times, with the factors tested were liming applications consisting of 5 doses of dolomite, namely: a). control, 2). 1 t dolomite/ha, 3). 2 t of dolomite/ha, 4). 3 t dolomite /ha, and 5). 4 t dolomite/ha. The plant spacing used was 50 cm x 50 cm, with a plot size of 5 m^2. The results showed that liming significantly affected the fresh and dry weight of sonchuz leaves. The quercetin content ranged between 0,61% to 0,84%. The application of 3 t dolomite/ha produced the highest leaf dry weight of sonchuz, while the highest quercetin yield was obtained from the application of 2 t dolomite/ha. The highest uptake of macro nutrients was potassium, followed by nitrogen, calcium, magnesium and phosphor, respectively.

Keywords: *Sonchus arvensis* L, liming, yield, quercetin

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INCREASING YIELD AND BENEFIT OF LOCAL GARLIC VAR. SANGGA SEMBALUN IN DIFFERENT PHOSPHORUS BASAL FERTILIZER RATE

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ABSTRACT

Basal fertilization purposed to increase soil fertility and available nutrient for plants. Nitrogen and phosphorus are critical determinant of plant growth and productivity. This study was carried out to determine effect of different phosphorus basal fertilizer rate to yield and benefit for local garlic farmer at Sembalun Higland of West Lombok District, Indonesia. The on-farm experiment was conducted from June to October 2019 where local garlic variety named Sangga Sembalun grown in randomized complete block design (RCBD) with four superfosfat rate at 200t/ha (T1), 300t/ha (T2), 400 t/ha (T3), and 500 kg/ha (T4). Each treatment was replicated in five plots (10 m^2). The results showed that yield component (dry biomas weight, neck diameter, bulb diameter, weight of bulb from average of 15 samples) was significantly higher following increase on fertilizer rate. Although the plot yield was not significant between treatments, there was tendency plot yield was increasing at 2.85 kg/m, 3.23kg/m, 3.69kg/m, and 3.71 kg/m for T1, T2, T3, and T4 respectively. Based on plot yield conversion into productivity, RC ratio for fresh garlic was 2.04 (T1), 2.36 (T2), 2.75 (T3), and 2.67 (T4). Benefit was increasing after sun dried for a month at 2.34, 2.66, 3.02, and 3.03 for each treatment at the same order.

Keywords: Sangga Sembalun, garlic, superfosfat, basal fertilizer

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STUDY OF THE SOIL CHEMICAL PROPERTIES, SULFUR DISTRIBUTION AND THE YIELD OF RICE PLANT IN RAWALO DISTRICT, BANYUMAS REGENCY

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ABSTRACT

The objectives of this study were to: 1) determine the chemical properties of soil distribution of sulfur nutrients in the rice fields of Rawalo District, Banyumas Regency and 2) to determine the relationship between sulfur and soil organic C of lowland rice with yields of plant in Rawalo District, Banyumas Regency. The research was conducted in the rice fields of Rawalo District, Banyumas Regency. The research method is survey. Determination of observation locations based on LU (Land Units) Maps of Rawalo District with a scale of 1: 50,000. Determination of sample points at each LU, taking into account their proportional distribution, following a modified grid method. Soil samples were taken in a composite manner at each observation location. Variables of soil chemical properties include pH (H2O), pH (KCl), EC, redox potential, C-organic, S available of soil and plant yields. The results showed that the pH (H2O) shifted between 5.74-7.45 or including slightly acidic to neutral, EC less than 4,000 µS/cm or very low, redox potential ranging from 197-383 mV or moderately, soil organic C ranging from 1.36 - 3.83% or low to high, S available ranging from 91-197 ppm SO_4 or moderate to high, the C-organic content of the soil had an effect on crop yield by 1.68%, while S available soil had an effect of 10.37%.

Keyword: soil chemical properties, sulfur, lowland rice

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INFLUENCE OF VARIETIES, PLANT SPACING AND MANURE FERTILIZER TO MAIZE PRODUCTIVITY IN DRY LAND

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ABSTRACT

Cultivation of maize on dry land is faced with problems of soil fertility and water availability. In this regard, an assessment was carried out in the dry land of Cerme village, Ngimbang district, Lamongan district (85 m asl) during the MK I season from February to June 2019. The experiment used a split split plots design with 3 replications. As the main plot was the hybrid varieties namely HJ 21, Bima 19 and NK 212; as a sub plot was the plant spacing i.e. double row "*jajar legowo*" 90 x 50 x 20 cm and farmers habitual 60 cm x 30 cm; and sub-sub plot was the application of organic manure fertilizer i.e. 2 tons/ha and without organic manure fertilizer. The results of the study showed that there was no interaction between the three factors tested. Each factor has a free effect on the variables observed. The result showed that each treatment of both NK 212 varieties, doble row plant space and organic fertilizer application had a real effect on plant growth and yields. The highest yield was obtained in the treatment of NK 212 varieties about 8.51 tons/ha. Double row plant spacing treatment can increases the yield up to 16.26% and organic fertilizer treatment can increase yields only 5.7 %

Keywords : corn, dry land, varieties, planting distance, organic fertilizer, productivity

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PHYSICAL CHARACTERISTICS OF HEAT RESISTANT DARK CHOCOLATE MADE WITH THE ADDITION OF COCOA BUTTER REPLACER AT SEVERAL DURATIONS OF CRYSTAL MATURATION

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ABSTRACT

Dark chocolate which is made from 100% cocoa has melting point in the range of 33-34℃. Due to this, dark chocolate made from 100% cocoa easily melts at room temperature. The melting point of dark chocolate can be increased by adding Cocoa Butter Replacer (CBR). The aim of this study was to examine the impact of CBR on the several characteristics of dark chocolate, including moisture content, particle size, density, color, hardness, and melting point. Proportion of CBR used on this research were 0%, 70%, 75%, 80%, 85%, and 90% , while duration of crystal maturation applied were 1, 2, 3, 4, 8 and 12 day. The results showed that the more CBR was added, the higher the values of hardness, L*, a*, b* and melting point were observed. The longer the duration of crystal maturation, the lower the values of hardness, L* and melting point.

Keywords: Heat resistant chocolate, cocoa butter replacer, dark chocolate, chocolate characteristics, melting point

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PHYSICAL CHARACTERISTICS OF CHOCOLATE MADE WITH COCOA BUTTER REPLACER (CBR) AND COFFEE POWDER

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ABSTRACT

Melting temperature of chocolate made with 100% cocoa butter has low melting temperature at 33-34^{0}C. Cocoa butter replacer (CBR) can be used as an alternative for cocoa butter to increase the melting point. The purpose of this research was to examine the effect of CBR proportion and duration of crystal maturation on the characteristics of chocolate. The ratio of cocoa butter : CBR used in this research were 1:9; 1,5:8,5; 2:8; 2,5:7,5; 3:7 and 100:0. In order to understand the role of solid particles, coffee powder was partially used to replace the cocoa powder. The ratio of coffee powder and cocoa powder used was 3:1. After production, the chocolates were moulded, stored and tested on the day of 1,2,3,4,8,12. The parameters evaluated in this research were hardness, color, melting point, density, water content, and particle size. The results showed that CBR proportion, duration of maturation, and their interaction affected the hardness, color (L*, a*, b*), and melting point. The higher the CBR proportion, the brighter color, the higher the hardness, and the higher the melting point. The longer the duration of maturation, the brighter the colour, the higher the hardness , and the lower the melting point.

Keywords: coffee powder, cocoa butter replacer, chocolate characteristics, melting point, hardness

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PHYSICAL CHARACTERISTICS OF CHOCOLATE COMPOUND MADE WITH VARIOUS FLAVOURING AGENT PRODUCED USING MELANGER AS A SMALL SCALE CHOCOLATE PROCESSING DEVICE

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ABSTRACT

Chocolate bars usually use cocoa with or without milk as the basis for making chocolate. Innovative chocolate was developed in this study by replacing all cocoa with or without milk solids with three different powders, namely ginger powder, coffee powder, and fruit flavored powder which was combined with the use of cocoa butter substitute to increase the melting point of chocolate. An alternative processing for chocolate (using a melanger) was used in this study. Various types of solids (ginger, coffee, mango flavored powder drinks) and fat content (34%, 36%, and 38%) were used as independent variables. The physical characteristics of chocolate evaluated were moisture content, color, hardness, melting point and particle size. Evaluation of the color, hardness, and melting point were carried out on the day 1, 4, 7, 10, and 13. The results showed that the replacement of all cocoa with or wihout milk solids with three different powders affected the value of moisture content, color, hardness, melting point, and particle size. Moisture content (wb), particle size, and color were directly affected by the original color of the material. Duration of maturation had an effect on the increase of the hardness and decrease of the L * value. However, duration of the maturation had no effect on the melting point of chocolate.

Keywords: chocolate, cocoa butter substitute, ginger powder, coffee powder, fruit flavored powder drink.

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PHYSICAL PROPERTIES OF HEAT RESISTANT RED VELVET COMPOUND CHOCOLATES SWEETENED WITH STEVIA AND INULIN AS AN ALTERNATIVE SWEETENER

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ABSTRACT

The ingriedients of chocolate in general are cocoa butter, sugar, and cocoa powder/cocoa mass. However, in this study, *Cocoa Butter Substitute* (CBS) was used to increase the value of melting point. Stevia and inulin were used to reduce calories in chocolate. Red velvet powder was used as flavoring agent. The purpose of this study was to examine the physical properties of *red velvet* chocolate sweetened with an alternative sugar as heat resistant chocolate (HRC). Three variable that used are the propotion of *stevia* (15%, 30%, and 45%), fat content (34%, 36%, and 38%) and crystal maturation duration (day 1,4,7,10, and 13). Physical properties to be tested were water content, particle size, color (L*, a*, b*, hue and chroma), hardness, and melting point. The result showed that the proportion of *stevia* and variation of fat content significantly affected the characteristics of each chocolate sample. The highest proportion of stevia produced chocolate with the lowest moisture content. Chocolate sample had a moisture content in the range of 0.78-1.49%. Particle size was inversely proportional to the water content, which was in the range of 59.71-86.64 µm. Color of chocolate was directly affected by the original color of the material. Likewise with the value of hardness and melting point which was affected by the proportion of *stevia*. During maturation, the L color of chocolate decreased, the hardness changed fluctuatively but tended to increase, and melting point did not change significantly.

Keywords: chocolate properties, stevia, inulin, cocoa butter substitute, red velvet powder.

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PHYSICAL CHARACTERISTICS OF INSTANISED CHOCOLATE BEVERAGE POWDER PRODUCED WITH PALM SUGAR AND SUCROSE AS SWEETENERS.

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ABSTRACT

Cacao has a lot of potential in Indonesia. Chocolate beverage is a derivative product from cacao which is popular especially in the form of cold chocolate beverages. Cold chocolate beverage is delicious yet appropriate for Indonesia's tropical climate. One of the problems is hot water is needed to make a chocolate beverage. Agglomeration process with steam agglomeration is one of methods to increase the solubility of instant chocolate beverage powder. The advantages of steam agglomeration are easy to use and cheap to make. Sweeteners is added to increase chocolate beverage's and taste. This research is conducted to investigate the use of continuous and batch steam agglomerator toward the characteristics of instanised chocolate beverage powder which was sweetened with 45% of sugar in various time of drying duration. Palm sugar and sucrose are used as the sweeteners. The result showed that agglomeration process increased the physical, flow and instanised characteristic of chocolate beverage powder. The moisture content of instant chocolate powder after the drying process met the SNI 3747 standard which was below 5%. In conclusion the characteristics of instanised chocolate beverage powder which were agglomerated with continuous steam agglomerator were better than the one agglomerated with batch steam agglomerator.

Keywords: instant chocolate beverage powder, jet steam agglomeration, solubility, instanised cocoa drink

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PHYSICAL CHARACTERISTICS OF INSTANISED COCOA DRINK FORMULATED WITH THE ADDITION OF MALTODEXTRINE PRODUCED USING CONTINUOUS-TYPE STEAM JET AGGLOMERATOR

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ABSTRACT

Cocoa drinks are in great demand by consumers, considering that Indonesia has a high temperature. The purpose of this study was to examine mathematically, the characteristics of instanised cocoa powder made using continuous-type steam jet agglomerator. The variables used in this study were fat content (11%, 27%, and a mixture of both), duration of drying (4, 6 and 8 hours) and maltodextrine content (25%, 30%, 35%, and 40%). The results of this study indicated that the three variables and their interactions affect the characteristics of instant cocoa powder. It can be seen from several characteristics that instanised cocoa powder had higher solubility values (40-65%), lower dispersibility value (3-5%) and greater particle size (0.105-0.107 mm) than those of reference sample (without steam).The best samples obtained from this study was instanised cocoa powder made with 11% of fat content, 8-hour drying duration, and 35% maltodextrine.

Keywords: instant chocolate beverage powder, jet steam agglomeration, solubility, maltodextrine

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THE EFFECT OF COCOA POWDER, MATERIAL THICKNESS AND TIME OF STEAMING ON THE CHARACTERISTICS OF INSTANISED COCOA DRINK POWDER MADE USING BATCH-TYPE STEAM JET AGGLOMERATOR

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ABSTRACT

Cocoa drink is a beverage product made from cocoa powder. However, more effort is needed in its manufacture to dissolve the cocoa powder because the fat content of cocoa powder is quite high. Agglomeration process with *steam* is one of the methods to produce cocoa powder that dissolves easily in water. This research aimed to examine the effect of variations in the material of cocoa powder, the thickness of the material, and steaming time on its characteristics. Variations in cocoa powder material consist of C cocoa powder dan P cocoa powder, variations in the thickness of materials at thicknesses of 1, 1,5, 2 cm, and variations in steaming time at 1, 2, 3, 4, and 5 minutes. The results showed that type of cocoa powder, thickness and steaming duration as well as their interaction influenced the characteristics of instanised cocoa powder. After the agglomeration process, cocoa powder had the following physical characteristics: higher solubility value, lower dispersibility value, lower moisture content, lower L* values, higher a* values, lower b* values, lower bulk and tapped density, higher fineness modulus, and average diameter than those of reference sample. CI value was lower and HR was higher than those of reference.

Keywords: batch-type steam agglomerator, solubility, time of steaming, instanised cocoa drink

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PHYSICOCHEMICAL CHARACTERISTICS OF CHOCOLATE PRODUCED WITH COCOA BEAN AT DIFFERENT LEVEL OF FERMENTATION PROCESS

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ABSTRACT

Dark chocolate is one of the most popular chocolates due to its health benefit offered. One of the factors influencing its health effect is the fermentation process prior to the chocolate making. Fermentation results in cocoa bean with physicochemical changes, such as flavor, cocoa bean structure and antioxidant content. This study aimed to investigate the effect of fermentation level (unfermented, partially fermented, and fully fermented) and maturation on the quality attributes of dark chocolate. The results showed that fermentation, maturation duration and their interaction highly influence the antioxidant content, colour, hardness, melting profile and aroma of the dark chocolate.

Keywords: dark chocolate, antioxidant, quality attributes of chocolate, fermentation

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ENDOPHYTIC BACTERIA: AN EMERGING TOOLS FOR BIOLOGICAL CONTROL BACTERIAL LEAF BLIGHT OF PADDY

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ABSTRACT

Endophytic bacteria were isolated from the root of paddy, not negative influence even could serve as plant growth promoter and pathogen biocontrol likely *Xanthomonas oryzae* pv. *oryzae* caused of bacterial leaf blight. The research was aimed at controlling the endophytic bacteria against bacterial leaf blight of paddy. Methods of this research were suppressing effect to control bacterial leaf blight with seed dipping and soaking the endophytic bacterial suspension on surounding plant in the polibag. Nine bacterial and one control were treatment in this assay and three replicates, arranged with randomize completely block design. Endophytic bacteria isolated from roots of paddy were evaluated for their capacity to suppress bacterial leaf blight intensity, infection rate and AUDPC (*area under disease progress curve*). The result showed that the endophytic bacteria could suppress the disease, and the isolate of SB3 (from Sumbang) is the best for antagonistic effect by 58% effectivity. Infection rate of this disease was slow by 0.024 unit.day^{-1} and different with the control was 0.088 unit.day^{-1}. The AUDPC of this disease with isolate SB3 was lowest level value than other treatment.

Keywords: Biological control, endophytic bacteria, paddy, bacterial leaf blight

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THE EFFECT OF ARGININE ADDITION ON CHEMICAL AND ANTIOXIDANT PROPERTIES OF COCONUT SAP DURING HEATING TREATMENT

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ABSTRACT

Coconut sap is the substance with sweet taste, translucent that is obtained by tapping coconut inflorescence commonly used as raw material of coconut sugar. The chemical compositions, *i.e.* reducing sugar and amino acid on coconut sap are important in generating the brown color and flavor of the sugar produced. The polar amino acid with the positively charged end such as arginine makes it suitable for binding to molecules with many negative charges on their surfaces such as carbonyl groups of reducing sugars. This interaction is called carbonylamino reaction, the initial stage of Maillard reaction. This research aimed to determine the effect of variation arginine concentration on chemical and antioxidant properties of coconut sap during heating process. A 2.5 L of coconut sap obtained was then added with arginine with various concentration of 0,4; 0,8 and 1,2 mM, heated with an open process until the end of process *i.e*. the temperature of 118 ºC of sap was reached. Fifty grams of sap samples was collected when the sap temperature reached of 80, 100 and 118 ^{0}C during heating treatment. The same weight of granulated sugar produced was also collected subsequently. The results showed that the 0.8 mM of arginine concentration and the sap temperature of 100 ºC were the optimum condition to obtain the highest DPPH radical scavenging activity and Fe^{2+} chelating activity *i.e.* 69.93 and 23.78 %, respectively. This condition yielded sap with chemical properties as follows: pH value 6.7; water content 39.18 %; reducing sugar 6.79 %db; sucrose 70.82 %db; total sugar 77.61 %db; free amino acid 0.14 %db; total polyphenol 0.83 %db; and browning intensity 0.105.

Keywords: antioxidant activity, arginine, coconut sap, Maillard reaction

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PHYSICAL AND MECHANICAL PROPERTIES OF PAPER PULP PACKAGING MADE FROM BANANA STALK AND RICE HUSK

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ABSTRACT

Use of non biodegradable packaging has been known to cause environmental problems because the materials can last for centuries polluting soil and water. Therefore, efforts to develop degradable packaging needs to be done. Accordingly, this research was focused on development of biodegradable egg tray using banana stem and rice husks. Objectives of the research were to determine physical and mechanical properties, and to confirm biodegradability level of egg tray made from banana stem and rice husks. The research included 4 steps, i.e. design drawing using coreldraw, packaging moulding (material pulping, formulating and mixing, moulding and drying), objectives testing, and descriptive analysis. The testing were done to determine physical and mechanical properties includes grammage, density, water absorption, tensile strength, elasticity modulus, tear strength, compressive strength, and biodegradable level. Results of the tests indicated that (1) grammage: rice husks= 791.68 g/m2, banana stem= 437.12 g/m2, (2) density: banana stem= 0.45 g/m3, and rice husks= 0.24 g/m3, (3) water absorption: rice husk= 7.5 g/sec, banana stem= 2.4 g/sec, (3) tensile strength: banana stem= 5.2652 MPa, rice husks= 0.0252 MPa, (4) Elasticity modulus: banana stem= 169.84 MPa, rice husks= 298.52 MPa, (5) tear strength: banana stem= 2.0475 MPa, and rice husks= 0.0108 MPa, (6) compressive strength: rice husks= 2.8317 MPa, banana stem= 1.5787 MPa, (7) biodegradable level: rice husk= 17 days, banana stem= 25 days.

Keywords: packaging, biodegradable, pulp, mechanical, properties

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THE ROLE OF COMMUNITY INSTITUTIONS IN UPLAND RICE FARMING IN BANYUMAS DISTRICT, CENTRAL JAVA, INDONESIA

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ABSTRACT

Upland is one of the agro-ecosystems that has great potential for agricultural business, both food crops, horticulture and annual crops. Banyumas District is an area where most of its territory is upland. Ajibarang as one of the Banyumas' sub district has upland area approximately of 70% and rest of 30% is rainfed rice field. One of the success factor of upland rice farming is influenced by how much the farmer's ability to manage production factors into a profitable business and sustained. Community empowerment programs through institutions strengthen have a very important role Keywords: upland, rice, income, community institutions, social capital. in development. Data collection method was using survey method. Simple random sampling technique was done and obtained total sample of 50 farmers. Based on the analysis we could know that the average income of farmers was Rp5,654,000/production process with RCR of 1.36. The role of community institutions in upland rice farming was very important. The social capital was built from family relations in many years ago. The stronger emotional tight among farmer, the higher possibility of the successful community institutions would exist.

Keywords: Keywords: upland, rice, income, community institutions, social capital.

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RICE FIELDS CLASSIFICATION AMONG GOOGLE EARTH SATTELITE IMAGES USING CONVOLUTIONAL NEURAL NETWORK

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ABSTRACT

In agriculture, vegetation classification and mapping are important tasks for agricultural resource planning and management. However, the classification and mapping tasks are traditionally hand crafted by humans since their complexity still needs human intervention. Deep learning methods have become recent artificial intelligent technology for image-based classification. In this paper, we researched the deep learning technology to automatically classify rice fields in Google Earth images. We applied combination of chopped-image method and convolutional neural network to learned the feature of rice field among satellite images in Google Earth. We tested LeNet-5 and VGG-16Net convolution neural network algorithms with those methods and found the algorithms have accuracy 0.993 and 0.992 in rice fields classification respectively.

Keywords: deep learning, rice fields classification, convolutional neural network

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ASSESSING EMERGING AGRIBUSINESS ENTREPRENEURS BY USING BRAINWAVE TECHNOLOGY

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ABSTRACT

Individual attributes are positively influencing the success of entrepreneurs. There should be a way that enable potential youths' entrepreneurs to learn and acquire these attributes that make them successful entrepreneurs. Potential entrepreneurs need to be mentored in relevant business skills that can enable them survive in the business environment. To address this, we introduce Electroencephalography (EEG) or Brainwave to investigate the level of attention and meditation of the students in entrepreneur skill and to develop an original approach to entrepreneurship learning around innovation. To do so, we constructed a Keywords: upland, rice, income, community institutions, social capital.n integrated system of EEG brainwave, in which each participant could be engaged in a virtual product design activity. The participant's creative behavior, brainwave state, and the level of creativity of their virtual product could be observed and recorded simultaneously to further understand the creative process, and their creative product could be evaluated afterwards. The experiment was involving 20 students of agribusiness study program from different semester. The result of the students' exam is compared to their level of attention and meditation, and analyzed. The experiment showed "attention" is dominated more on to keep the brainwave technology work rather than to explore on many entrepreneur paths explained by the teacher. Further investigation was showing the difference of entrepreneur thinking's priority from before experiment and after experiment, i.e. creativity-risk taking-decision making into risk taking-creativity-decision. It happened since the students had differ perception on how become the successful agribusiness entrepreneurs after the experiment.

Keywords: entrepreneurs, agribusiness, brainwave, attention, meditation.

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DEVELOPMENT STRATEGY OF RICE BUSINESS "INPAGO UNSOED 1" USING BLUE OCEAN STRATEGY

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ABSTRACT

The low interest of farmers to plant upland rice is due to the low productivity of the rice and the quality of the rice that is not aromatic. This resulted in upland rice being disliked by farmers and consumers. Therefore, the value of upland rice was low and planting upland rice was considered unprofitable. Nevertheless, an upland rice development strategy is needed to increase the added value of upland rice. The Blue Ocean Strategy (BOS) formulation is based on four principles of blue ocean strategy formulation, namely (1) reconstructing market boundaries; (2) focusing on the big picture, not numbers; (3) reaching beyond existing demand; and (4) carry out a strategic series. The analysis results from the four-step framework approach were (1) eliminating the competition for variations in taste and price factors from producers or agents; (2) reducing competition for health benefits, facilities provided by producers, and distribution systems; (3) increasing hygiene factors, product information, ease of obtaining products, convenience. obtaining seeds, contract system; and (4) creating a partnership or cooperation factor, supporting service facilities for consumers, and product diversification. The three characteristics of BOS that are good for recommendations on the rice business "Inpago Unsoed 1" are (1) focusing on creating new market space (blue ocean), increasing the amount of demand, and creating value for buyers, (2) creating divergences on the strategy of the canvas value curve by looking at the four-step framework prepared, (3) making a good marketing slogan. Testing the blue ocean strategy idea by considering four elements, namely special utility, price, cost, and adoption. This aims to strengthen the hypothesis that blue ocean strategy made was appropriate and feasible to be implemented.

Keywords: upland rice, Blue Ocean Strategy, business, Inpago Unsoed 1.

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TECHNICAL EFFICIENCY AND FACTORS AFFECTING THE TECHNICAL INEFICIENCY OF DRY ONION AND RAIN IN BREBES DISTRICT

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ABSTRACT

The objectives of this study are: (1) To estimate the production function of shallot farming (2) To analyze differences in technical efficiency and allocative efficiency between the dry and rainy seasons, and (3) to identify the factors that influence technical inefficiency. The Cobb-Douglas Frontier Production Function was used and estimated using the MLE method. The research method used was a survey method, with a purposive random sampling technique. Samples were taken as many as 100 farmers who carry out shallot farming during the dry and rainy seasons. The results showed that: Seed, fertilizer, and labor variables had a positive effect on shallot production. The technical efficiency of farming in the dry season (0.6771) is lower than the technical efficiency of farming during the rainy season (0.7621). The allocative efficiency for each input during the dry season, namely 2.4366 seeds; fertilizer 10.5760, and power 0.6030, while in the Rainy Season the allocative efficiency for seeds is 0.5096, fertilizer is 4.3828, and labor is 0.7003. Factors that influence technical inefficiency are farmer age (positive), experience (negative), and source of farm funds (positive).

Keywords: Frontier production function, technical efficiency, technical inefficiency

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THE INFLUENCE OF LAND TENURE STATUS TOWARDS HIGH-YIELD SALINE RICE PRODUCTION IN PEMALANG DISTRICT, CENTRAL JAVA, INDONESIA

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ABSTRACT

"Inpari Unsoed 79 Agritan" is a new variety of saline rice that can gives higher yield among the others. Besides tolerant of saline land, this seed also tolerant of leafhoppers and pests. "Inpari Unsoed 79 Agritan" seeds are planted in Nyamplungsari Village, Petarukan Sub District, Pemalang District, Central Java for almost 7 years and covering area of 100 hectares. Land is one of the production factors that affect rice production. The objective of this study is to determine the effect of agricultural land tenure status on the production of "Inpari Unsoed 79 Agritan" Purple Label in Nyamplungsari Village. Data collection method was using survey method. Simple random sampling technique was done and obtained total sample of 43. Data analysis was using one-way analysis of variance (One-way ANOVA). Based on the analysis we could know that the amount of "Inpari Unsoed 79 Agritan" Purple Label in Nyamplungsari Village shows a significant difference between non-land owner farmers and land owner farmers. Farmers who are not-land owner get an average yield greater than farmers who own rice fields. Motivation became most important factor while gain recent information had received small amount of attention from the non-land owner farmers to achieve high yield productivity.

Keywords: land tenure, saline rice, Inpari Unsoed 79 Agritan, production.

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KINETICS PHOSPHATE ROCK DISSOLUTION AS AFFECTED BY NH_4^+- AND H^+-CHARGED NATURAL ZEOLITES

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ABSTRACT

The experiment was aimed at investigating the dissolution of phosphate rocks as affected by NH_4^+ and H^+-saturated natural zeolites. The natural zeolite was collected from Cipatujah (West Java, Indonesia). Zeolites was charged with various proportions of NH_4^+ and H^+ (1:0, 4:1, 3:2, 2:3, 1:4, respectively). The phosphate rocks (PR) samples were North Carolina (NCPR) and Ontario (OPR). A 2000-mg sample of PR and zeolite mixtures with a ratio of 1:10 w/w, respectively, was placed in a 50-ml polypropylene centrifuge tube and added with 25 ml nano-pure water. The mixtures were then shaken on a reciprocating shaker at 30^{o}C at 120 cycles min^{-1} for 16 days. The phosphorus solubilized (sodium bicarbonate-extractable P) was determined every 48 hours using Lachat Flow Injection Analyzer (LQFIA). The results indicated that NH_4^+ and H^+-charged zeolite significantly enhanced the dissolution of PR. The P solubilized increased with the higher proportions of H-charged zeolites. At the same treatment, the amount of P solubilized from NCPR was much higher than that of OPR. The greatest amounts of P solubilized in OPR and NCPR were 3.3 and 17.3 percent, respectively, indicating of different reactivity of the phosphate rocks. The results also indicated that the P solubilization could be quite well described by both the first-order and Langmuir kinetics reaction models, with the Langmuir performed slightly better. The average r^2 value of the Langmuir model 0.9634, higher than the first-order kinetics (0.8608). The rate constants obtained from the first-order kinetics ranged from 0.0007 to 0.0069 (d^{-1}).

Keywords: natural zeolite, phosphate rock, first-order kinetic, Langmuir model, slow-release fertilizer

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THE DETERMINATION OF SHELF LIFE OF THE CARICA SEEDS POWDER

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ABSTRACT

Carica fruit is a main commodity in the Dieng plateau. The seeds was one of the by-products in the processing of the carica fruit cocktail. The seeds has high content of antioxidants, so that it could be consumed as functional beverage. The objectives of this study were to determine the shelf life of the product. The processes involved in carica seed powder production were; soaking with citric acid, boiling, fermentation with an *R. oligosporus* containing inoculum, drying, roasting, and mixing the roasted seeds with dried jackfruit at ratio of 3: 1. The packaging used in this study were glass bottle and aluminum foil. The products were stored at 35, 45, and 55^{o}C; and analyzed for its chemical and sensory characteristics at every 5 d for 20 d. The shelf life examined by the acceleration method using the Arrhenius equation with moisture content as the critical parameter. Results of the study showed that shelf-life of products packed with aluminum foil at room temperature (25^{o}C) was 1 year and 1 month and at cold temperature (8^{o}C) was 1 year 4 months; meanwhile, products packed in glass bottles at room temperature (25^{o}C) was 5 months and at cold temperatures (8^{o}C) was 6 months.

Keywords: *Carica pubescens*, L., seeds, functional beverage, *R. oligosporus*, shelf life

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THE EFFECT OF ADDITION OF WHEY PROTEIN CONCENTRATE AND EMULSIFIER ON CHARACTERISTICS OF CHEDDAR CHEESE ANALOGUE FROM CORN MILK

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ABSTRACT

Corn milk is one of the basic ingredients for analogue cheddar cheese manufacturing. The process of making analogue cheddar cheese basically requires additional ingredients that function to increase the texture and increase the yield, namely whey protein concentrate. In addition, there are materials used to stabilize the water and fat content required for an emulsifier, including Tween-80 and Span-80. The objective of this study is 1) to determine the proportion of best formulae between Whey Protein Concentrate and emulsifier types to produce analogue cheddar cheese based on maize milk. 2) to determine effect on the physical, chemical and sensory characteristics of produced cheddar analogue cheese of variations in concentration of whey protein Concentration; and 3) to determine the effects on the physical, chemical and sensory characteristics of the produced cheddar analogue cheese of variations in emulsifier concentration. The experimental design used was a factory randomized block design with two factors, namely the wheat protein concentrate level (20, 25, 30%) and the emulsifier type (Tween-80, Span-80, and Tween-80 combination: Span-80). The variables observed in this study were physicochemical and sensory variables. Physicochemical and sensory variable data were analysed on a 5% F-test, and if the results of the analysis show a significant effect, the multiple-range test of Duncan was continued at a level of 5%. Results showed changes in Whey Protein Concentrate concentration had effects on yield value, water content, dissolved protein content and fat content. The variation of different types of emulsifiers affects water content and protein content. Whey Protein Concentrate (WPC) concentration is the best proportion of the analogue cheddar from the WPC, 30% emulsifier Tween-80 of 1%, since the value of yield is 63.23%, pH 5.7, total dissolved solids is 31.75%, moisture contents are 59.24%, protein dissolves are 10.07% bk, fat contents are 13.65% bk, total acid is 1%.

Keywords: Cheese analogue, fat content, Span-80, Tween-80, texture, yield

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CHARACTERISTICS OF SORGHUM COOKIES WITH THE ADDITION OF ALMOND FLOUR AND FAT VARIATIONS

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ABSTRACT

To overcome the bitter taste of sorghum and enhance the flavor of cookies, almond flour can be added. Almond also contains high protein and can replace milk as a protein source in cookies, resulting in lactose-free cookies. The addition of vegetable fats like margarine and virgin cocoa oil to cookies also affects the final features of cookies. This study aims to: 1) know the physical and chemical properties of gluten and non-lactose cookies of sorghum flour and almond flour; 2) know about the effect of fat changes on the physical and chemical characteristics of gluten and lactose-free cookies; and 3) know about best processes for the sorghum and almond meal proportions and fat variation on gluten and lactose free variations. This study was conducted using Randomized Block Design (RBD) factorial with 2 factors. The factors studied were proportion of sorghum flour and almond flour (A) consisted of 1:1 (A1), 2:1 (A2), and 3:1 (A3), and fat variation (L) consisted of margarine (L1), VCO (L2), and mixture of margarine and VCO (1:1 b/b) (L3). Physical and chemical properties data were analysed using ANOVA at 95% level and if there were a tangible difference, will be continued with Duncan Multiple Range Test (DMRT) at 5% level. The findings show that the proportion of sorghum and almond flour affects ash, a fat content, dissolved protein levels and lower sugar levels tangibly. However, there were no tangible effect on water content and baking expansion. The higher sorghum flour proportion decreased the ash content, fat content, dissolved protein levels, and reduced sugar levels. Fat variation has a tangible effect on ash content, fat content, and reduced sugar levels but did not affect the water content, dissolved protein levels, and baking expansion. Cookies with margarine addition has the highest ash content (0,67%), cookies with VCO addition has the highest fat content (36,14%), and cookies with the addition of margarine and VCO mixture has the highest reduced sugar levels (0,49%). The best treatment in this study was the cookies with 1:1 proportion of sorghum flour and almond flour (A1) and with margarine addition (L1) which has the following physical and chemical properties: water content 3,08%, ash content 0,82%, fat content 36,65%, dissolved protein levels 1,27%, reduced sugar levels 0,56%, and baking expansion 92,04%.

Keywords: almond, cookies, margarine, sorghum, virgin coconut oil

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THE EFFECT OF HYDROCOLLOID ON STABILITY OF PAPAYA-PINEAPPLE JELLY DRINK DURING STORAGE

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ABSTRACT

Present study evaluated effect of hydrocolloid type on the stability of antioxidant antioxidant activity of papaya-pineaplle jelly drik during stotage. The antioxidant content of the jelly drink also evaluated. The research had been performed using randomized block design (CRD)with two factor, i.e.: types of hydrocolloid (agar and carrageenan and storage durations (0; 1; 2; and 3 weeks). Jelly drink was storage at 7^{o}C in refrigerator. The analysis carried out were total phenolic content, ferric thiocyanate (FTC) and thiobarbituric acid (TBA) tests. The result showed that increasing of storaged resulted in decreasing of total phenolic content, ferric thiocyanate and thiobarbituric acid, while carraggeenan had the lower stability of antioxidant activity.

Keywords: stability, antioxidant activity, storage, papaya-pineapple jelly drink

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ENZYMATI KINETIS STUDY OF CELLULOSA HYDROLYSIS USING CELLULASE FROM GOATH'S RUMEN

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ABSTRACT

By reason of fossil fuels depletion, there are incresing interest and demand for bioethanol production. Nipah trunk is an attractive organic material which has a high cellulosa content. Cellulosa can be hydrolysed into glucose and finally converted to bioethanol. Cellulosa hydrolysis by pure cellulase need a high cost. Effort to find a cheap of cellulase source is a logical step. One of potential cellulase source is goat's rumen. Until now, the information about reaction kinetics and characteristics of cellulase from goat's rumen is not much avaliable. Therefore the study to isolate crude cellulase, detremine K_M, V_{max}, optimum temperature and optimum pH need to be conducted. The study organized at Agricultural Technology Laboratory for 3 months. 7 samples of goath's rumen were used for this study. The step of study were isolation and enzymatics kinetics study. Isolation filtration, ammonium sulfate fractination (50, 60,70, dan 80% w/v), and centrifugation at 7.000 rpm 4^{o}C for 15 minutes. Enzyme activities assays were subjected to each sample. Crude cellulase which highest enzyme activities was not only used for enzymatics kinetics study but also enzyme characterization. Temperature and pH resistent assays of crude cellulase were conducted respectively at 45, 55, 65^{o}C and 4, 5, 6, 7, 8 of pH. K_M and V_{max} values were determined by calculate activitiy of crude cellulase at various concentration of CMC (1, 1,5, 2, 2,5, dan 3% w/v). Crude cellulase has a specific activity avarage of 1.7356 IU/mg. The highest of enzyme activity, as much as 0.9845 IU/ml, revealed by sample 3. Optimum activities of crude cellulase was detected at pH 6 with 1.1015 IU/ml of enzyme activity and 60^{o}C with 0.9637 IU/ml of enzyme activity. At 25% (w/v) of CMC concentration, crude cellulase has 0.3279 IU/ml of enzyme activity with 0.0045 IU/ml of V_{max} value and 0.0252 % (w/v) of K_M value.

Keywords: lignocellulosa, cellulase, enzymatic kinetics, K_M, V_{max}

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INVESTIGATION ON THE APPLICATION OF SUBSOILER VIBRATION TO REDUCE THE ENERGY REQUIREMENT

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ABSTRACT

The aim of this study was to investigate the input energy in vibration and non-vibration of subsoiler wings based on field operations and was compared the field performance using energy use efficiency to determine the best among them. The investigation and comparison were carried out during vibration and non-vibration wings of the subsoiler and two rake angles in the soil (45° and 55°). Three tractor speeds that including 2.88, 4, and 5.6 km/h were considered. The results showed that input energy in non-vibration wings more than vibration wings at all treatments. Analysis of the energy input, the diesel fuel records the largest inputs form all input energy for both wings cases. The treatment of 45^{O} with 2.88 km/h has the largest share with 1528.95 MJ/ha in non-vibration wings while the treatment of 55^{O} with 2.88 km/h has the largest share 1239.86 MJ/ha of input energy in vibration wings. Total soil volume disturbance in vibration wings and non-vibration wings was 2704.185 and 3586.491 m^3/ha, respectively. Accordingly, energy use efficiency for vibration wings more than non-vibration wings. Finally, vibration wings surpassed non-vibration wings in field performance in addition to that it can produce higher cross-section soil with consumes the least input energy.

Keywords: Human energy; machinery energy; rake angles; tractor speeds; vibration wings

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ANTIOXIDANT ACTIVITIES, PHYSICOCHEMICAL PROPERTIES AND SENSORY CHARACTERISTICS OF KECOMBRANG TEA (*Etlingera elatior*) AS FUNCTIONAL FOOD

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ABSTRACT

Kecombrang is a plant of the Zingiberaceae group which has antioxidant properties. The high content of antioxidants in kecombrang flowers has the potential to be processed as raw material for functional drinks and can be used as ingredients for making herbal teas. The addition of sugar and tamarind causes some characteristic changes when added to kecombrang tea. The purpose of this study was to determine the effect of adding types of sugar and tamarind to kecombrang flower powder on physicochemical properties, antioxidant activity and sensory characteristics of kecombrang tea. This study used an experimental method with a randomized block design (RBD) which was arranged factorial with 6 treatment combinations and repeated 4 times in order to obtain 24 experimental units. The factors tested included the kecombrang plant parts, namely flowers and fruit; addition of tamarind, namely without and addition of acid; and the addition of crystal coconut sugar, namely without and the addition of coconut sugar. The results showed that the best treatment combination based on the effectiveness index method was kecombrang tea with kecombrang flowers with the addition of tamarind and coconut sugar. This product has a total phenol of 5.96 mg TAE (Tannic Acid Equivalent) / gram bk, water content of 1.32%, ash content of 3.54%, pH of 4.5, and antioxidant activity of steeping 85.93%, red color, the distinctive aroma of kecombrang is rather strong, and a bit sour.

Keywords: kecombrang tea, tamarind, physicochemical properties, antioxidant activity and sensory characteristics

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ANTIOXIDANT POTENTIAL INGREDIENT OF KECOMBRANG PLANTS (*Etlingera elatior*)

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ABSTRACT

Kecombrang (Etlingera elatior) is a type of plant that has been known and used by humans as food and medicine. The stems, leaves and rhizomes of kecombrang as well as flowers are contained bioactive compounds such as polyphenols, alkaloids, flavonoids, steroids, saponins and essential oils which have potential as antioxidants. This study aims to determine the effect of the parts of kecombrang plants and the type of fraction extracted from the part of the kecombrang plant on the total phenol, antioxidant activity and physicochemical properties of the preparation. This study used a completely randomized design (CRD) with 12 combinations, 3 replications to obtain 36 experimental units. The factors tested included fragmented plant parts, namely flowers, stems, leaves, and rhizomes, the types of stratified extraction fractions, namely ethyl acetate, and ethanol. The variables observed included physicochemical properties, total phenol and antioxidant activity of kecombrang preparations. Data were analyzed by analysis of variance (F test) followed by DMRT 5%. The results showed that the total value of phenol and the highest antioxidant activity was the part of kecombrang stems fractionated using ethanol, namely 15894.07 mg / 100g and 89.12%, respectively.

Keywords: kecombrang ingredient, physicochemical properties, total phenol and antioxidant

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EFFECT OF HORIZONTAL RIDGE WITH VARIOUS DRAINAGE INTERVALS ON SOIL WATER AND NUTRIENTS DYNAMICS IN POTATO FIELD

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ABSTRACT

Application of the horizontal ridge (HR) system on highland potato cultivation has been confirmed to be significantly effective in reducing run-off and soil loss in the field. However, the ridge hasn't been yet optimal in supporting the crop production due to water-logging condition within the profile. Introducing the appropriate drainage techniques is expected to be a suitable way to overcome the problem, and needs to be evaluated in more comprehensive field investigation. This research was aimed to identify the soil water and nutrients dynamics in highland potato cropping field with various intervals of drainage channel introduced under the HR system. Totally 12 cropping-plots (3 m x 3 m in large) were prepared within 4 combination of HR-drainage intervals (treatments), namely: (i) no-drainage intervals (R0), (ii) 1-m drainage intervals (R1), (iii) 1.5-m drainage intervals (R1.5), and (iv) 2-m drainage intervals (R2), with 3 replications each. The undisturbed soil were sampled from each cropping-plot at 10 and 20 cm depth using 100-cc core samplers at 35, 42, and 63 days after planting (DAP). The soil volumetric water content (θ)-dry bulk density (ρ_b) and saturated hydraulic conductivity (K_s) were measured using gravimetric and falling head method, respectively, while the soil total-N and total-P were determined using Kjeldahl and Colorimetric method, respectively. The data were then analysed statistically using ANOVA, Kruskal-Wallis, and DMRT-5% test. The results showed that the θ, ρ_b, and K_s were fluctuated during a cultivation period and affected by the treatments significantly, of which their optimum values were 0.538 cm cm^{-3}, 0.556 g cm^{-3}, and 0.019 cm s^{-1}, respectively, obtained within R1 treatment. The total-N and total-P were also fluctuated during a cultivation period, and only the latter was affected by the treatments significantly, of which the optimum value was 2,660.13 kg ha^{-1}, obtained within R1 treatment. Thus, the HR with 1-m drainage interval might be an alternative suitable combination for a sustainable potato cultivation.

Keywords: Drainage channel, horizontal ridge, nutrient dynamics, potato cropping field, soil-water dynamics

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EFFECT OF FEEDING AN ANTIOXIDANT RICH COFFEE ON MDA AND SOD OF SERUM AND LIVER TISSUE ON DIABETIC RATS INDUCED STREPTOZOTOCIN

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ABSTRACT

Diabetes is associated with high in oxidative stress. Supply of antioxidants will reduce the risk of degerative disease stimulated by oxidative stress. The aim of this study was to examine the effects of antioxidant rich coffee on blood pressure, glucose blood response, levels of MDA and SOD serum and liver tissue of Wistar diabetic rats induced Streptozotocin. The study was designed using 24 Wistar rats and adapted for 3 days with the standard feed Comfeed II AD ad libitum. Furthermore, a total of 18 rats were induced with Streptozotocin of 60 mg / kg BW for 4 days up to be a fasting blood glucose level of > 250 mg / dL (diabetic rat group), and 6 normal rats (non-diabetic) as the control groups. Rats than grouped into 4 groups, namely: 1) control group (non-diabetic group) was given distilled water, 2) diabetic control group that given sugar cane coffee of 0.45 gram / 200 g BW / day, 3) Diabetic group that given antioxidant rich coffee of 0.45 g / 200 g BW / day, 4) Diabetic group that given antioxidant rich coffee of 0.90 gram / 200g BW / day. Intervention was carried out for 4 weeks. Observations were made every week on blood pressure, fasting blood sugar levels, body weight and blood pressure as well as serum and tissue levels of SOD and MDA. The results showed that coffee rich in antioxidant significantly reduced oxidative stress in diabetic rats which was shown to be lower blood pressure in the group given of rich antioxidant coffee (101-105.3 mmHg) than sugar cane coffee or market coffee(183 mmHg). Serum MDA values is also lower in the group of rats given antioxidant rich coffee (1.5-3.0 nmol / mL) than in the diabetic rats given cane sugar coffee (9.1 nmol / mL). Likewise, the tissue MDA value in the group of diabetic rats given antioxidant rich coffee was also lower (4.0-6.2 nmol / mL) than the rats group that given cane sugar coffee (12.1 nmol / mL). In contrast, in the normal group of rats given distilled water, the blood pressure value was relatively stable, namely 1.21 (pre) to 1.47 nmol / mL (post). This illustrates that giving of antioxidant rich coffee for 0.90 g per day in mice or the equivalent of 60 grams per day in humans, can reduce oxidative stress in diabetes.

Keywords: Antioxidant rich coffee, diabetic rats, stress oxidative, SOD, MDA

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EFFECT OF DRYING METHOD AND WATER RATIO ON MICROBIAL, RHEOLOGICAL AND SENSORY PROPERTIES OF REHYDRATION OF COW AND GOAT YOGURT POWDER

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ABSTRACT

Yogurt powder is dehydrated products produced through one of drying methods based on removal water (moisture) or reduces water activity of finally product, which increase the shelf life of food. Rehydration is an importance part in viability of bacteria cells (lactic acid bacteria) in the product of powder fermented. This study is aimed to treatment cow and goat yogurt powder with rehydrate processing to provide suitable rehydration method. Methods of Ibrahim and Pestana were employed to make yogurt, whilst Indonesia National Standards (SNI) with Association of Official Analytical Chemistry International (A O A C), used to analyzed the parameters of rehydrated yogurt. T-test were performed to evaluate the difference between data by Microsoft Excel Version 13, and separate between means used Multiple Duncan Test. Drying method were freeze-dryer at (-72˚C for 19 hr), and spray-dryer at inlet temperature 160 ˚C, outlet temperature 80-90˚C, and feeding temperature at 15˚C. The rehydration conditions consider was; powder to water ratio (1:3, 1:4, and 1:5), respectively. These results shown there was significant different between rehydrated freeze-dried and spray-dried yogurt on viscosity, pH, titratable acidity and survival bacteria cells, whilst the water to powder ratio had significant effect on features properties of rehydrated yogurt. The study results established that the rehydration water ratio 1:3 by freeze- dryer gave generally better quality compared to fresh yogurt.

Keywords: Yogurt Powder; Rehydration, Rheological properties

2nd ICSARD 2020
International Conference on Sustainable Agriculture for Rural Development
Purwokerto, Indonesia - October 20, 2020

ID: 1292

THE ROLE OF PRETREATMENT IN ENHANCING YIELD AND ANTIOXIDANT ACTIVITY OF LEMONGRASS (*CYMBOPOGUN CITRATUS*) ESSENTIAL OIL

Erminawati, Rifda Naufalin, Wuryatmo Sidik and Fadhil A Rahman

University of Jenderal Soedirman, Purwokerto, Indonesia
Crresponding author, email: erminawati.w@gmail.com

ABSTRACT

Sample preparation before distillation is important step in producing high yield and quality of lemongrass (*Cymbopogun sitratus*) essential oil. In order to improve the producing process, to provide information as reference for further practical applications; the effects of sample pretreatment (with and without microwave heating), and distillation time (3, 4, and 5 h) were studied. In addition, the samples types (dried stem and dried leave) were compared. Result of the study suggested that the highest lemongrass essential oil yield (of 2,31%) obtained from microwave heated of dried stem of lemongrass distilled for 4 h. The essential oil produced has index bias of 1,4867 , and antioxidant activity of 86,3%. Based on the result can be concluded that lemongrass stem contain higher essential oil compare to that of the leave, and microwave heating before distillation gave the high yield and quality of the product

Keywords: pretreatment, microwave –heating, stem, leave, yield and antioxidant-activity.

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The Effect of Addition of Whey Protein Concentrate and Emulsifier on Characteristics of Cheddar Cheese Analogue from Corn Milk

Jura Sumarmono[1], Nur Aini[2]*, Budi Santoso[1], V. Pribasanto[2], Eka Safitri[2], Annisa Widiastuti[2]

Corresponding author. nur.aini@unsoed.ac.id

[1]Department of Animal Science, Jenderal Soedirman University
[2]Department of Food Technology, Jenderal Soedirman University

ABSTRACT

Corn milk is one of the basic ingredients for analogue cheddar cheese manufacturing. The process of making analogue cheddar cheese basically requires additional ingredients that

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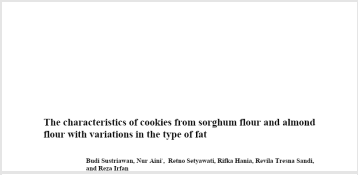

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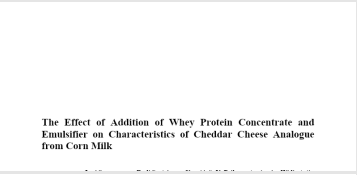

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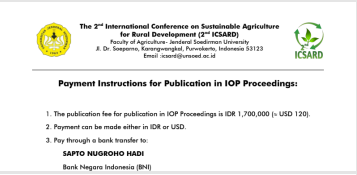

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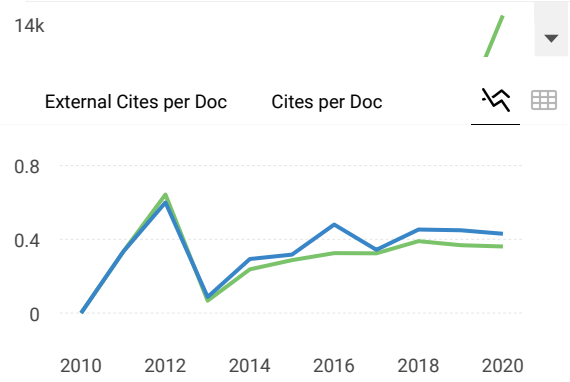

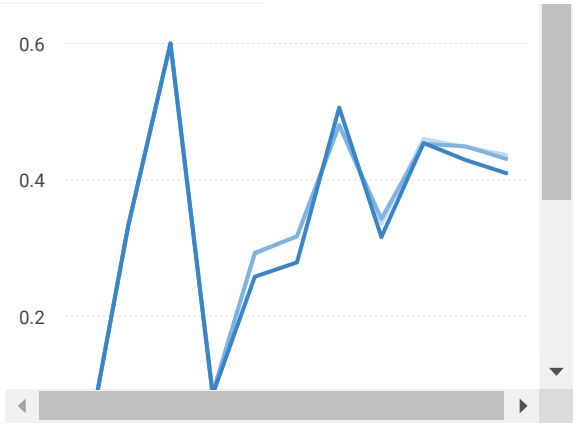

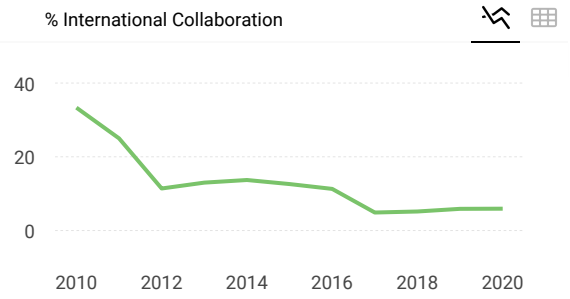

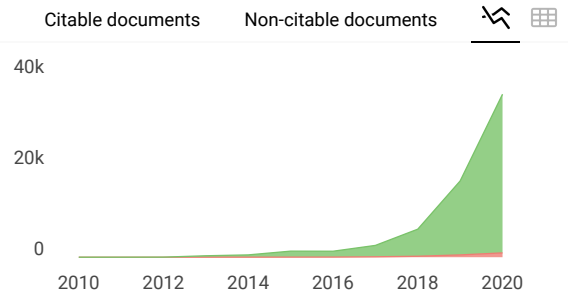

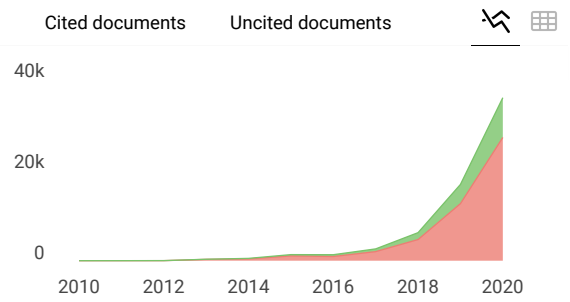

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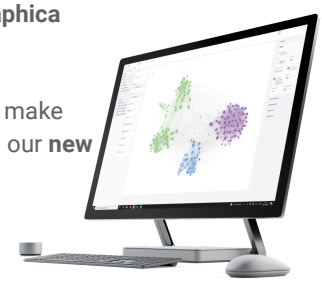

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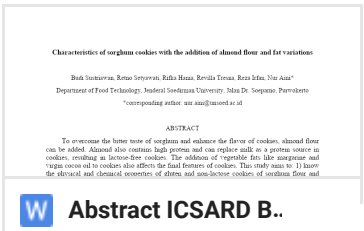

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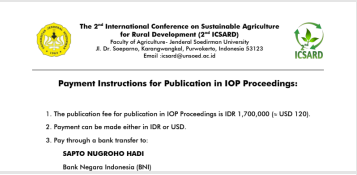

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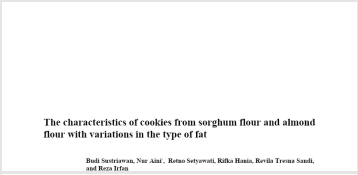

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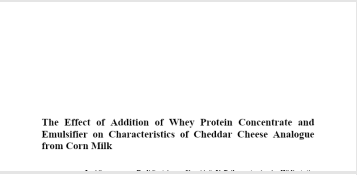

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