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**DAVAO DEL SUR STATE COLLEGE**  
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**Institute of Computing,  
Engineering and Technology**

# **BOOK OF ABSTRACTS**

**A.Y. 2021-2022**



**BOOK of ABSTRACTS A.Y. 2021-2022**  
**Institute of Computing Engineering and Technology**

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The Book of Abstracts A.Y. 2021-2022 Institute of Computing Engineering and Technology is an annual publication of Davao del Sur State College that showcases a selection of research studies conducted by students. This publication offers valuable insights into the wealth of knowledge and innovative ideas emerging from the academic work of both students and their mentors.

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*MESSAGE FROM THE OFFICE OF THE PRESIDENT*



The Davao del Sur State College (DSSC) is committed to delivering quality education and fostering impactful research that contributes to community development and improves quality of life. Our research initiatives create opportunities for growth, innovation, and progress.

I congratulate our students for their impactful research and our faculty members for their dedication to mentoring students to become future researchers of integrity and excellence. I also extend my gratitude to Dr. Cherry Ann P. Roxas, RDI Director, and Asst. Prof. Jayson R. Pucot, Head of the Research Publication Office, for their hard work in compiling and documenting our graduate students' thesis abstracts. May this Book of Abstracts inspire future researchers for years to come.

*Congratulations to all involved in this achievement!*

**AUGIE E. FUENTES, Ph.D.**  
President

*MESSAGE FROM THE OFFICE OF THE DIRECTOR FOR  
RESEARCH, DEVELOPMENT AND INNOVATION*



Research is a cornerstone of academic excellence, driving students to engage with global challenges and contribute to the creation of new knowledge. It is with great pleasure that I present the Book of Abstracts, highlighting the outstanding theses of students from the Institute of Computing, Engineering, and Technology.

I would like to express my sincere appreciation to our dedicated faculty and Dean Prof. Eduardo F. Aquino for his leadership and support in guiding our students. To the graduates, congratulations on your achievements! May this research experience inspire you to continue exploring, learning, and contributing to the world of knowledge.

**CHERRY ANN P. ROXAS, DBA**  
RDI Director

## *MESSAGE FROM THE DEAN*



Welcome to the Book of Abstracts of the Institute of Computing, Engineering and Technology. This compilation highlights the innovative and transformative research conducted by our talented faculty and students. It is a testament to the relentless pursuit of knowledge, the spirit of collaboration, and the commitment to addressing the challenges of tomorrow.

I extend my appreciation to the institute research coordinator, Engr. Jeah Bejarasco, for her diligent work on assisting in the compilation of the students' theses abstracts. I also extend my heartfelt congratulations to all researchers, and I hope this work inspires further exploration and discovery in the ever-evolving field of computing, engineering and technology.

**PROF. EDUARDO F. AQUINO**  
Dean, ICET

## Table of Contents

Title	Page
Message of the College President	i
Message of the RDI Director	ii
Message of the Dean	iii
<b>BACHELOR OF SCIENE IN AGRICULTURAL BIOSYSTEM ENGINEERING</b>	
Formulation and Processing of Madre De Agua Leaves ( <i>Tricanthera Gigantea</i> ) as Feed Pellets for Swine ( <i>Sus domestic</i> ) Authors: Carcedo, Wally T.	1
Processing Of Carabao's ( <i>Bubalus Bubalis Carabanesis</i> ) Manure into Paper at Different Bleaching Treatments Authors: Carillo, Chester R.	3
The Effect of Fish Amino Acid as Supplement to Snap Solution on Growth and Yield of Hydroponic Pechay ( <i>Brassica chinensis</i> ) Authors: De Arce, Bernelyn S.	4
Physco-Mechanical Property Evaluation of Brick as Influence by Abaca ( <i>Musa Textilis</i> ) Residue ash and Cement as Partial Replacement of Clay Authors: Dejarme, Alyssa Jill M.	5
Influence of Fermented Kangkong ( <i>Ipomoea Aquatica</i> ) Juice (Fkj) as an additive on Commercial Snap Solution on the Growth and Yield of Hydroponically Grown Pechay ( <i>Brassica chinensis</i> ) Authors: Leahcim Dela Salde	6
Processing of Cardava Banana ( <i>Musa Acuminata X Balbisiana 'Cardava'</i> ) and Cavendish Banana ( <i>Musa Acuminata</i> ) Peel Waste as Potential Bio-Charcoal Material Authors: Charlie E. Egnisaban	8

Quality Of Briquettes Made from Oil Palm ( <i>Elaeis Guineensis</i> ) Empty Fruit Bunch Compressed at Different EFB Mixture Quantities Authors: Jassen P. Guardaquivil	10
Fabrication of Coco-Coir Dust Pot for Banana Tissue Culture Seedling at Different Levels of Starch as Binder Authors: Jona Mae Gumba	11
Growth and Yield of Hydroponically Grown Spinach ( <i>Spinacia Oleracea</i> ) at Different Sizes of PVC Planting Facilities Authors: Honey D. Jandoquele	12
Quality Evaluation of Cement-Bonded Particleboard from Different Mixtures of Cacao and Durian Husk Authors: Elmie S. Llamas	13
Evaluation Of Dried Sea Cucumber ( <i>Holothuria Scabra</i> ) Using Solar Dryer with Light Bulb for Drying Authors: Jalandie M. Lumampa	15
Utilization And Evaluation of Coconut ( <i>Cocos Nucifera</i> ) Peat and Coconut ( <i>Cocos Nucifera</i> ) Coir as Biodegradable Sprouting Mats Authors: Claire Vinz P. Macalino	16
Quality Attributes of Kraft Chipboard Produced from the Combination of Guest Tree ( <i>Klienhowia Hospita</i> ) Fiber and Recycled Paper Authors: Paul Mar N. Magbulogtong	17
Quality of a Non-Carbonize Briquettes from Blended Sawdust and Banana Pseudostem Authors: Ara Jane L. Mangaron	19
Production of Biodiesel from Waste Cooking Oil using Calcined Waste Chicken Bones as Catalyst Authors: Betsi Faith N. Mercado	21
The Utilization of Rice Husks Thermal-Insulation Box Authors: Jollive T. Monsing	22

Physical And Mechanical Property of Coco-Concrete Hollow Blocks Authors: Cliekert M. Orbuda	24
Evaluation On the Quality of Banana Peelings ( <i>Musa Sp.</i> ) as A Material for The Production of Floor Wax Authors: Reychel C. Padilla	26
Physico-Mechanical Property of Particle Board from Shredded Rice ( <i>Oryza Sativa</i> ) Straw Stalk and Plastic Bottle Wastes with Epoxy Resin as Binder Authors: Zhaira M. Rabaño	27
Quality Assessment of Cement-Bonded Particleboard Made from Sawdust and Planer Shavings of Gmelina Arborea Authors: Versano, Imy Joy A.	29
<b>BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY</b>	
Android-Based Clinic Reservation System Authors: Billy June Corenales	32
A Secured Android-Based Clinic Reservation System using One Time Password (OTP) based on Unix Time Code Authors: Denmark A. Ermita	33
Web-Based Information System of Trichoderma Adaptors with xAlgebraic Model Decision Support System Authors: Nwel Jhean N. Fernandez	34
Web-Based and Android-Based Research Management System in Davao Del Sur State College Using Nearest Neighbor Search Algorithm with Decision Support System Authors: Jay A. Jornales	35
Management Using Convolutional Neural Network with Recommender Authors: Karl Vincent A. Surdella	36

**Bachelor of Science  
Agricultural Biosystem  
Engineering**

## **FORMULATION AND PROCESSING OF MADRE DE AGUA LEAVES (*Tricanthera gigantea*) AS FEED PELLETS FOR SWINE (*Sus domestic*)**

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Authors: Wally T. Carcedo

Year: 2022

Adviser: Engr. Teresa S. Lumansoc

This study was designed to formulate and process feed pellets for swine using the leaves of Madre De Agua plants as the main raw materials. The study has three treatments in different mixing percentages of Madre De Agua leaves (MDAL), Corn Bran (CB), and Molasses (M). The mixing percentage of each treatment was based on the protein requirement of swine in their growing stage and was formulated scientifically through trial and error method. The Treatment 1 (T1) has the mixing percentage of 78.5% MDAL, 17.5% CB, and 4% M, Treatment 2 (T2) with 77.6% MDAL, 19.4 CB, and 3% M, and Treatment 3 (T3) with 76.7% MDAL, 21.3% CB, and 2% M. The gathered data were analyzed through one way ANOVA, and Least Significant Difference (LSD) at 1% and 5% level. Based on the laboratory analysis, the mean Crude Protein was highest at T2 with 12.64% followed by T1 with 11.63% and T3 with 7.90%, while the mean Crude fat was highest at T2 with 5.739%, T1 with 5.622% and T3 with 5.472%. The mean Calcium and Phosphorous were highest at T1 with 2.3% and 0.47%, T2 with 2.0% and 0.41%, and T3 with 2.1% and 0.41% respectively. On the other hand, the mean Bulk Density was highest at T3 with 0.8433g/cc, T2 with 0.8033g/cc, and T1 with 0.7967g/cc. The mean Durability was highest at T3 with 99.26%, T2 with 97.78% and T1 with 94.04%, and the mean Percentage Fines was highest at T1 with 0.06%, T2 with 0.02%, and lowest at T3 with 0.01% respectively. The cost per unit production of the three treatments was observed highest in T1 with 15.77 Php/kg, then T2 with 15.53 Php/kg, and lowest in T3 with 15.28 Php/kg respectively. The significant difference were observed statistically in the Crude protein, bulk density, durability, and percent fines while no significant difference was observed in the crude fat of the pellets among the treatments. The study found that the formulated feed pellets for grower swine based on the trial and error computation mixture had low Crude Protein, high Crude Fat and Calcium, and satisfied the needed nutrient content of Phosphorous. The physical quality of the feed pellets, on the other hand, had met the required requirement. To fulfill the needed requirement, nutritional imbalances can be supplemented with feed additives.

# **PROCESSING OF CARABAO'S (*Bubalus bubalis carabanesis*) MANURE INTO PAPER AT DIFFERENT BLEACHING TREATMENTS**

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Authors: Chester R. Carillo

Year: 2022

Adviser: Eduardo F. Aquino, MSME

This Study examines the potential of Carabao's (*Bubalus bubalis carabanesis*) manure as an alternate material for the production of paper. The Carabao manure was collected, dried, squeezed for the collection of fiber, and cleaned thoroughly through cooking. The collected fibers were then processed into pulp which was added with bleaching treatments. The study was established with three (3) treatments and five replicates. Treatment 1 with no bleaching involved, Treatment 2 with 25% of per 1kg of fiber, and Treatment 3 with 25% of Hydrogen Peroxide per 1 kg of fiber. Using the molder, the pulp was layered and sundried for 8 hours. The quality of the produced paper was evaluated in terms of Color, Odor, Texture, Acceptability, Grammage and Water Absorption. Frequency distribution table was made for the sensory evaluation parameters to be specific Color, Odor, Texture, and Acceptability. The gathered data were statistically analyzed using One-Way Analysis of Variance (ANOVA) at 1% to 5% level of significance. The ANOVA result for Grammage and Water Absorption showed no significant difference with a p-value 0.115, and 0.250 respectively. Based on the finding it shows that, the bleaching treatments do not significantly differ in terms of Odor, Texture, Acceptability, Grammage, and Water Absorption of the produced paper. Meanwhile, Color is the only sensory parameter that shows a highly significant difference on the sensory characteristics of all treatments. In addition, Carabao's Manure can be a potential source of a raw material in processing paper. Hence, it still needs more modification and study in order to enhance the quality of paper.

## **THE EFFECT OF FISH AMINO ACID AS SUPPLEMENT TO SNAP SOLUTION ON GROWTH AND YIELD OF HYDROPONIC PECHAY (*Brassica chinensis*)**

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Authors: Bernelyn S. De Arce

Year: 2022

Adviser: Eduardo F. Aquino, MSME

The study was conducted at Demetria Compound, Mother Ignacia Village, Bansalan, Davao del Sur, to know the effect of fish amino acid when used as a supplement to snap solution on pechay growth and production. Five treatments were replicated three times using a Completely Randomized Design (CRD). Treatments were T1- 60ml fish amino acid per li. of water; T2- 60ml fish amino acid and 4 ml snap solution per li. of water; T3- 60ml fish amino acid and 3 ml snap solution per li. of water; T4- 60ml fish amino acid and 2 ml snap solution per li. of water; T5- 5 ml snap solution. The effect of fish amino acid as a supplement to SNAP solution was determined in terms of area of leaves, breadth of leaves, number of leaves, plant height, pH, and yield. One-Way Analysis of Variance (ANOVA) was used to statistically evaluate the collected data at a 1% to 5% level of significance. The ANOVA result for Area of Leaves, Breadth of Leaves, Number of Leaves, Plant's Height, and Average Yield revealed a substantial difference with an f-value of 54.049, 34.715, 24.423, 43.685, and 18.225 respectively. According to the analysis of the results, the treatments differ significantly in terms of area of leaves, breadth of leaves, number of leaves, plant height, and yield. Meanwhile, the only parameter that does not differ significantly throughout all treatments is pH. Furthermore, the concentration of fish amino acid supplement in the snap solution did not meet the requirements for hydroponic pechay growth and yield. However, laboratory analysis of the FAA will be conducted to ensure the nutrient content of the FAA and its associated microelements.

# **PHYSICO-MECHANICAL PROPERTY EVALUATION OF BRICK AS INFLUENCE BY ABACA (*Musa textilis*) RESIDUE ASH AND CEMENT AS PARTIAL REPLACEMENT OF CLAY**

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Authors: Alyssa Jill M. Dejarme

Year: 2022

Adviser: Engr. Ryan Art M. Tuling

The study was conducted to evaluate the physico-mechanical property of residue ash and cement as partial replacement of clay. The study parameters evaluated were compressive strength, water absorption capacity, bulk unit weight, dry density, specific gravity and cost per unit production.

Analysis of Variance for Completely Randomized Design (CRD) was used to process the data gathered. Means with significant results was further analyzed using Least Significant Difference (LSD) at 5% level. The treatment mixture proportion used were as follows; for T1 - 80% wt. Clay was mixed with 20% sand, T2 - 66% wt. Clay with 20% wt. Sand and 14% wt. Cement, T3 - 66% wt. Clay with 20% wt. Sand and 14% wt. ARA and T4 - 66% wt. Clay with 20% wt. Sand, 7% wt. cement and 7% wt. ARA. And all the treatments used 0.14 wt. water ratio. The study used four (4) treatments and three (3) replications with eight (8) samples per treatment per replication.

Analysis of Variance (ANOVA) results revealed that there was a significant difference in the compressive strength, water absorption capacity, dry density and specific gravity. While, in bulk unit weight the results revealed that there was no significant difference.

Based on the results of the Least Significant Difference (LSD), it was revealed that the compressive strength, water absorption, dry density and specific gravity showed significant difference. It can be distinguished further that the abaca residue ash can be used as partial replacement for clay.

**INFLUENCE OF FERMENTED KANGKONG (*Ipomoea aquatica*) JUICE (FKJ) AS AN ADDITIVE ON COMMERCIAL SNAP SOLUTION ON THE GROWTH AND YIELD OF HYDROPONICALLY GROWN PECHAY (*Brassica chinensis*)**

Authors: Leahcim Dela Salde

Year: 2022

Adviser: Engr. Eduardo F. Aquino, MSME

The utilization of organic fertilizer as an alternative on the chemical nutrient solution used in hydroponics system is now being studied. However, studies show that using organic fertilizer alone only resulted to poor plant growth. Hence, an experiment entitled, "Influence of Fermented Kangkong (*Ipomoea Aquatica*) Juice (FKJ) as an Additive on Commercial Snap Solution on the Growth and Yield of Hydroponically Grown Pechay (*Brassica Chinensis*)" was carried out at Lim Extension, Digos City. The experimental research was laid out in Completely Randomized Design (CRD) having five (5) treatments replicated three (3) times.

Waste kangkong (*Ipomoea Aquatica*) were chopped into tiny pieces and underwent molasses fermentation for 14 days. The pechay (*Brassica Chinensis*) plants were grown under Kratky hydroponics system and was treated with different nutrient solution n: 1/200 SNAP Solution (T1), 1/800 FKJ (T2), 1/800 FKJ and 1/250 SNAP Solution (T3), 1/800 FKJ and 1/333.33 SNAP Solution (T4), and 1/800 FKJ and 1/333.33 SNAP Solution (T5).

The means for the different growth parameters: plant height, number of leaves, area of leaves, breadth, length of roots, pH level, and yield per plant were calculated for each replication. Data were statistically analyzed using one-way analysis of variance (ANOVA) at 1% and 5% level of significance. Least Significance Difference (LSD) were also run to determine the significant differences between the five treatments.

Results showed that there is a significant difference between the number of leaves of each treatment at 5% level with a P-value of 0.011. It was also shown that the plant height, leaf area, breadth of leaves, yield per plant, and ph level significantly differ at 1% level having a p-value of 0.008, 0.001, 0.001, 0.288, 0.002, 0.008, respectively. There was also no significant difference between the length of roots of each treatment. Thus, it was recommended to apply FKJ as supplement of commercial SNAP Solution for its positive effect on environment as it promotes chemical fertilizer usage reduction and lessen inorganic fertilizer dependency.

# **PROCESSING OF CARDAVA BANANA (*Musa acuminata x balbisiana* 'Cardava') AND CAVENDISH BANANA (*Musa acuminata*) PEEL WASTE AS POTENTIAL BIO-CHARCOAL MATERIAL**

Authors: Charlie E. Egnisaban

Year: 2022

Adviser: Mark Jude F. Trondillo, Ph.D

The study entitled, "Processing of Cardava Banana (*Musa acuminata x balbisiana* 'Cardava') and Cavendish Banana (*Musa acuminata*) Peel Waste as Potential Bio-Charcoal Material" was successfully conducted at Davao del Sur State College, Mati, Digos City. The study was carried out through T-Test with two (2) treatment and three (3) replicates. The data was analyzed at 5% level of significance.

Banana peel from cardava and cavendish were carbonized through the process of burning in kiln type metal drum.

Moisture content determined into oven drying at set temperature of 100°C for the initial moisture content determination. The result of Means for burning rate, bulk density, ash content and recovery/yield were calculated for all samples. Results show that mean burning rate of commercialized (36.52 g/min) was significant at 5% level with P value 0.0036 compare to cardava and 0.0022 compare to cavendish. However, Cardava (24.39 g/min) and cavendish (23.33 g/min) was observed to have no significant difference with P value (0.4670). Bulk density showed that cardava and cavendish were not significantly different with each other.

The Results of the bulk density revealed that cardava banana peel bio-charcoal has the mean of 0.07g/cm<sup>3</sup> and the cavendish banana peel bio-charcoal has the mean of 0.08 g/cm<sup>3</sup>. The mean of ash content results that there are no significant different for cardava banana peel bio-charcoal (44.62%) and (49.62%) for cavendish banana peel bio-charcoal. Mean for yield for cardava banana peel bio-charcoal (44.7%) shows no significant different compare to cavendish banana peel bio-charcoal (43.5%).

Keywords: *Bio-charcoal, Cardava, Cavendish, Burning Rate, Ash Content, Bulk Density, Recovery/Yield*

**QUALITY OF BRIQUETTES MADE FROM OIL PALM (*Elaeis guineensis*) EMPTY FRUIT BUNCH COMPRESSED AT DIFFERENT EFB MIXTURE QUANTITIES**

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Authors: Jassen P. Guardaquivil

Year: 2022

Adviser: Razel Allan R. Valleser, ABE, MOP

This study was conducted to characterized the quality of briquettes made from Oil Palm Empty Fruit Bunch compressed at different EFB mixture quantities. The study was carried out through Complete Randomized Design with three replications. In every 1-kilogram EFB, 300g starch is added for mixture of all treatments. The treatment was T<sub>1</sub> - 100g, T<sub>2</sub> - 75g, T<sub>3</sub> - 50g of mixtures compressed at 4 cm thickness. The burning rate, ignition time, time to boil 1 liter of water, particle density, moisture content, ash content, and shatter index were determined and the data were analyzed through One-way Analysis of Variance at 1% an 5% level of significance and Least Significant Difference (LSD) was used to further analyzed the significant difference among treatments. Statistically, the results revealed a significant difference in ignition time and shatter index, however the burning rate, time to boil 1 liter of water, quantity of briquettes to cook one cup (200g) of rice, particle density, moisture content, and ash content analysis revealed no significant difference between the mean of each treatment. In general, oil palm empty fruit bunch briquettes can be used as a raw material in the production of non-biomass briquettes. All briquette treatments are for good potential use.

## **FABRICATION OF COCO-COIR DUST POT FOR BANANA TISSUE CULTURE SEEDLING AT DIFFERENT LEVELS OF STARCH AS BINDER**

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Authors: Jona Mae Gumba

Year: 2022

Adviser: Razel Allan R. Valleser, ABE, MOP

The fabrication of coco-coir dust pot for banana tissue culture seedling at different levels of starch as binder was conducted at Brgy. Maibo, Magsaysay, Davao del Sur. The study was conducted to determine the physical properties of coco-coir dust pot such as bulk density, changes in dimension (thickness, height, and diameter of pot), volumetric flow rate and durability. Moreover, difference on physical properties of fabricated coco-coir dust pot for banana tissue culture seedling at different levels of starch a binder now also determined. Molding was performed with a tin can and used bottle to press the mixture of gelatinized starch and coco-coir dust. The bulk density ranges from  $1.275 \text{ g/cm}^3$  –  $2.785 \text{ g/cm}^3$ , change in dimension on thickness ranges from  $0.075 \text{ cm}$  –  $0.1 \text{ cm}$ , change in height ranges from  $0.125 \text{ cm}$  –  $0.15 \text{ cm}$ , change in diameter ranges from  $0.225 \text{ cm}$  –  $0.55 \text{ cm}$ , and ii volumetric flow rate ranges from  $13.28 \text{ cm}^3 / \text{sec}$  –  $16.967 \text{ cm}^3 / \text{sec}$ . It has a good quality for the reproduction of fabricated coco-coir dust pot for banana tissue culture seedlings. It was concluded that the higher starch binder content has the better bulk density and durability.

**GROWTH AND YIELD OF HYDROPONICALLY GROWN SPINACH (SPINACIA OLERACEA) AT DIFFERENT SIZES OF PVC PLANTING FACILITIES**

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Authors: Honey D. Jandoquele

Year: 2022

Adviser: Razel Allan R. Valleser, ABE, MOP

The study was conducted to observe the Growth and Yield of Spinach at different sizes of PVC planting facilities. It was conducted at Davao del Sur State College, Mati, Digos City. The data gathered was limited from transplanting until to harvesting stage. Completely Randomized Design (CRD) were used in this study with four treatments replicated 3 times. The parameters used on this study were number of leaves, length of veins, yield and cost and return analysis. Based on the results and the findings of the study, it concluded that the used of different sizes of PVC planting facilities has significant difference in the length of veins. However, the numbers of leaves and yield have no significant differences. Furthermore, for the cost and return, there was an estimated increase in projected sales for the next harvest.

# **QUALITY EVALUATION OF CEMENT-BONDED PARTICLEBOARD FROM DIFFERENT MIXTURES OF CACAO AND DURIAN HUSK**

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Authors: Elmie S. Llamas

Year: 2022

Adviser: Engr. Ryan Art M. Tuling

The study was conducted to evaluate the physical and mechanical properties of cement-bonded particleboard from different mixtures of cacao and durian husk. The study was carried out through Complete Randomized Design with three treatments and three replications. Cacao and durian husk were used as main raw materials to produce cement-bonded particleboards with an additive of calcium chloride. The treatment 1 was 50% (121.5g) cacao husk and 50% (121.5g) durian husk, treatment 2 was 25% (60.75g) cacao husk and 75% (182.25g) durian husk and treatment 3 was 75% (182.25g) cacao and 25% (60.75g) durian husk. All the treatments have a husk-cement (607g) ratio of 1:2.5. The board density, percentage of water absorption, thickness swelling and bending strength were determined and the data were analyzed through ii One-Way Analysis of Variance at 1% and 5% level of significance. Statistically, results revealed that there was a significant difference in percentage of water absorption and thickness swelling. However, no significant differences were observed in the board density and bending strength of the treatments. In summary, it was concluded that the use of cacao and durian husk in this study have a slight potential to be good source of cement bonded particleboards. The most recommended treatment is the T2 because it met most of the standards. Many factors affect the physical and mechanical properties of the boards such as curing time, type of additives and husk-cement ratio. The researcher recommends to increase the husk-cement ratio, pretreatment of the raw materials and the use of other agricultural waste in making cement-bonded particleboards.

## **EVALUATION OF DRIED SEA CUCUMBER (*Holothuria scabra*) USING SOLAR DRYER WITH LIGHT BULB FOR DRYING**

Authors: Jananie M. Lumampa

Year: 2022

Adviser: Mark Jude F. Trondillo, Ph.D

The study entitled Evaluation of Dried Sea Cucumber (*Holothuria scabra*) Using Solar Dryer with Light Bulb for Drying. A Fabricated solar glass dryer with and without light bulb for drying were used for the drying process. The study evaluated the weight loss, drying rate, drying time duration, sensory characteristics and its unit production cost of dried sea cucumber. The fresh sea cucumber samples (*Holothuria scabra*) were collected, processed and dried. Samples were dried for 24 hours in the solar dryer with light bulb (Treatment 1) and 32 hours in the solar dryer without light bulb (Treatment 2). The drying process was replicated five times. It was observed that the average drying rate for Treatment 1 was 3.28 grams/hour, whereas the Treatment 2 an average drying rate of 2.6 grams/hour. ii The two drying processes had an impact on the outcome of the sensory characteristic's evaluation. The overall acceptability in terms of color, texture and general acceptability revealed that using solar dryer with light bulb had the highest scale were rated as more acceptable while for solar dryer without light bulb in terms of odor had the highest scale were also rated as more acceptable. Generally, among the treatments, solar drying with a light bulb was observed to have shorter drying time and obtained acceptable quality of dried sea cucumber samples.

*Keywords: drying process, drying time, sea cucumber, solar dryer*

# **UTILIZATION AND EVALUATION OF COCONUT (*Cocos nucifera*) PEAT AND COCONUT (*Cocos nucifera*) COIR AS BIODEGRADABLE SPROUTING MATS**

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Authors: Claire Vinz P. Macalino

Year: 2022

Adviser: Mark Jude F. Trondillo, Ph.D

The research work was carried out to evaluate and utilize the potentiality of Coconut Peat and Coconut Coir as Biodegradable Sprouting Mat. This study used a complete randomized design to discern the physical properties of the biodegradable sprouting mats namely the bulk density, water holding capacity, air porosity and its suitability as growing media for cabbage seeds for its germination rate, and root length. The treatments were as follows: was T1 = 75% coconut coir + 25% coconut peat, T2 = 50% Coconut Coir + 50 % Coconut Peat, and T3 = 25% Coconut Coir + 75% Coconut Peat. The proportion of cornstarch added for every treatment's mixture was 5% of the total weight of the raw material. Following the proportioning of each treatment's combination, each treatment was replicated three times. ii As per the results, there were significant differences in air porosity, germination rate, and root length between the mean of each treatment, but no significant differences in bulk density or water holding capacity. Generally, Coconut Coir and Coconut peat are great substrate and good alternative growing media but with great cautious and a good balance of proportion for each kind. It is concluded that Treatment 2 is the most acceptable and suitable growing media among the three treatments because of the results shown. It is also concluded that good balance of physical properties of growing substrate is highly favorable for cabbage seeds.

Keywords: *Biodegradable sprouting mat, Coconut Coir, Coconut Pea*

# **QUALITY ATTRIBUTES OF KRAFT CHIPBOARD PRODUCED FROM THE COMBINATION OF GUEST TREE (*Klienhovia Hospita*) FIBER AND RECYCLED PAPER**

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Authors: Paul Mar N. Magbulogtong  
Adviser: Teresa S. Lumansoc, MSAE

Year: 2022

The study was designed to examine the potential use of Guest Tree (*Klienhovia Hospita*) Fiber and Recycled Paper as an alternative material for chipboard production. The study was established with three (3) triplicated treatments which vary only on the percentage of Guest Tree Fiber and Recycled Paper per kilogram of the mixture. The chipboard produced from each treatment were evaluated by subjecting the samples for Water absorbency (%), Grammage (gsm), pH and Tensile strength (MPa) tests. Cost per unit production analysis was also performed to determine the cost incurred per unit of chipboard produce per treatment. The data gathered were statistically analyzed through One-way ANOVA in Complete Randomized Design (CRD) and Least Significant Difference (LSD) at 1% and 5% level.

Statistically, the water absorbency, grammage and pH of the chipboard differ significantly among and between the treatments; whilst

the tensile strength show no significant difference both at 1% and 5% level. The Chipboard produced from the treatment with the highest percentage (15%) guest tree fiber and lowest percentage (85%) of recycled paper (T3) had the highest mean value for water absorbency (206.7%), grammage (1706.67 gsm) and Tensile strength (2.9640 MPa) and with the lowest result for pH (8.58) among the treatments. In contrast the treatment with the lowest amount (5%) of guest tree fiber and the highest amount (95%) of recycled paper (T1) obtain the highest mean pH (10.8) and lowest mean result for water absorbency (132.94%), grammage (1473.33 gsm) and tensile strength (2.2553 MPa).

Based on the results, the grammage, tensile strength of all treatment and the pH value of T2 and T3 passed the standard value. However, the water absorbency results of the treatments is above the recommended value. The cost per unit of chipboard produced per treatment is lower than those commercially available in the market. Thus with these results, the researcher concluded that the combination of guest tree fiber and recycled paper can be a potential material in chipboard production. Generally, based on the result of this study, the researcher recommends the production of chipboard utilizing the percentages of materials specified in treatment 2 and treatment 3 for commercialization.

## **QUALITY OF A NON-CARBONIZE BRIQUETTES FROM BLENDED SAWDUST AND BANANA PSEUDOSTEM**

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Authors: Ara Jane L. Mangaron

Year: 2022

Adviser: Mark Jude F. Trondillo, Ph.D

The goal of the study was to determine the quality of non-carbonize briquettes made from blended sawdust and banana pseudostem. With five treatments and three replications, the study was conducted using Complete Randomized Design. The non-carbonized biomass briquette was made utilizing cassava starch as the binder and dried banana pseudostem and sawdust in various proportions as the major raw components. 30g percent banana pseudostem (T1), 22.5g percent banana pseudostem and 7.5g sawdust (T2), 15g percent banana pseudostem and 15g sawdust (T3), 7.5g percent banana pseudostem and 22.5 percent sawdust (T4), and 30gpercent sawdust (T5)). The density, durability, ash content, and burning rate of the briquettes were determined, as well as the cost per unit of ii manufacture, and the data was evaluated using One-Way Analysis of Variance at 1% and 5% levels of significance. The durability test, ash content, burning rate, and density of the treatments were all shown to be significantly different statistically. According to the findings, the density, durability, ash content, and cost per kilogram of briquettes produced from all treatments are all within the typical acceptable range of values. Dried banana pseudostem, sawdust, and their mixtures in various proportions can all used as a viable raw material for non-biomass briquette production. However, the T3 treatment, which contains 50% dried banana pseudostem and 50% sawdust, is the most recommended of the treatments because of the better density, durability, ash content, burning rate, and cost per kilogram produced, which is one of the most significant aspects to consider.

*Keywords: Biomass briquettes, Banana Pseudostem, Noncarbonized, Sawdust, Density, Durability, Ash Content, Burning Rate*

## **PRODUCTION OF BIODIESEL FROM WASTE COOKING OIL USING CALCINED WASTE CHICKEN BONES AS CATALYST**

Authors: Betsi Faith N. Mercado

Year: 2022

Adviser: Ryan Art M. Tuling, ENP

This study was successfully done at the researcher's residence located at Lim Bataan St. Digos City, Province of Davao del Sur in the month of April to May of 2022. This study was conducted to produce a biodiesel from waste cooking oil from using waste chicken bones as catalyst sourced from vendor of crispy chicken in the locally to determine its potential by using solar heating method. Moreover, this study determines the biodiesel produced yield and physicochemical properties. Based on the statistical analysis of the results of the study, the catalyst loading in the biodiesel yield do not have any significant difference for each treatment. Further, the results also show that Treatment 1 loaded with 20 grams of catalyst shows the highest yield for the biodiesel produced meanwhile the Treatment 2 and Treatment 3 shows the least amount of biodiesel yield. Moreover, laboratory analysis of the physicochemical properties shows that it cannot be classified as biodiesel, since it did not attain the standard limits for acid number, kinematic viscosity and density set by ASTM/PNS.

Keywords: *Biodiesel, Catalyst, Transesterification, Calcination*

# **THE UTILIZATION OF RICE HUSKS THERMAL-INSULATION BOX**

Authors: Jollive T. Monsing

Year: 2022

Adviser: Mark Jude F. Trondillo, Ph.D

The study was conducted to assess the potential of Rice Husks as material for Thermal-Insulation Box. The study was carried out through Complete Randomized Design with three treatments and three replications. The rice husks were used producing the rice husks thermal-insulation box with PVA (Polyvinyl Acetate) Glue as binder. The treatment was 1kg rice husks and 2.5kg PVA (Polyvinyl Acetate) Glue (T1), 1kg rice husks and 3.0kg PVA (Polyvinyl Acetate) Glue (T2), and 1kg rice husks and 3.5kg PVA (Polyvinyl Acetate) Glue (T3). The ice retention, density, durability, and physical attributes (color, texture, configuration and general acceptability) were determined and the data were analyzed using One-Way Analysis of Variance at 1% and 5% level of significance. ii The results revealed that there was no significant differences observed in the ice retention, density, durability, and physical attributes (color, texture, configuration and general acceptability) of all treatments. Furthermore, the results showed that in terms of ice retention, all treatments has the capability to retain ice for 15-19 hours before it would totally melt. Meanwhile in terms of density, Treatment 3 has the highest mean density of 0.67 g/cm<sup>3</sup> which is much heavier compared to Treatment 1 and Treatment 2. In addition, in terms of durability, Treatment 3 got the highest mean durability rate after being dropped horizontally and in incline position. Moreover, in terms of color all treatments were considered to have light color and have texture ranges from rough to very rough. Lastly, the respondents were satisfied with Treatment 2 thermal-insulation box maybe because it's still have better configuration and durability. It was found out that rice husks are a good material for creating and manufacturing thermal-insulation boxes, and PVA glue performs well as a binder.

Keywords: *Rice Husks Thermal-Insulation Box, Cool box, PVA Glue*

## **PHYSICAL AND MECHANICAL PROPERTY OF COCO-CONCRETE HOLLOW BLOCKS**

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Authors: Cliekert M. Orbuda

Year: 2022

Adviser: Eduardo F. Aquino, MSME

The study on the Physical and Mechanical Property of Coco-Concrete Hollow Blocks was conducted to determine the bulk unit weight, bulk density, specific gravity, compressive strength, water absorption and cost per unit production of Coco-CHBs. Crushed coconut shells were used as partial replacement of aggregates and molasses as binder of the CHB mixture. The treatments were measured by volume, T1 with 10% crushed coconut shell and 90% aggregates, T2 with 15% crushed coconut shell and 85% aggregates, T3 with 20% crushed coconut shell and 80% aggregates, and T4, the controlled CHB with 100% aggregates. Each treatment was added with 400 ml of molasses by volume and was cured for 28 days. Controlled CHB was produced in the study for comparison of the test results of Coco-CHB.

The ANOVA results showed that there was a highly significant difference in the mean bulk unit weight, bulk density and specific gravity among all the treatments. The compressive strength and water absorption test showed that there is no significant difference among all the treatments. In further investigation on the differences among the treatments LSD at 1% and 5% was used. Means in bulk unit weight of the all the treatments showed significant difference except for Treatment 2 and 3. In terms of bulk density and specific gravity, all the treatment showed significant differences with each other except for Treatment 2 and 3. Compressive strength and water absorption showed no significant differences between all the treatments.

The results of the study revealed that Coco-Concrete hollow Blocks passed the standard requirements for non-load bearing hollow blocks of Department of Public Works and Highways. And as for the cost per unit production, coco-CHBs and controlled CHB cost lesser than the non-load bearing hollow blocks sold in construction supplies. Hence, the use of Coco-CHB as non-load bearing hollow blocks is recommendable for it is lesser in weight and reliable in strength. In addition, the utilization of coconut shells reduces the use of natural aggregates and lessen its detrimental effect to the environment.

## **EVALUATION ON THE QUALITY OF BANANA PEELINGS (*Musa sp.*) AS A MATERIAL FOR THE PRODUCTION OF FLOOR WAX**

Authors: Reychel C. Padilla

Year: 2022

Adviser: Mark Jude F. Trondillo, Ph.D

The study was conducted to evaluate the Quality of Banana Peelings (*Musa sp.*) As a Material for the Production of Floor Wax. The study was carried out through Complete Randomized Design with three treatments and three replications. The treatment was the commercial floor wax (T1), saba banana peel floor wax (T2) and latundan banana peel floor wax (T3). The quality of the produced floor wax was tested in terms of Odor, Color, Texture, Gloss or Shine, Slipperiness and General

Acceptability. Statistically the results revealed that there was significant difference in odor color, gloss or shine, slipperiness and general acceptability. However, no significant differences were observed in the texture of the treatment. The results showed that banana peelings can be a good material for floor wax. But the most recommended among the treatments is T3 had because it has comparable result on Treatment 1 which is the Commercial Floor Wax. This entails that Treatment 3 Latundan Floor Wax can be a potential substitute for the production of floor wax.

Keywords: *Banana peelings, Floor wax, Production, Substitute, Quality*

**PHYSICO-MECHANICAL PROPERTY OF PARTICLE BOARD FROM SHREDDED RICE (*Oryza Sativa*) STRAW STALK AND PLASTIC BOTTLE WASTES WITH EPOXY RESIN AS BINDER**

Authors: Zhaira M. Rabaño

Year: 2022

Adviser: Teresa S. Lumansoc, MS

The study was conducted to evaluate the bulk density, water absorption capacity, specific gravity and tensile strength of the particleboard produced using different levels of rice straw stalk (RSS) and plastic bottle wastes (PBW) while considering the epoxy resin as binder as affected by the different proportions of rice straw and plastic bottle waste. The cost per piece of the board produced per treatment was also evaluated. This study was carried in a Completely Randomized Design (CRD) with three treatments, replicated thrice. Treatments were T1 -75% (750g) RSS + 25% (250 g) PBW; T2 -50% (500 g) RSS + 50% (500 g) PBW; T3 -25% (250 g) RSS + 75% (750 g) PBW. The results showed that there is no significant difference on the bulk density, water absorption capacity, specific gravity and tensile strength of the particle board produced from each treatment. The bulk density result shows that the lesser the rice straw stalk in the treatment, the higher the bulk density is. In terms of water absorption capacity, the more the rice straw stalk added on the mixture shows that there is an increase in weight when soak in water for 24 hours. The specific gravity results implied that the more plastic bottle waste added on the mixture it has a significant reduction of the particle board's specific gravity. The tensile strength results indicated that the more rice straw stalk further added on the mixture it will increase the tensile strength of the particle board. Based on the general findings of the study, the researcher concludes that the particle boards produced from each treatment can be used for construction purposes. However, due to the expensive price of epoxy resin as binder it may cause a significant increase of the cost per unit production of the particle boards

# **QUALITY ASSESSMENT OF CEMENT-BONDED PARTICLEBOARD MADE FROM SAWDUST AND PLANER SHAVINGS OF GMELINA ARBOREA**

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Authors: Versano, Imy Joy A.

Year: 2022

Adviser: Eduardo F. Arborea, MSME

The goal of the study was to determine the quality of cement bonded particleboard made from various quantities of Gmelina Arborea sawdust and planer shavings. The proportion of the mixture used in every treatment was 75% (158g) sawdust and 25% (53g) planer shavings (T1), 50% (105g) sawdust and 50% (105g) planer shavings (T2), 25% (53g) sawdust and 75% (158g) planer shavings (T3). A constant amount of cement added to all mixtures was 630g (3:1 cement to wood ratio), with 3% (19g) of calcium chloride and an amount of 416g of water. The density, water absorption, thickness swelling, and modulus of rupture of the boards were determined. The data were gathered using a Complete Randomized Design and were tested at 1% and 5% levels of significance using One-way Analysis of Variance and Least Significant Difference to test significant differences among treatments. Based on the result, the highest value of mean density is the T2 (0.9445 g/cm<sup>3</sup>) and T1 (0.9153 g/cm<sup>3</sup>) which has the lowest mean density among treatments. In water absorption, it was revealed that T3 has the highest mean of 32.08% and T2 with 31.41% has the lowest mean percentage among treatments. In thickness swelling determination, it was revealed that T3 has the highest percentage of 2.77% and T1 with 1.13% has the lowest percentage of the mean. In modulus of rupture, it was indicated that T3 has the highest mean of 1.4593 MPa and T1 with the lowest mean MOR of 1.1561 MPa. Test for analysis of variance at 1% and 5% level of significance as well as the tests of significant difference among treatments using the Least Significant Difference reveals that water absorption and thickness swelling have significant differences among treatments. However, there's no significant difference in the density and the board's modulus of rupture. The density and thickness swelling of the boards conform to the existing general-purpose particleboard specifications. Because it falls within the standard value, the researcher concludes that various mixtures of sawdust and planer shavings can be used as a material for cement bonded particleboard.

# **Bachelor of Science in Information Technology**

## **ANDROID-BASED CLINIC RESERVATION SYSTEM**

Authors: Billy June Corenales

Year: 2022

Adviser: Domingo V. Origines, Jr., IT.D

Android-Based Clinic Reservation System that can used for making a reservation in the clinic through mobile application. The patient can book a reservation without going to the clinic by using mobile application and also the patient can ask to the secretary using the chat-support feature, the secretary can control the patient coming to the clinic for check-up by declining the reservation if the patient is over the limitation and can inform the patient what is the new protocol in the clinic. The development of the application used a laptop and android phones. The software used is android studio for developing the application and google firebase as database of the mobile application. The functionality of the objectives has the consolidated mean 3.82 which mark as very agree and this indicates in with the interpretation in Likert Scale of the certain functionality are stables. However, the time is not in a correct format and in the admin console it is difficult to manage the client when using android application. Therefore, it is recommended that the admin console should be in web-based for best functionality, the time should be dropdown format and improved the UI of the system to be more interactive and user friendly.

## **A SECURED ANDROID-BASED CLINIC RESERVATION SYSTEM USING ONE TIME PASSWORD (OTP) BASE ON UNIX TIME CODE**

Authors: Denmark A. Ermita

Year: 2022

Adviser: Domingo V. Origines, Jr., IT.D

A Secured android-based clinic reservation system using one time password (OTP) based on unix time code is an android application system that you can create an account to receive a unit time code for confirmation and security of the patient. This android application system develops to generate code and the code was direct to the Gmail account of the user or patient. In that way, based on the series of testing of an android app of A Secured Android-Based Clinic Reservation System Using OTP base on Unix Time Code, it is concluded that the Android application system has done, its main objectives of this system. As of now, the result of android application system was working and may help the patient for phishing attack, functionality has the consolidated mean of 4.1 which mark as Very Agree and this indicates in the interpretation through Likert scale of that certain functionality is stable. However, it is recommended that the android application system has an SMS text to receive a code; the patient can easily create an account. And also, the system has a SMS Security alert to confirm that you are the owner of the account.

# **WEB-BASED INFORMATION SYSTEM OF TRICHODERMA ADAPTORS WITH ALGEBRAIC MODEL DECISION SUPPORT SYSTEM**

Authors: Nwel Jhean N. Fernandez  
Adviser: Felomino P. Alba, IT.D

Year: 2022

Web-based Information System of Trichoderma adaptors with decision support system automates the process of recording and processing of Trichoderma data and the distribution to the adaptors. The web-based application stores the data and generates information and reports by monthly, quarterly, and annual sales of Trichoderma. The system produces an information about adaptors information and the frequencies that the adaptors acquire the Trichoderma in graphical format. The system includes a algebraic model decision support mechanism, that when the user encodes the data of the adaptors with the length and the planting distance of the area will be encoded, the system will automatically display or recommend of how much kilo of Trichoderma needed in the planting area of the adaptors after the user inputted the length and distance in the system, so that the adaptors have a better decision making, applying the formula area over planting distance ( $X=a/b$ ) where x is kilos, a is area, and b is planting distance in the algorithm of decision support. The algebraic model DSS a high-level modeling system for solving complex equations. It is employed to optimize variable or equation. Following a testing of Web-based Information System of Trichoderma Adaptors with decision support system the researcher conclude that in developing the web application planning, analysis, design, coding, and testing must follow the developing process to know if it was working well or not. In that way, when the final implantation there will be a fewer problem on it. The result of testing of the web application was working and can help the Trichoderma personnel to automate the recording (f) functionality has the consolidated mean of 3.90 which described as very agree in Likert scale of the certain functionality is stable.

**WEB-BASED AND ANDROID-BASED RESEARCH MANAGEMENT SYSTEM IN DAVAO DEL SUR STATE COLLEGE USING NEAREST NEIGHBOR SEARCH ALGORITHM WITH DECISION SUPPORT SYSTEM**

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Authors: Jay A. Jornales

Year: 2022

Adviser: Felomino P. Alba, IT.D

Web-based and Android-based Research Management System in Davao del Sur State College using nearest search algorithm with decision support system is a web application where students from graduates and undergraduates of DSSC upload and store their final research manuscript through the system. The system is equipped with search engine using a nearest neighbor search algorithm that can generate result of the relevance to the user queries with pattern that provide decision support system the system displays sense of value of field expertise of that search based on inputs and compared to search algorithm. Nearest neighbor search algorithm, it searches for its nearest neighbors in a feature space filled with known dataset instances. The nearest neighbor's class prediction is used, or the weighted average of the k classes closest neighbor is used. The relevance between two data records is determined in part by the variables utilized in the featured space leading to index similarity results. The advantage of this method is that, in many circumstances, an estimated nearest neighbor is nearly as good as an exact one. Some of the inputs from this study is that there must be a notification system that can author notified when there's a request of downloading of author file, it should have data statistics of downloaded files every day, there must be a guest user for non-students of the college for downloading and searching review related literature of their studies and lastly, detailed tabular data that records the downloads that author receives from his file.

## **MANAGEMENT USING CONVOLUTIONAL NEURAL NETWORK WITH RECOMMENDER**

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Authors: Karl Vincent A. Surdella

Year: 2022

Adviser: Rhea Mae L. Perito, MSIS

The traditional mango management was found to be a laborious task for orchardists, specifically on blooming assessment. Furthermore, pixel segmentation employs a fixed color threshold range, but panicle and canopy colors vary depending on cultivar and growing conditions, leading to false positives and negatives. In addition, color thresholding and feature-based segmentation are rendered ineffective by mango's inconspicuous inflorescence, resulting in misclassified flowers and non-flowers. Therefore, the researcher developed an Android application that employed the CNN sequential model to enhance the image classification of mango flowering. Moreover, the study also focused on recommending a spraying schedule based on the assessed captured image of a mango leaf and flowering stage—subsequently, the establishment of the spraying schedules, recommendations, and notifications. Furthermore, with only 2610 as the total images of trained datasets used, the system's classifier still performed an outstanding classification. It provided an average of 0.60 as the lowest and 0.99 as the highest confidence rate as the prediction result. Moreover, the system's accuracy garnered a 3.5 weighted mean described as agreeable; the dependency of the system's accuracy on the system's classifier affected its result as the classifier needs improvement, but still, experts agreed with the evaluation results. However, recognition errors such as unrecognizable flowering stages and mismatched results on the desired stage arose due to the minimal number of datasets. Therefore, in further study, it is recommended to increase the number of datasets during training for better accuracy.



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