

Republic of the Philippines  
**DAVAO DEL SUR STATE COLLEGE**  
Research Publication Office

**Institute of Computing,  
Engineering and Technology**

# **BOOK OF ABSTRACTS**

**A.Y. 2019-2020**



**BOOK of ABSTRACTS A.Y. 2019-2020**  
**Institute of Computing Engineering and Technology**

Copyright © 2024 by Davao del Sur State College

<https://www.dssc.edu.ph/>

The Book of Abstracts A.Y. 2019-2020 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.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without written permission of the copyright owner.

To request permission, contact Research Publication Office (RPO) of Davao del Sur State College.

**Published by:**

Name of Publisher: Davao del Sur State College

Address: Brgy. Matti, Digos City, Davao del Sur 8002

Contact Details: 082-293-9136 [president@dssc.edu.ph](mailto:president@dssc.edu.ph)

**EDITORIAL BOARD**

Siverlyn M. Camposano, Ph.D.

**Editor-in-Chief**

Engr. Eduardo F. Aquino

Cherry Ann P. Roxas, DBA

Quennie Lyn G. Almerez,

Ph.D. Jayson R. Pucot, MSc

**Associate Editors**

Engr. Teresa S. Lumansoc

**Managing Editor**

*MESSAGE FROM THE COLLEGE 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 RESEARCH, DEVELOPMENT AND  
INNOVATION DIRECTOR*



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**

Director, RDI

## *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. Teresa S. Lumansoc, 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 from the College President	i
Message from the RDI Director	ii
Message from the Dean	iii
<b>BACHELOR OF SCIENE IN AGRICULTURAL BIO-SYSTEM ENGINEERING</b>	
Profile of Pond and Cage Aquaculture production and physicochemical assessment of water quality in Sta. Cruz Davao del Sur Author: Carl Christian T. Alquitas	1
Onvective Drying of Cauliflower at Diferent Blanching Duration Author: Aldrin A. Bacalso	3
Design Fabrication, and Performance Evaluation of a Multi-Fruit Picker Author: Goldee M. Bangcailan, MSAE	4
Biobriquetting of Carbonized and Noncarbonized Cacao Pod Husks Author: Christine Hope L. Binseg	5
Development of Design, Fabrication and Performance Evaluation of Prototype Hydraulic Ram Pump for Small Scale Irrigation Author: Dehco C. Cabarubias	6
Effluent Quality of The Designed and Constructed Helophyte Filter for Wastewater Treatment Author: Cyrus Just Z. Cabasaan	7
Design, Development and Performance and Evaluation of Cacao Bagger Author: Jeffer M. Cimafranca	8
Utilization of Shredded Oil Palm (Elaeis Guineensis) Empty Fruit Bunches Wastes for Fiberboard at Different Levels of Cassava Starch As Binder Author: Cristine Joy S. Conde	9

Skills And Competency Assessment of Southern Philippines Agri-Business and Marine and Aquatic School Of Technology (Spamast) Agricultural Engineering Graduates Author: Jho-Ann A. Cuico	10
Design, Fabrication, and Performance Evaluation of a Small-Scale Potato ( <i>Solanum Tuberosum</i> L.) Peeler Author: Katheryn C. Dalagan	12
Design, Fabrication, and Performance Evaluation of Prototype Rice Hull Charcoal Briquetting Machine Author: Eden U. Songaling	13
Quality of Fiber from Different Banana ( <i>Musa</i> Spp.) Varieties Author: Jay-Ar G. Estimada	14
Identifying Soil Types in the Municipality of Matanao Through Geographic Information System (Gis)-Based Mapping Operations Author: Venann O. Eugenio	15
Biogas Production from Sugarcane Bagasse Mixed with Cow Dung at Different Ratio Author: James Carl L. Fadallan	16
Evaluation of Dried Sea Cucumber ( <i>Stichopus Horrens</i> ) Under Different Drying Methods Author: Jeselle-Ann M. Florida	17
Utilization of Kamias ( <i>Averrhoa Bilimbi</i> L.) in the Production of Vinegar Through Fermentation Process and Its Biochemical Profiling Author: Daphne B. Gamo	18
Effects of Different Drying Temperature on The Drying Rate and Quality of Dried Papaya ( <i>Carica Papaya</i> ) Chips Author: Eliezer C. Gaspar	19
Evaluation of Slaughterhouse Wastewater Treated with Different Levels of Indigenous Microorganisms (Imo) On the Growth and Yield Performance Of Pechay ( <i>Brassica Chinensis</i> ) Author: Aiah D. Gegrimsa	20

Design, Construction and Performance Evaluation of Motorized Peanut Roaster – Huller Author: Karl Daniel C. Gula	21
Design, Fabrication and Performance Evaluation of Automated Bioethanol Distiller Author: Faye Jan Amor J. Jayag	22
Bioethanol Production Using Pomelo (Citrus Maxima) Peel Author: Jules Dominique D. Cañada	23
Gis-Based Assessment on Financial Capability of Local Rice Farmers in Bansalan, Davao Del Sur Author: Wilfredo A. Lawas Jr.	24
Evaluation Of Pineapple Peel (Ananas Comusos) Paste Mixed with Different Level of Glycerol as Bioplastic Material Author: Aljean Licaros	25
Design, Fabrication and Performance Evaluation of An Automated Banana (Musa Acuminate X Balbisiana) Fruit Ripener Author: Cyril C. Madulin	26
Design, Fabrication and Performance Evaluation of Evaporative Cooler for Tomato (Solanum Lycopersicum) Author: Mary Ann D. Mamolo	27
Improving Water Quality Of “Spamast” Matti, Digos City Using Filtering Apparatus Utilizing Bio-Sand, Gravel and Activated Charcoal Author: John Ray R. Manigo	28
Design, Fabrication and Performance Evaluation of a Granular Fertilizer Applicator Author: Arieston S. Mohamad	29
Comparative Study of Hot Press and Cold Press Method of Extracting Essential Oil from Fermented Pomelo (Citrus Maxima) Peel Author: Kristelle Joy D. Parsacala	30

Sensory Evaluation and Cost Analysis of Processed Philippine Natural Grade Carrageenan Using Potassium Hydroxide Author: Max Ryan M. Pilapil	31
Biogas Yield of Different Pre-Treated Rice Straw using Trichoderma Harzianum Blended with Swine Manure Author: Julien Frence Mare V. Rapas	32
Effects Of Different Levels of Fermented Plant Juice on The Growth and Yield of Pechay (Brassica Rapa) Under Greenhouse Condition Author: Ray-An M. Rivas	33
Production Of Ethanol from Different Banana Biomass Waste Though Biochemical Conversion Author: Jesuven V. Rosique	34
Growth And Yield of Pechay (Brassica Chinensis) Under Hydroponic Vertical Planting Using Oil Palm Empty Fruit Bunch Mixed with Waste Egg Shell as Growth Media Author: Mary Catherine M. Saplagio	35
Evaluation Of Potassium Permanganate, Clay and Activated Charcoal Mixed Powder as Fruit Ripening Decelerator Author: Marjem S. Serrano	37
Growth And Yield of Pechay Using Desalinated Seawater as An Alternative Irrigation Water Author: Mary Fe R. Silvano	38
Processing of Crown of Thorns (Acanthaster Planci) Mixed with Charcoal as Odor Neutralizer Author: Sarah Jade M. Sumabat	39
Gis-Based Mechanism Level and Index Evaluation of Rice in Magsaysay, Davao Del Sur Author: Christine M. Watin	40
Assessment Of Potential Hydrogen and Temperature as Factors Influencing Fermentation of Crescentia Cujete with Bioethanol Production Enhancers Author: Jessie Rose L. Aboyot	41

Processing and Extraction of Cocoa Potash from Cocoa Pod Husk Author: Rawen G. Abrea	42
Evaluation On Buri ( <i>Corypha Elata</i> ) Leaf Fiber Under Different Drying Methods Author: Leah A. Acebedo	43
Wicking Hydroponics System with Milkfish ( <i>Chanos Chanos</i> ) Based Biofertilizer Effects on the Growth and Yield of Pechay ( <i>Brassica chinesis</i> ) Author: Kryzelou R. Aguelo	44
Effects Of Electrolyzed Water Fogging of Sugarcane ( <i>Saccharum Officinarum</i> ) At Different Levels of Sodium Chloride Author: Lovely Marie D. Amarillo	45
Physical Qualities of Fiber-Based Ecoseedling Bag from Snake Plant ( <i>Sansevieria Trifasciata</i> ) Author: Verra Myza C. Arat	46
Biogas Yield of Oil Palm Empty Fruit Bunches Co-Digested with Swine Manure at Different Ratio Author: Ivy Grace P. Arcena	47
Quality Of Buri Flour as Affected by Different Drying Methods Author: Romelita C. Arriaga	48
Evaluation Of Water Lettuce ( <i>Pistia Stratiotes</i> ) Powder as A Potential Material in Bioplastic Production Author: Jenebeve D. Babatuan	49
Identification Of Water Ph Levels in Fish Cages Areas in Tagabuli, Santa Cruz Davao Del Sur Author: Kaye S. Bello	50
Design, Fabrication and Performance Evaluation of A Continuous Controlled Coffee Bean Dryer Author: Louise Jan G. Bohol	51

Evaluation Of Fish Waste Ash as a Potential Replacement of Cement in Clay Brick Production Author: Richard B. Bravo	52
Determination of Ph Level of the Wastewater Treated with Cardava (Musa Acuminata X Balbasiana) Banana Peels Under Different Treatment Process Author: Adela Grace V. Bustos	53
Utilization of Corn Husk Ash as Partial Replacement of Cement in Concrete Hollow Block Author: Rey Jim L. Cayabyab	54
Identification On Water Ph Level in Mangrove Areas in Sitio Biao, Barangay Cogon, Digos City Author: Emmalou D. Chiu	55
Non-Circulating Hydroponic Growing of Cucumber (Cucumis Sativus L.) As Affected by Different Levels of Banana Peduncle Juice and Kd Foliar Author: John Charlo Cobol	56
Effect Of Different Pre-Treatments on The Physical Quality and Drying Rate of Breadfruit (Artocarpus Altilis) Fruit Flour Author: Jessa G. Danduan	57
Modification And Performance Evaluation of Motorized Peanut (Arachis Hypogaea) Roaster-Huller Author: Jeneae Delos Santos	58
Identifying Discharge and Water User of The Selected River of Digos City, Davao Del Sur Author: Niño G. Diestro	59
Design And Performance Test of Prototype Manual Banana Peduncle Juicer Author: Ronel M. Egido	60
Utilization And Processing of Pomelo (Citrus Maxima) Peel for Bar Soap Author: Rey Ann M. Embodo	61

Evaluation of White Silk Cotton (Ceiba Pentandra) Fiber Paper using Magnesium Hydroxide with Cassava Starch and Seaweed Powder Author: Merje Faye L. Enerio	62
Evaluation Of Aratilis Fruit (Muntingia Calabura Linn) as a Potential Source of Bioethanol Author: Joezel A. Entienza	63
Properties Of Clay Bricks Mixed with Abaca Residue Ash Author: Edda Louise M. Fiel	64
Quality Of Cacao (Thebroma Cacao L.) Pod Husk as a Bioplastic at Different Levels of Mixtures Author: Karen Rizza C. Foronda	65
Quality of Alkali Pretreated Leaf Midrib Fibers from Different Banana (Musa Spp.) Cultivars Author: Francis L. Cabigas	66
Design, Fabrication and Performance Evaluation of Water Flow Driven Waste Collector for Irrigation Canals Author: Georgy G. De Castro, Jr.	67
Design, Fabrication and Performance Evaluation of Prototype Mechanical Milkfish (Chanos Chanos) Sorter Author: Christhelle G. Gerona	68
Properties Of Fiberboard from Cavendish Banana (Musa Acuminata) Empty Fruit Bunch Fibers as Influenced by Different Levels of Cornstarch Binder Author: Danielle Justice Marie T. Gica	69
Gis Database on Soil Nutrient, Soil and Water Management and Production Yield of Arabica Coffee Author: Lorecris L. Gilvero	70
Processing And Drying of Lemon Grass (Cymbopogon Citratus) As Potential Source of Essential Oil Author: Christian Dominique A. Iyog	71
Properties of Bioplastic Made from Different Mixture of Taro (Colocasia Esculenta) Corm Starch and Protein Author: Ma. Victoria Jegremsa	72

Quality Of Charcoal from Calabash ( <i>Crescentia Cujete</i> ) Fruit Shell Author: Jesa M. Lausa	73
Utilization Of Jute ( <i>Corchorus Olitorious</i> ) Stem Fiber and Chayote ( <i>Sechium Edule</i> ) Stem Fiber with The Inclusion of Paper Waste and Corn Starch For Paper Board Production Author: Ryan E. Lolipay	74
Effect of Different Levels of Glycerol on the Quality of Bioplastic Using Pineapple ( <i>Ananas Comosus L.</i> ) Stem Starch Author: Jireh L. Loquinario	75
Quality of Concrete Hollow Blocks with Crushed Coconut Shell and Molasses Author: Christine D. Maghanoy	76
Utilization of Rice ( <i>Oryza Sativa</i> ) Straw Products Mixed with Different Sources of Starch for The Production Of Bioplastic Material Author: Anthony Bryan Q. Mallari	77
The Effects of Organic Fruit Coating from Seaweeds ( <i>Kappaphycus Alvarezii</i> ) Extract on The Shelf Life and Quality of Lakatan Banana ( <i>Musa Acuminata</i> ) Author: Arjun R. Mampusti	78
Sensory Characteristics of Breadnut ( <i>Artocarpus Camansi</i> ) Seed Flour as Affected by Different Drying Methods Author: Edilyn G. Maniapao	79
Design, Fabrication and Performance Evaluation of a Non- Operated Prototype Portable Soil Siever for Sand, Silt and Clay Author: Anthony E. Merquita	80
Brewed Quality of Naturally Processed Robusta Coffee in Different Roasting Profile Author: Anna Mae S. Naol	81
Utilization Of Different Ratio of Cardava Banana ( <i>Musa Balbisiana</i> ) Peel And Swine Manure For Biogas Production	82

Author: Vincent Jay S. Padillo	
Weight Loss And Sensorial Quality of Lakatan Banana (Musa Acuminata) Treated Under Wet and Dry Ozonation Processes	83
Author: Kobe B. Partol	
Quality of Broccoli ( <i>Brassica oleracea</i> var. <i>italica</i> ) Using Different Precooling Operations and Packaging Materials	84
Author: Baltazar M. Nicolas	
Design, Fabrication and Testing of The Prototype Brick-Walled Evaporative Cooler with Different Cavity Filler for Cucumber ( <i>Cucumis Sativus</i> )	85
Author: Cloyd D. Pepito	
Design, Fabrication and Testing of Hand-Held Driven Mechanical Cacao Beans Extractor	86
Author: Mark Bryan C. Quiao	
Design, Fabrication, and Performance Evaluation of Prototype Two Spindle Type Abaca ( <i>Musa Textilis</i> Nee) Winding Machine	87
Author: Junell Jayson E. Quisto	
Design of a Household – Type Coffee Bean Huller	88
Author: Michael Jhonny A. Rama	
Formulation And Evaluation of Plant-Extract Based Natural Dye	89
Author: Gine C. Redido	
Design, Fabrication and Performance Evaluation of Prototype Agri - Sonic Bird Repellent Device on Rice Field	90
Author: Rex Adrian S. Natingga	
Potential Hydrogen (Ph) Value Determination on The Fermented Mixture of Cardava Banana ( <i>Musa Acuminata</i> or <i>Balbisiana</i> ) Flower for Bioethanol Production	91
Author: John Virg A. Rosal	
Quality Characterization of Paper Produced from Different Canna Plant Species	92
Author: Saysay A. Rosillo	

Processing And Evaluation of Guyabano ( <i>Annona Muricata</i> L.) Leaves as Potential Tea Powder Under Different Drying Conditions	93
Author: Precious C. Solosod	
Extraction And Evaluation of Fermented Juice from <i>Gmelina Arborea</i> Sp. Leaves Hot Press Method and Cold Press Method	94
Author: Aljer O. Tanduyan	
Biodegradability And Physical Properties of Sugarcane Bagasse as Seedling Bag	95
Author: James Toledo	
Characterization of Arabica Coffee Using Different Processing Methods	96
Author: Krystal Mae A. Torres	
Physical Properties Assessment of Fiber Cement Bonded Board Prepared from Extracted Non-Woody Cellulosic Plant Fibers, Cement and Different Fillers	97
Author: Golda Myra Velasco	
Ph Determination on the Fermented Mixture of Waste-Matured Coconut Juice ( <i>Cocos Nucifera</i> L) As Potential Source of Bioethanol	98
Author: Honey Lyn T. Villamor	
Extraction and Evaluation of Dwarf Variegated Agave ( <i>Desmettiana</i> Variegata) Leaf Fiber Under Different Drying Methods	99
Author: Jc O. Yabis	
<b>BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY</b>	
Enhancement of Web-Based General Facility Management System of Spamast Digos Campus with Barcode Technology	111
Author: Bobby Carillo Jr.	
Advance Farming Monitoring System	112
Author: Eric Dela Calzada	

Automated Piglets Feeder with Feeds Weight Monitoring System and Sms Notification Author: Lyca Janice Pasa	113
Development Of Egg Classifier Using Pixy Camera and Load Cell Author: Jeneby G. Reyes	114
Android-Based Monitoring System: A Case on Quality Dried Of Mango Chips Author: Genivie E. Sarsona	115

**Bachelor of Science in  
Agricultural Bio-System  
Engineering**

# **PROFILE OF POND AND CAGE AQUACULTURE PRODUCTION AND PHYSICOCHEMICAL ASSESSMENT OF WATER QUALITY IN STA. CRUZ DAVAO DEL SUR**

---

Author: Carl Christian T. Alquitas

Year: 2020

Adviser: Engr. Razel Allan R. Valleser

The study entitled 'Profile of Pond and Cage Aquaculture Production and Physicochemical Assessment of Water Quality in Sta. Cruz Davao del Sur' was conducted. This was carried out to determine the profile of pond and cage aquaculture production and to assess the physicochemical properties of water quality that greatly affect safe and favorable fish production. Profiling was done through in-depth interviews with the 17 and 15 identified pond and cage operators or farmers, respectively. The profile of pond and cage aquaculture production is in terms of materials used in the construction of aquaculture structure, physical dimensions, production equipment, cultured species, stocking density, production yield, average size of fish during harvest, mortality rate and common problems encountered. On the other hand, water quality assessment was done through 3-day composite water sampling with 6 days interval, laboratory analysis and evaluation of the determined water quality parameters by comparing to the established water quality standards. The water quality parameters considered in the study are dissolved oxygen, alkalinity ( $\text{CaCO}_3$ ), water temperature, pH level and total suspended solids (TSS).

Results revealed that mean dissolved oxygen level in marine cages and ponds of Sta. Cruz were very low and near critical level of 5.0 mg/L. DO in marine cages measured 3.67 mg/L while 5.20 mg/L was observed in ponds. The very low concentration of dissolved oxygen was due to the lack of aeration equipment, biofouling problems and overstocking. Alkalinity ( $\text{CaCO}_3$ ) levels exceeded the maximum allowable limit of 100 mg/L. Highest and lowest mean reading among ponds and cages were 341.25 mg/L and 229.20 mg/L, respectively. Water temperature in ponds slightly exceeded the maximum allowable limit of 32 °C which obtained mean value of 32.61 °C. TSS and pH values met the water quality standards.

Furthermore, the profile of pond and cage aquaculture in terms of production yield, mortality rate and common problems in production were quite alarming. Production rate in marine cages is very low although the stocking density laid within the typical range. Production rate in cages is commonly below 1.0 kg/m<sup>3</sup> compared to typical range of 3-20 kg/m<sup>3</sup>. High mortality in both pond and cage were observed obtaining 50 % and 70 %, respectively. Main problems in marine cages were fish kill, slow growth and biofouling problems

while dike leakage, predator attack, and presence of competitors were the main issues in pond aquaculture. Thus, the marine cages in Sta. Cruz are considered unsafe and unfavorable for fish production while pond aquaculture in Sta. Cruz is near to critical level.

## **ONVECTIVE DRYING OF CAULIFLOWER AT DIFERENT BLANCHING DURATION**

---

Author: Aldrin A. Bacalso

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph.D

The study entitled, "Convective Drying of Cauliflower (*Brassica Oleraceae*) at Different Blanching Duration" was successfully conducted at SPAMAST-Digos Campus, Matti Digos City last March 18 to April 16, 2019. The study was conducted to determine the effect of different blanching duration: T<sub>1</sub>- 40 seconds, T<sub>2</sub>- 50 seconds, T<sub>3</sub>- 60 seconds, and T<sub>4</sub>- no blanching pre-treatment, on convective oven dried cauliflower. The study was carried out in a Completely Randomized Design (CRD). Data gathered were drying rate, crude protein content, sensory characteristics, and rehydration ratio capacity.

Study revealed that T<sub>4</sub>- no blanching pre-treatment had a highly significant effect ( $p < 0.01$ ) on drying rate, rehydration ratio capacity, and significant effect ( $p < 0.05$ ) of sensory characteristics in terms of color but not significantly different in terms of odor and overall acceptability, variable T<sub>1</sub>- 40 seconds blanching duration also showed significant difference ( $P < 0.05$ ) of sensory characteristics in terms of texture among treatments. Cauliflower provided high amount of crude protein. According to test results 40 seconds blanching pretreatment provide high amount of crude protein content with 28.25 %.

## **DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF A MULTI-FRUIT PICKER**

---

Author: Goldee M. Bangcailan

Year: 2020

Adviser: Engr. Eric Z. del Rosario, MSAE

This study was undertaken to design, fabricate and evaluate the performance of a multi-fruit picker. The conduct of the study was from 3rd week of May 2019. The study aimed to determine the comparison between the conventional picker and the multi-fruit picker in terms of: picking efficiency, picking capacity, the percentage of mechanical damage of fruits per harvest, and the cost analysis of the multi-fruit picker. The commodities that were used during the evaluation were mango, pomelo, and guava.

The study was analyzed using T-test for probability of difference among two sets of data, harvesting method using the conventional picker and the multi-fruit picker.

Based on the results and findings on the study of design, fabrication, and performance evaluation of the multi-fruit picker, the picking capacity of harvesting mango has a significance difference between the two treatments that has a P-value of 0.002861. The pomelo also showed a significant difference while in guava harvesting, the not significant difference were observed between the two treatments. In terms of picking efficiency, the mango harvesting has a significant difference between the two treatments that garnered a P-value of 0.00397, while in pomelo and guava harvesting showed no significant difference among the treatment means. The data acquired in the percentage of mechanical damage showed that the mango and pomelo harvesting has a significant difference between the two treatments with the P-value of 0.003982 and 7.68E-05, while in guava harvesting using the two treatments showed a not significant difference having a P-value of 0.400605.

Total investment cost was the cost of the fabricated multi-fruit picker at Php 2,500.00. Fixed and variable cost was assumed with the daily labor cost and 5 years life span, interest on investment, repair and maintenance as well as insurance was also assumed at 26%, 10% and 3%, respectively.

The cost of operation per day was assumed as Php 303.35. The calculated average capacity of the multi-fruit picker was 210.67 kg/day, the calculated custom rate was Php 1.44 per kilogram of the harvested commodity that was assumed at Php 50.00 per kilogram of fruits and the payback period of the multi-fruit picker were 0.42 year or 157 days.

## **BIOBRIQUETTING OF CARBONIZED AND NONCARBONIZED CACAO POD HUSKS**

---

Author: Christine Hope L. Binseg

Year: 2020

Adviser: Nila Nanette S. Revilla Ph.D

This study was conducted in SPAMAST Digos Campus, Digos City. It aimed to produce and evaluate the difference of carbonized and noncarbonized cacao pod husk briquettes at different levels of starch. There were two factors being considered in this study, Factor A for type of briquettes, and Factor B for levels of starch. The study mainly focused on percent recovery, durability, ignition time, time to boil, burning rate, burning efficiency and ash residue.

There were two kinds of briquette with four different levels of starch replicated three times to attain reliable results. The first treatment combination for carbonized and non-carbonized CPH are 1kg and 0% starch, second treatment combination are 1kg and 5% starch, third treatment combination are 1kg and 10% starch and fourth treatment combination are 1kg and 15% starch by weight.

Highest durability, burning rate and burning efficiency were observed in non-carbonized cacao pod husk, highest percent recovery, ignition time, time to boil and ash residue were in carbonized cacao podhusks. Among the levels of starch, Treatment 1 obtained the longest time to boil one liter of water and Treatment 4 are highest in burning rate, burning efficiency and durability. Treatment 2 obtained the shortest ignition time and time to boil one liter of water. Non-carbonized cacao pod husk briquette with a mixture of 1:5 is best and is suitable for cooking.

# **DEVELOPMENT OF DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF PROTOTYPE HYDRAULIC RAM PUMP FOR SMALL SCALE IRRIGATION**

---

Author: Dehco C. Cabarubias

Year: 2020

Adviser: Gabby C. Lanticse, PAE

The design and fabrication was conducted at EFG Bansalan Parts and Services Marang St. Poblacion Uno, Bansalan Davao del Sur and the performance evaluation of prototype hydraulic ram pump was conducted at Southern Philippines Agri-Business and Marine and Aquatic School of Technology, SPAMAST-Digos Campus, Matti, Digos City, on April 2019.

The prototype hydraulic ram pump was made up of 40 cm in length and 3 inches in diameter G.I. pipe for the pump body; 3 inches in diameter G.I pipe and the same flange plates on top and bottom with 10 mm in thickness but having different volume for the air vessel; the first air vessel is 50 cm high with a volume 139.18 cu.in. , the second air vessel is 55 cm high with a volume of 153.03 cu.in. , and the third air vessel is 60 cm high with a volume of 166.96 cu.in.

One half inch in diameter G.I. pipe for the outlet pipe with threaded end; 1 ½ inch in diameter G.I. pipe for the inlet pipe with threaded end; rubber gaskets 3 inches in diameter and 10 mm in thickness; impulse valve plate and delivery valve plate; impulse valve rubber with the diameter of 50 mm and thickness of 8 mm; snifter valve rubber diameter of 60 mm and thickness of 2 mm; impulse valve stem is 150 mm in length; M8 threads 40 mm from top and 70 mm from the bottom; impulse valve stop bar; impulse valve plug and impulse valve plate; 8 x 50 mm M8 bolts and 2 x 7 mm washers and nuts.

The parameters being considered in this study were the volume of the lifted water, volume of the wasted water, discharge rate of lifted water, discharge rate of wasted water and efficiency of the hydraulic ram pump at different volume of the air vessel and delivery heads. The prototype hydraulic ram pump was tested at different volumes of the air vessel (139.19 cu.in., 153.03 cu.in., 166.96 cu.in.) and replicated three times at different delivery heads (1 m, 1.5 m, 2 m, 2.5 m and 3 m).

All the parameters being considered in this study shows that at different volume of air vessel and different delivery heads, shows that height of delivery was inversely proportional to the volume of lifted water and is directly proportional to the volume of wasted water.

## **EFFLUENT QUALITY OF THE DESIGNED AND CONSTRUCTED HELOPHYTE FILTER FOR WASTEWATER TREATMENT**

---

Author: Cyrus Just Z. Cabasaan

Year: 2020

Adviser: Ryan Art M. Tuling, PAE, EnP

The study entitled Effluent Quality of the Designed and Constructed Helophyte Filter for Wastewater Treatment was conducted at Poblacion Dos, Cosmos St. Bansalan Davao del Sur last April to May 2019 to determine the quality of the helophyte filter effluent for irrigation water purposes. Data were statistically analysed through the use of t-Test method.

Salinity, pH level, Temperature, Dissolved Oxygen, Total Suspended Solids, Biochemical Oxygen Demand did not differ significantly between Non-treated and treated (effluent) because of the wastewater quality was not in a critical level in different parameters for irrigation water. Thus, test other wastewater with critical quality to test the efficiency of the constructed helophyte filter for irrigation water purposes.

## **DESIGN, DEVELOPMENT AND PERFORMANCE AND EVALUATION OF CACAO BAGGER**

---

Author: Jeffer M. Cimafranca

Year: 2020

Adviser: Engr. Eduardo F. Aquino, MSME

This study was conducted in Bansalan, Buenavista, Davao del Sur. It aimed to develop and evaluate the performance of mechanical bagger. The existing bagger was purchased at USeP-Obrero Campus. The study was conducted from April 15 to May 25, 2019.

The study was carried out in a complete randomized design. There are two treatments, the existing bagger and the new develop bagger. The treatments were replicated three times and been test for twenty five cacao trees. One-way ANOVA and t-test analysis was done to determine significant difference among treatments.

Based on the result, existing and new develop bagger shows to had no significant difference. This result were all the same in terms to actual bagging capacity (pods/hr), pod bagging efficiency (%), actual bagging capacity (trees/hr) and bagging time efficiency (%).

The researcher is strongly recommended to use other rubber band for the locked of the cellophane. Conduct a study were the mechanical reloading of magazine is used. And make the pole larger than the study for more efficient result.

## **UTILIZATION OF SHREDDED OIL PALM (*Elaeis guineensis*) EMPTY FRUIT BUNCHES WASTES FOR FIBERBOARD AT DIFFERENT LEVELS OF CASSAVA STARCH AS BINDER**

---

Author: Cristine Joy S. Conde

Year: 2020

Adviser: Engr. Melanie A. Astang, PAE

A study on the utilization of shredded oil palm (*Elaeis guineensis*) empty fruit bunches wastes for fiberboard at different levels of cassava starch as binder was conducted at Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST) located at Brgy. Matti, Digos City, Davao del Sur from April 10, 2019 to May 10, 2019. The study aimed to determine the quality of the fiberboard in terms of molds and fungus occurrence, density, porosity and tensile strength. The study was carried out through Completely Randomized Design (CRD).

In determining the physical properties of fiberboard, there was significant difference among treatments in terms of thickness after oven drying and thickness after 30 minutes of exposing the fiberboard into the natural surroundings. The result on measuring the thickness of the fiberboard after oven drying indicates that Treatment 1 had the highest measured thickness of 2.553 cm while Treatment 4 had the lowest measured thickness of 1.943 cm. On the other hand, the result on measuring the thickness of the fiberboard after 30 minutes of exposing into natural surroundings indicates that Treatment 1 had a highest measured thickness of 2.503 cm while Treatment 4 had the lowest measured thickness of 1.710 cm.

In determining the microbiological properties of fiberboard in terms of molds and fungus occurrence in the fiberboard indicates that there was no observed occurrence of molds even if it was exposed into natural environment for one month.

The results on the mechanical properties of the fiberboard in terms of density shows a significant difference among each treatments. The results indicate that the highest computed density of fiberboard was the Treatment 1 of 0.2437 g/cm<sup>3</sup> while Treatment 4 had the lowest computed density of 0.1830 g/cm<sup>3</sup>. However, the test result in terms of tensile strength of the fiberboard indicates that Treatment 2 and 3 had the highest calculated tensile strength of 3.09 MPa while Treatment 4 had the lowest computed tensile strength of 2.7 MPa.

# **SKILLS AND COMPETENCY ASSESSMENT OF SOUTHERN PHILIPPINES AGRI-BUSINESS AND MARINE AND AQUATIC SCHOOL OF TECHNOLOGY (SPAMAST) AGRICULTURAL ENGINEERING GRADUATES**

---

Author: Jho-Ann A. Cuico

Year:

2020

Adviser: Dr. Nila Nanette S. Revilla

This study was aimed to determine the skills and competencies of graduates of the Southern Philippines Agri-Business and Marine and Aquatic School of Technology. This study was conducted from March to May 2019. A descriptive survey questionnaire was used. Data were presented in relative frequency distribution.

Data gathered aimed to present Socio-economic characteristics, educational attainment, eligibility, area of Specialization and employment status. Meanwhile, this study is to assess and determine the different skills and competencies on the BS Agricultural Engineering Graduates. Introduction Agricultural science curriculum was developed scientific knowledge and practical and applied skills in agricultural engineering field.

Out of 45 respondents, there were only 40 (88.89 %) of the total agricultural engineering graduates are employed. Of the 40 respondents employed, 23 (57.50 %) of them have current job related to agricultural engineering profession while 17 (42.50 %) of them have current job not related to agricultural engineering profession.

Those who are employed, there are 23 graduates who are working in government institutions. Those who are working in line with agricultural engineering profession, 21 (91.30 %) of them are licensed agricultural engineers while two (8.70 %) of them did not pass the agricultural engineering licensure examination. There were 17 (37.78 %) graduates who are working in government agencies but not in line with Agricultural Engineering, eight of them did not passed the licensure examination while 9 of them are licensed agricultural engineers. On the other hand, only 5 graduates were not employed due to lack of experience and no job opportunity.

In terms of skills learned in the field during employment, mostly answered the use of Quantum Geographical Information System (QGIS) mapping, make plans using AUTOCAD software, geo-tagging, skills to communicate different people, activity proposal preparation, monitoring and evaluating implemented projects, data analyzing, coordinating to various department heads for development and assessment of projects.

Problems encountered by the Agricultural engineering graduates in finding a job disclosed that the profession still do not

have office which recognized the work of AE either in provincial, city or municipality; agricultural engineering graduates were less qualified than other engineering graduates and mostly, Agricultural Engineering graduates compete with other agriculture graduates.

## **DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF A SMALL-SCALE POTATO (*Solanum tuberosum* L.) PEELER**

---

Author: Katheryn C. Dalagan

Year: 2020

Adviser: Eduardo F. Aquino, MS ME

This study was undertaken to design, fabricate and evaluate the performance of small-scale potato peeling machine. The conduct of the study was started from 1st week of March and ended on 1st week of May 2019. The study determines the significant difference on the peeling duration, peeling efficiency, peeling capacity, and peeling recovery at different potato sizes (T1 – 2.5 to 3 inches, T2 – 2 to 2.5 inches, T3 – 2 inches).

The study was analyzed using an F-Test with three treatments replicated ten times. T-test for probability of difference between two sets of data, the manual and machine type of peeling and Tukey's Range Test for the significant difference among means. Data gathered were peeling duration, peeling efficiency, peeling capacity, and peeling recovery of the small-scale potato peeler.

The recommended size of the potato when peeling using small-scale potato peeler was treatment 1 which was less than 2 inches since it contains the smallest size of all the treatments and it was proven in the data provided in the appendices that the smaller the size of the potato the more the blade can't fully touch the potato surface and dig the imperfect or the uneven curves of the potato. But when the largest size of the potato (2.5 to 3 inches) was peeled, the more difficult for the blade to peel the potato with little thickness.

# **DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF PROTOTYPE RICE HULL CHARCOAL BRIQUETTING MACHINE**

---

Author: Eden U. Songaling

Year: 2020

Adviser: Engr. Melanie A. Astang

The study was conducted at Prk.-4 Salvacion, Carmen, Davao del Norte at last April 2019 to determine the duration, recovery, production rate of prototype rice hull charcoal briquetting machine. In addition, to evaluate the physical characteristics (boiling test and porosity index) and proximate analysis (fixed carbon, ash content, volatile matter content, bulk density and calorific value) of rice hull charcoal produced by prototype rice hull charcoal briquetting machine.

This was carried in descriptive type of test. It has four (4) trials using the same weight (10 kg) rice hulls. The trials had the same amount of water (6 liters) and starch (8 %). Data gathered were duration, recovery, and production rate of prototype rice hull charcoal briquetting machine. The physical characteristics (boiling test, porosity, calorific value) and proximate analysis (fixed carbon, ash content, volatile matter content and bulk density) are the parameters in finding the quality of the briquettes. The mean duration that was 2.15 hours. The mean of recovery was 56.06 %. The mean of production rate was 4.325 (kg/hr). The result of physical characteristics of briquettes the mean of porosity index and water boiling test were 58.54 % and 7.17 minutes respectively. Based on the result of proximate analysis of the briquettes the mean of fixed carbon, ash content, volatile matter content, moisture content, bulk density and calorific value were 23.28 %, 36.675 %, 40.05 %, 4.4 %, 23.275 g/L and 801.5 MJ/kg respectively. The annual revenue total, total capital cost, total operation cost, total annual cost, all total cost and net profit were Php. 161, 670.00, Php. 18,000.00, Php. 100, 362.2, Php. 4,500.00, Php. 122, 862.2 and Php. 38, 807.8 respectively. The return investment of the prototype rice hull charcoal briquetting machine was 31.6 % with approximate payback period of 0.5 years.

## **QUALITY OF FIBER FROM DIFFERENT BANANA (MUSA SPP.) VARIETIES**

---

Author: Jay-Ar G. Estimada

Year: 2020

Adviser: Dr. Nila Nanette S. Revilla

This study on the quality of fiber from different banana (*Musa spp.*) varieties was conducted from March to April 2019 at Balagunon, Bansalan, Davao del Sur. The study aims to determine the significant difference on the percent recovery, fiber strand size, tensile strength, maximum tensile load of the fiber produced from different banana varieties.

This study was carried out using the Complete Randomized Design with three treatments, T1=Cardava Fiber, T2= Latundan Fiber, T3= Abaca Fiber and replicated three times. Analysis of Variance (ANOVA) was used in determining the significant difference among treatment means.

Latundan fiber showed the highest percent recovery, Cardava and latundan fibers were highest in fiber strand size, while abaca was highest in tensile strength and maximum tensile load.

However, no significant differences on percent recovery, fiber strand size, tensile strength and maximum tensile load.

# **IDENTIFYING SOIL TYPES IN THE MUNICIPALITY OF MATANAO THROUGH GEOGRAPHIC INFORMATION SYSTEM (GIS)-BASED MAPPING OPERATIONS**

---

Author: Venann O. Eugenio

Year: 2020

Adviser: Engr. Marvin T. Lopez

Knowing the physical and chemical properties of the soils in Matanao, Davao del Sur was crucial in formulating crop suitability analysis, risk reduction plan, hazard and climate change reaction plan, housing plan, and in identifying the flood prone and landslide prone areas in the municipality. A soil texture map can highly contribute in the determination of the areas that would primarily be affected by climate change. Together with soil nutrient map, soil texture map greatly helps in improving the crop production through farming the suitable crops in a particular area and following the proper farm operation practices. The information on soil nutrient improves the quality of the soil and develops strategies for better management of the farms and achieve higher crop yield.

This study was conducted to identify the different soil types in Matanao, characterize its nutrient content and determine its pH levels. Results reveal that the municipality's land resources that were used as crop production areas were still healthy and suitable for growing crops. Majority of the land resource of Matanao was covered with loam soil which was the ideal types of soil for plants. The soil in the municipality of Matanao, Davao del Sur contains acceptable levels of pH ideal for plant growth which also affects the nutrient content of these soils. The optimum pH range for most plants was between 5.5 and 7.5, however many plants have adapted to grow at pH levels outside this range. The nutrient (NPK) content of these soils also provides enough nutrients that the crops require for optimum growth.

## **BIOGAS PRODUCTION FROM SUGARCANE BAGASSE MIXED WITH COW DUNG AT DIFFERENT RATIO**

---

Author: James Carl L. Fadallan

Year: 2020

Adviser: Eduardo F. Aquino MA, MS

The study was conducted to determine the biogas yield of sugarcane bagasse with cow dung at different ratio and was held at SPAMAST Digos Campus, Matti, Digos City, from April 06 – May 06, 2019.

The study was carried out in a Complete Randomized Design (CRD). The Treatments were  $T_1$  with 100 % Sugarcane Bagasse,  $T_2$  with 75 % Sugarcane Bagasse and 25% Cow Dung,  $T_3$  with 50% Sugarcane Bagasse and 50 % Cow Dung, and  $T_4$  with 25 % Sugarcane Bagasse and 75 % Cow Dung. The biogas production was determined by using floating method. The parameters of the study were the biogas production, temperature, pressure, pH, and biogas composition in terms of methane content and carbon dioxide.

The results indicates that pure Sugarcane Bagasse produces a relatively low biogas production. However, adding a proportion of Cow Dung to Sugarcane Bagasse improves biogas production and apparently that the increase in Cow Dung mixtures increases the biogas production. Data analysis reveals that there was highly significant difference of all the treatments. Statistical analysis that there was highly significant difference among the treatments.

In addition, this study shows that pH is directly proportional to biogas yield and methane content.

## **EVALUATION OF DRIED SEA CUCUMBER (*Stichopus horrens*) UNDER DIFFERENT DRYING METHODS**

---

Author: Jeselle-Ann M. Florida

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph.D

The study entitled, "Evaluation of Dried Sea Cucumber (*Stichopus horrens*) Under Different Drying Methods" was successfully conducted at SPAMAST-Digos Campus, Matti Digos City last April, 2019. Drying methods used were traditional sun drying, fabricated solar glass dryer and convective type oven dryer (60 °C). Data gathered were: proximate ash, crude protein and crude fiber contents of dried sea cucumber samples, microbial contents such as aerobic plate count, yeast and molds, sensory characteristics and its unit production cost.

The sea cucumber samples were caught by the local fishermen in Bato, Sta. Cruz Davao del Sur. Dried sea cucumber samples were analyzed and the result revealed that solar drying method had the highest mean percentage of ash content at 39.60 %, while the lowest was sun drying method at only 26.52 % mean ash found among the treatments. Crude protein content in dried sea cucumber samples were also analyzed and the highest mean percentage with 41.53 % CP were observed from the treatment which is solar drying, however, sea cucumbers undergone oven drying samples were recorded as the lowest with 28.23 % CP. Crude fiber was observed to be affected by the pre-treatment conditions; oven drying got the highest mean percentage of crude fiber content at 1.31 % compared to other drying methods.

The result for microbial analysis revealed that sun drying had the utmost mean amount of aerobic plate count. While in yeast content of dried sea cucumber revealed that the three drying methods had equal amount of yeast that was present in the dried sea cucumber which is <10. Sensory characteristics were also affected by different drying methods. The overall acceptability that was based from its color, odor texture and general acceptability revealed that oven drying were more acceptable among treatments.

## **UTILIZATION OF KAMIAS (*AVERRHOA BILIMBI L.*) IN THE PRODUCTION OF VINEGAR THROUGH FERMENTATION PROCESS AND ITS BIOCHEMICAL PROFILING**

---

Author: Daphne B. Gamo

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph.D

The study entitled, "Utilization of Kamias (*Averrhoa bilimbi* L.) in the Production of Vinegar through Fermentation Process and its Biochemical Profiling" was successfully conducted at SPAMAST- Digos Campus, Matti, Digos City. The study was focused on the production of vinegar using the Kamias (*Averrhoa bilimbi* L.) fruits at different levels of maturity: T<sub>1</sub>- unripe fruits, T<sub>2</sub>- half-ripe fruits, T<sub>3</sub>- ripe fruits, and T<sub>4</sub>- control, Apple Cider Vinegar. Data gathered were: total titratable acidity, total residual alcohol content, total soluble solids, and pH value; sensory characteristics. Data was statistically analyzed through Completely Randomized Design (CRD).

The treatments were fermented for 40 days. The kamias vinegar samples were analyzed in the laboratory and sensory characteristics evaluation was also conducted.

The results showed that the kamias vinegar using ripe fruit has highest total titratable acidity of 0.31 % while the lowest was the unripe fruit with 0.20 % acetic acid where revealed to be less than compared to the apple cider vinegar with 5.15 %. The lowest sucrose was found on the treatment using ripe fruit with 19.90 % and both treatment with unripe and half-ripe fruit has 23 % sucrose, which is found to be very high compared to the apple cider with 3 % sucrose. The pH value of the kamias vinegar is not so distant to the apple cider with 2.45 where treatment using unripe fruit was the lowest with 2.70 and treatment with ripe fruit was the highest with 2.90. The residual alcohol content was very high at treatment that uses unripe fruit with 11 %, lowest was the treatment with ripe fruit by 7 %, but was not comparable to the apple cider with only 0.5 % alcohol.

Sensory characteristics were not affected by the maturity of kamias fruits used in the production of vinegar. All kamias vinegar treatments reted were acceptable. The overall acceptability based from its color, turbidity, odor, and general acceptability revealed that apple cider vinegar was most acceptable among treatments.

## **EFFECTS OF DIFFERENT DRYING TEMPERATURE ON THE DRYING RATE AND QUALITY OF DRIED PAPAYA (*CARICA PAPAYA*) CHIPS**

---

Author: Eliezer C. Gaspar

Year: 2020

Adviser: Teresa S. Lumansoc, PAE

The study on the effects of different drying temperature on the drying rate and quality of dried papaya (*carica papaya*) chips was conducted at SPAMAST-Digos Campus, Research and Learning Service Center (RLSC). The drying technique used was oven drying that varies on different temperature,  $T_1$  (55 °C),  $T_2$  (65 °C), and  $T_3$  (75 °C). Data were analyzed using the Analysis of Variance (ANOVA) at 1 %-5 % level of significance. Sunrise variety of papaya with similar ripeness was used to ensure that the moisture content of the fresh papaya would not differ from one fruit to another.

All treatments was underwent first blanching at 70-100 °C water temperature for 5 minutes then oven dried and weight at 15 minutes interval until the desired moisture content level at  $2\pm 1$  % was reached. The highest average moisture content removed per interval is 4.47 % and was recorded in treatment 3. Treatment 3 (75 °C) has the highest drying rate with 0.04037 kg/hr among all treatments. Highly significant difference ( $p < 0.01$ ) was observed in the mean drying rate of  $T_3$  when compared to the mean drying rate of  $T_1$ .

For nutritional analysis, the highest protein (4.47 %) and fat (0.16 %) were recorded at  $T_1$ , highest fiber (12.78 %) and ash (5.72 %) were at  $T_2$  and highest carbohydrate (54.24 %) was at  $T_3$ .

In the sensory evaluation, the color, odor, taste, texture, and overall appearance was all favoured in  $T_3$  (75 °C) with the average rating of 4.31 (more acceptable), 3.14 (acceptable), 3.34 (acceptable), 3.23 (acceptable), 3.83 (more acceptable), respectively. Color, taste and overall appearance are highly significant ( $p < 0.01$ ) in  $T_3$  compared individually to  $T_1$  and  $T_2$ . Texture is highly significant ( $p < 0.01$ ) in all treatments.

In unit cost production analysis,  $T_3$  has the lowest estimated cost and  $T_1$  has the highest estimated cost.

# **EVALUATION OF SLAUGHTERHOUSE WASTEWATER TREATED WITH DIFFERENT LEVELS OF INDIGENOUS MICROORGANISMS (IMO) ON THE GROWTH AND YIELD PERFORMANCE OF PECHAY (*Brassica chinensis*)**

---

Author: Aiah D. Gegrmosa

Year: 2020

Adviser: Nila Nanette S. Revilla, Ph.D

This study was conducted in SPAMAST Digos Campus, Matti, Digos City. It aimed to evaluate the effects of slaughterhouse wastewater treated with different levels of indigenous microorganisms (IMO) on the growth and yield performance of pechay (*Brassica chinensis*). Slaughterhouse wastewater were taken at Bansalan Slaughterhouse, Bansalan, Davao del Sur. The study was conducted from February 15 to April 03, 2019.

The study was carried out in a complete randomized design experiment. The treatments were replicated ten (10) times. The following were the treatments: T<sub>1</sub> – control, T<sub>2</sub> – 1 grams of IMO/1 liter of wastewater, T<sub>3</sub> - 2 grams of IMO/1 liter of wastewater, T<sub>4</sub> - 3 grams of IMO/1 liter of wastewater, T<sub>5</sub> – Pure wastewater and T<sub>6</sub> – 2 tbsp of Urea/Gal. of water. Analysis of variance (ANOVA) was done to determine significant difference among treatment and Least Significant Difference (LSD) @ 5% and 1% was done to further test for significant difference among treatment means.

Based on the result, pure wastewater (T<sub>5</sub>) and treated wastewater with different levels of IMOs (T<sub>2</sub> – 1 grams of IMO/1 liter of wastewater, T<sub>3</sub> - 2 grams of IMO/1 liter of wastewater and T<sub>4</sub> - 3 grams of IMO/1 liter of wastewater) were significantly different from pure water (T<sub>1</sub>) and with inorganic fertilizer (T<sub>6</sub>). This result were all the same in terms on the growth (leaf width, leaf length and number of leaves) and yield (fresh weight) performance of pechay.

Based on the findings of the study, pure wastewater (T<sub>5</sub>) posted the highest in leaf width, leaf length, number of leaves and yield (fresh weight) performance and did not differ significantly from T<sub>2</sub> – 1 grams of IMO/1 liter of wastewater, T<sub>3</sub> - 2 grams of IMO/1 liter of wastewater and T<sub>4</sub> - 3 grams of IMO/1 liter of wastewater. However, it is strongly recommended to do some test on the harvested crop to know if it is safe for human consumption. Also, the nutrient content of the treated wastewater maybe test if it can supply appropriate amount of nutrients needed by the plant. Soil media test also needed to see if there is any soil microorganisms created by the wastewater that may harm/affect the growth of a crop. To used other soil media and to used bigger pots.

## **DESIGN, CONSTRUCTION AND PERFORMANCE EVALUATION OF MOTORIZED PEANUT ROASTER – HULLER**

---

Author: Karl Daniel C. Gula

Year: 2020

Adviser: Engr. Eduardo F. Aquino, MA, MS

The design construction and performance evaluation of motorized peanut roaster – huller was conducted at the Southern Philippines Agri – Business and Marine and Aquatic School of Technology (SPAMAST) – Digos Campus on June 10, 2019.

The peanut roaster – huller was mostly made of stainless steel, angle bars, square bars, and a blower. The stainless steel which bend to form a cylinder which installed in the stainless solid shaft to serve as a peanut roaster – huller.

The parameters considered in accomplishing the study were the roaster – huller time, capacity, efficiency, and quality of the products in terms of color/appearance, aroma, and taste.

The motorized peanut roaster – huller was operated 27 times to acquire the required parameters and was observed that in every different time varies with a different level of flame it would increase the roasting – hulling efficiency. Results revealed that the color/appearance, aroma, taste, capacity and efficiency at the time of 5mins, 10mins, and 15 mins of roaster – huller machine with different level of flame of low, medium and high, the capacities are 0.156kg/hr, 0.805kg/hr, 0.956kg/hr. In the same manner, the efficiencies are 8 %, 40 %, 48 %, respectively.

Results and analysis gathered, the effect of time duration and flame does have a significant effect in terms of peanut roasting and hulling process, and also gives a good quality in terms of aroma, taste and color. However, too much flame and lesser flame would result to a poor quality product which would degrades the value of roasted and hulled peanut kernels to be sold to the market or to any consumers thus lessen the profit of the owner.

The study shows that the motorized peanut roaster – huller capacity was 0.805kg/hr and at 40 % efficiency, which can give difference with the conventional rate if provided.

The economic analysis revealed that the marginal benefit cost ratio of the machine is 2.56 with the annual net profit of ₱ 226,107.71/year.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF AUTOMATED BIOETHANOL DISTILLER**

---

Author: Faye Jan Amor J. Jayag

Year: 2020

Adviser: Engr. Eric Z. Del Rosario, MSAE

The study aimed to Design, Fabricate and Evaluate the Performance of Automated Bioethanol Distiller. The study was conducted in Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST) – Digos Campus, Matti, Digos City. May 2019.

Specifically, the study was conducted to determine the Distilling Rate, Distilling Duration, Distillation Efficiency, and Percent Alcohol Content. The study had three trials. The following components were installed; boiler, steam conduit, spiral tube, condenser and water inlet and outlet. The materials used during automation were servo motor, DS18B20 Waterproof Sensor, male jumpers and female jumpers, Arduino uno and digital display.

The average distilling rate of the Automated Bioethanol distiller was 0.115 ml/min. The average distilling duration of the automated bioethanol distiller was 147.3 minutes. The average distillation efficiency of the automated bioethanol distiller was 54.28 %. The result implies that 54.28 % only of 31.55 ml average practical yield was distilled by the automated bioethanol distiller. The average percent alcohol content of the bioethanol produced by automated bioethanol distiller was 81.15 %.

The investment cost of a complete set of the distiller is PHP 10,721.00. The cost to distill fermented molasses is PHP 1,577.17 per liter. Results implied that the distilling cost is not economical in terms of the average ethanol produced (17 ml) with lower average alcohol content (75.8 %). Design and the type of distillation affects the overall performance of the distiller. Moreover, the automated bioethanol distiller needs to be modified to increase its efficiencies and to be economical in producing ethanol.

## **BIOETHANOL PRODUCTION USING POMELO (*Citrus maxima*) PEEL**

---

Author: Jules Dominique D. Cañada

Year: 2020

Adviser: Engr. Eric Z. Del Rosario, MSAE

The study bioethanol production using pomelo (*Citrus maxima*) peel was conducted at chemistry laboratory of Southern Philippine Agri-Business, Marine and Aquatic School of Technology, Digos Campus, Mati, Digos City last March-April.

This was carried in a Randomized Completely Block Design with 2 factors. Factor A was on fermentation process (A1 – 10 grams of yeast, 135 grams of grinded pomelo peel, 250 mL of distilled water, A2 – 13 grams of yeast, 135 grams of grinded pomelo peel, 250 mL of distilled water, A3 – 15 grams of yeast, 135 grams of grinded pomelo peel, 250 mL of distilled water) and factor B was on fermentation duration (B1 – 7 days, B2 – 14 days, and B3 – 21 days) with 3 replications. Data gathered were further analyzed using the Analysis of Variance (ANOVA) at 1 % and 5 % confidence interval. Significant treatment means were further analyzed using Least Significant Difference (LSD).

Based on the data gathered, A3B3 (15 grams of yeast, 135 grams of grinded pomelo peel, and 250 mL of distilled water fermented at 21 days period) yielded the most bioethanol of 43.33 mL. with 74.33 % percent alcohol content and 1443.17 minutes distilling duration while A1B1R1 (10 grams of yeast, 135 grams of grinded pomelo peel, and 250 mL of distilled water fermented at 7 days period) yielded the lowest bioethanol of 2 mL. with 77.57 percent alcohol content and 25.67 minutes distilling duration. There were significant difference in the parameters in distilling duration, distilling rate and bioethanol yield while no significant difference in percent alcohol content. As what observed, increasing the amount of yeast and fermentation duration means increasing the yield of bioethanol. Redistilling the distillate will increase the percent alcohol content of the bioethanol.

## **GIS-BASED ASSESSMENT ON FINANCIAL CAPABILITY OF LOCAL RICE FARMERS IN BANSALAN, DAVAO DEL SUR**

---

Author: Wilfredo A. Lawas Jr.

Year: 2020

Adviser: Marvin T. Lopez, PAE

This study was conducted at the municipality of Bansalan, Davao del Sur last March 2019 to April 2019. It aimed to assess and evaluate the financial capability of local rice farmers in Bansalan, Davao del Sur. Among the eight (8) barangays with rice production in the municipality of Bansalan, Davao del Sur, only 25 respondents and a purposive sampling design was used in selecting the respondents.

A survey questionnaire was used to determine the demographic profile and farmer's profile. With the used of Global Positioning System (GPS), it gets the coordinates of the location of every rice farmers in the municipality. In addition, the research used software like Garmin Map Source, MS Excel and Quantum Geographic Information System (QGIS) to extract, tabulate, integrate, convert, and process data and to create maps of the spatial distribution and cost of activity per operation of the rice farmers.

Results showed that there were 70 % of the rice farmers who were financially incapable while only 30 % were financially capable. This reflects that majority of the rice farmers depend on financing services. Also, rice farmers' income today was different from the past few years. Today, less yield due to insufficient supply of water and low price of palay. Most of the rice farmers that have higher level of education and have a good source of income were those were financially capable.

## **EVALUATION OF PINEAPPLE PEEL (*Ananas comosus*) PASTE MIXED WITH DIFFERENT LEVEL OF GLYCEROL AS BIOPLASTIC MATERIAL**

---

Author: Aljean Licaros

Year: 2020

Adviser: Teresa S. Lumansoc, PAE

This study was carried out to evaluate the potential of pineapple peel paste as an alternative source of material for bioplastic. All samples of pineapple peel paste were mixed with different levels of glycerol as additional plasticizer and oven dried for about 4 hours at 100°C. The processed bioplastic were then characterized according to its tensile strength at break, burning rate and biodegradability. Data were analysed in a one-way ANOVA at 1 % and 5 % level of significance. Results of the analysis revealed that "T" \_"1" (113.7 kN/m<sup>2</sup>) has the highest tensile strength at break and "T" \_"3" (29.13 kN/m<sup>2</sup>) was the slowest. ANOVA results also showed that tensile strength of the bioplastic was significant ( $p < 0.05$ ) among the treatments. LSD revealed further that the mean tensile strength of T1 was highly significant ( $p < 0.01$ ) to the mean tensile strength of "T" \_"3". Burning rate was highest (0.447) in "T" \_"1" and slowest (0.395) in "T" \_"3".

ANOVA result revealed no significant difference in the burning rate among the treatments. Biodegradability rate was observed to be similar in all treatments after 7 days burying in the garden soil in a depth of 100 mm.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF AN AUTOMATED BANANA (*Musa acuminata x balbisiana*) FRUIT RIPENER**

---

Author: Cyril C. Madulin

Year: 2020

Adviser: Engr. Marvin T. Lopez

Cardaba banana has been one of the country's agricultural products with vast demands and large productions throughout the archipelago however, existing artificial methods lacked on post-harvest machineries that provides convenience to the producers and farmers, such as banana ripener. As a result, this study, Design, Fabrication and Performance Evaluation on Automated Banana (*Musa acuminata x balbisiana*) Fruit Ripener was made.

This study involves three treatments according to the different maturity ages of banana including 90 days, 100 days and 110 days, also the said treatments were replicated thrice. Three performance parameters such as ripening duration, ripening capacity and ripening efficiency were evaluated to ensure performance of the banana fruit ripener. Four quality parameters were also evaluated to identify the quality of the ripened banana, the colour, pulp to peel ratio, pH and total soluble solids.

The statistical tool, one-way ANOVA was used in the study. Results showed that there is a high significant difference among treatments on the ripening duration. There was also a high significant difference among the treatments on the ripening capacity and there was a significant difference among treatment on ripening efficiency at 5% tabular F. On the quality of the ripened banana, results showed that there is a high significant difference among treatments on the pulp to peel ratio. There was also a significant difference among treatments on the total soluble solids value at 5% tabular F. On the other hand, pH level of ripened banana among treatments shows no significant difference.

# **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF EVAPORATIVE COOLER FOR TOMATO (*Solanum lycopersicum*)**

---

Author: Mary Ann D. Mamolo

Year: 2020

Adviser: Mark Jude F. Trondillo, MSAE

The study entitled, "Design, Fabrication and Performance Evaluation of Evaporative Cooler for Tomato (*Solanum lycopersicum*)" was successfully conducted at SPAMAST-Digos Campus, Matti Digos City, from April 6 to April 15, 2019.

Three crates with 69 kg capacity of evaporative cooler was fabricated. The performance of evaporative cooler was evaluated in terms of temperature, relative humidity, actual power rating and specific energy consumption. The testing was done by keeping freshly harvested tomato in full load condition for the observation and evaluation of different quality parameters in terms of physiological weight loss, total soluble solid and total titratable acidity.

The effect of temperature and relative humidity inside evaporative cooling storage structure was observed with the difference in temperature drop and respective differential change in relative humidity, the highest temperature drop was 7.7 °C and difference in relative humidity at 40 % for 10 days period storage study. Recorded weight loss was higher in the ambient condition. Based on the result, the evaporative cooler can be used to store commodities for a desirable period of time with minimum significant loss and will be beneficial to maintain a regular market flow for a marginal farmer.

## **IMPROVING WATER QUALITY OF "SPAMAST" MATTI, DIGOS CITY USING FILTERING APPARATUS UTILIZING BIO-SAND, GRAVEL AND ACTIVATED CHARCOAL**

---

Author: John Ray R. Manigo

Year: 2020

Adviser: Ryan Art M. Tuling, PAE, EnP

The study was conducted at AE Lab of Southern Philippine Agri Busines, Marine and Aquatic School of Technology, Digos Campus, Matti, Digos City last March-April 2019. For the laboratory analysis, it was conducted at Davao City Water District last April-May 2019.

This was carried in a Completely Randomized Design (CRD) with 3 treatments with 3 replications. Data gathered were analyzed using the Analysis of Variance (ANOVA) for Completely Randomized Design (CRD) at 1 % and 5 % level. Significant treatment means were used Least Significant Difference (LSD)

Based on the data gathered, T3R3 (1.5 kgs of Coarse Bio-sand, 1.5 kgs of Fine Bio-sand 1 kg of Gravel and 3 kgs of Activated Charcoal) had meet the standards of microbiological and physical analysis.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF A GRANULAR FERTILIZER APPLICATOR**

---

Author: Arieston S. Mohamad

Year: 2020

Adviser: Eduardo F. Aquino, MA, MS

The design, fabrication and operation of a granular fertilizer applicator was conducted at Sitio Kapatagan, Digos City at Andrade's banana farm on April 2019 to May 2019.

The granular fertilizer applicator was made of stainless pipe, PVC pipe, stretchable re-breather tube and plywood. The stainless pipe was installed inside the main frame to serve as penetrator to the soil.

In this study the parameters were considered are the effective field capacity of the granular fertilizer applicator and the manual method, the efficiency of the granular fertilizer applicator, the rate of recovery, operating cost and labor savings of the granular fertilizer applicator.

The granular fertilizer applicator was operated five times of trials per ten plants to acquire the parameters and was observed that it operates in a granular fertilizer applicator manner by fertilizing the banana plants. Results revealed that the effective field efficiency and effective fields capacity of the manual method and the granular fertilizer applicator, rate of recovery, operating cost and the labor savings of the granular fertilizer applicator and manual method are 146.84 %, 3.149 plants/min., 4.624 plants/min., 95.27 %, 218.97 Php/ha, 312.53 Php/ha and 31.9 % respectively. Furthermore, the study showed that the granular fertilizer applicator was significantly faster in applying fertilizer to the plants than the manual method.

## **COMPARATIVE STUDY OF HOT PRESS AND COLD PRESS METHOD OF EXTRACTING ESSENTIAL OIL FROM FERMETED POMELO (*Citrus maxima*) PEEL**

---

Author: Kristelle Joy D. Parsacala

Year: 2020

Adviser: Teresa S. Lumansoc, PAE

This study was conducted to compare Hot press and Cold press method of extracting essential oil from pomelo (*Citrus maxima*) peel. The study aimed to evaluate the essential oils physical quality in terms of color, odor, pH value, density, and specific gravity, and its quantity (ml of oil/g of peel used).

Based on the results, cold press oil extraction method has the higher mean quality value in terms of odor (3.26), pH (6.4), density (1125) and specific gravity (1.124). Color quality was recorded to have the same rating in two methods, higher essential oil was obtained from Hot Press Method (0.96).

T-test results show no significant difference between Cold Press (1) and Hot Press method in terms of color and odor quality of the essential oil. While in the pH, density and specific gravity, T-test reveals that there is a significant difference ( $P < 0.05$ ) in both treatments. Higher essential oil recovered was obtained from Hot Press and Cold Press Method. However, T-test resulted that essential oil recovered from Cold Press Method has no significant effect on the essential oil recovered during Hot Press Method.

# **SENSORY EVALUATION AND COST ANALYSIS OF PROCESSED PHILIPPINE NATURAL GRADE CARRAGEENAN USING POTASSIUM HYDROXIDE**

---

Author: Max Ryan M. Pilapil

Year: 2020

Adviser: Mark Jude F. Trondillo, MSAE

The study entitled, "Sensory Evaluation and Cost Analysis of Processed Philippine Natural Grade Carrageenan using Potassium Hydroxide" was successfully conducted at SPAMAST- Digos Campus, Matti, Digos City. The study was focused on the sensory evaluation and cost analysis of the processed Philippine Natural Grade carrageenan using potassium hydroxide: T<sub>1</sub>- pretreated seaweed with 281 g potassium hydroxide, T<sub>2</sub>- pretreated seaweed with 141 g potassium hydroxide, and T<sub>3</sub>- no potassium hydroxide pretreatment (control). Data gathered were sensory characteristics in terms of color, odor texture, and general acceptability. Data was statistically analyzed through Completely Randomized Design (CRD).

The pretreated seaweeds were bleached with sodium hypochlorite for 24 hours and the treatments were dried afterwards. The pretreated and bleached seaweeds were subjected to mechanical drying for minimum of 11 hours to 14 hours or until the moisture content reach 11-13 % MC. The dried seaweed were further bone dried for the pulverization of the sample. The dried seaweeds were grinded and the sensory characteristics are evaluated.

The results revealed that treatment with 281 g potassium hydroxide had the highest mean percentage of color, odor, and general acceptability at 3.049, 3.185, and 3.636, respectively while the control (distilled water only) has the lowest mean percentage at 1.753, 2.617, and 3.321, respectively. In terms of texture, the control had the highest mean of 3.679 in contrast to treatment with 141 g potassium hydroxide at 3.667. there is highly significant difference ( $P < 0.01$ ) among treatment in terms of color, odor, and general acceptability while no significant different ( $P < 0.05$ ) found among treatments in terms of the texture. Based on the sensory evaluation result, it was recommended to use potassium hydroxide in the production of carrageenan. However, based from the cost analysis and recovery rate, the production of carrageenan was not economical.

## **BIOGAS YIELD OF DIFFERENT PRE-TREATED RICE STRAW USING (*Trichoderma harzianum*) BLENDED WITH SWINE MANURE**

---

Author: Julien Frence Mare V. Rapas  
Adviser: Nila Nanette S. Revilla, Ph.D

Year: 2020

The study was conducted to determine the biogas yield of different pre-treated rice straw using *Trichoderma harzianum* blended with swine manure and was held at SPAMAST Digos Campus, Matti, Digos City, from February 14 – March 2, 2019.

The study was carried out in a Completely Randomized Design (CRD). The Treatments were T1 – (50%) Rice straw at 4.00 kg wet weight + (50%) swine manure (Slurry mixture) at 4.00kg, T2 – (50%) 10 days fungal pre-treated rice straw at 4.00 kg Rice straw at 4.00 kg wet weight + (50%) swine manure (Slurry mixture) at 4.00kg, T3 – (50%) 15 day fungal pre-treated rice straw at 4.00 kg Rice straw at 4.00 kg wet weight + (50%) swine manure (Slurry mixture) at 4.00kg, T4 - (50%) 20 days fungal pre-treated rice straw at 4.00 kg Rice straw at 4.00 kg wet weight + (50%) swine manure (Slurry mixture) at 4.00kg. Biogas was determined by water displacement method and perceived to have a high yield, considering its parameters particularly the temperature, pressure, pH, methane content and carbon dioxide content.

Treatment 3 (15 days of fungal pre-treated rice straw) was observed to be the best in terms of biogas production. However, T1 (untreated rice straw), and T4 (20 days fungal pre-treated rice straw) had a comparable effect in Methane and carbon dioxide content.

## **EFFECTS OF DIFFERENT LEVELS OF FERMENTED PLANT JUICE ON THE GROWTH AND YIELD OF PECHAY (*Brassica rapa*) UNDER GREENHOUSE CONDITION**

---

Author: Ray-An M. Rivas

Year: 2020

Adviser: Engr. Mark Jude F. Trondillo

This study was conducted at Southern Philippines Agribusiness and Marine and Aquatic School of Technology, Digos Campus, Davao del Sur to evaluate the effects of different levels of fermented plant juice on the growth and yield of pechay (*Brassica rapa*) under greenhouse condition.

A Complete Randomized Block Design was used with four treatments replicated three times. The data gathered were analyzed using the Analysis of Variance (ANOVA). In determining linear comparison among treatments, the researcher used the Least Significant Difference (LSD) was employed.

Results of the study revealed that Treatment 4 (3 tbsp Fermented Banana Blossom Plant Juice and Water Spinach/ liter of water) responded significantly in terms of the leaf area index and yield. In the case of the levels of application, higher application levels (6 tbsp/liter of water) excelled on some parameters tested (LAI and yield). This implies that the high concentration of FPJ diluted on water promotes better growth and development of pechay plant emphasizing development of the physical and biological properties of the soil. This result was similar to the findings of Tagotong, M.M (2009) when he said that organic fertilizers like fermented plant juice is a good source of plant nutrients to improve the physical properties of soil that was responsible for the vigor growth and development of plants. He further mentioned that when levels of fermented plant juice application increased it was an effective dilution of water to improve the growth and yield performance of vegetable crops those leafy vegetables.

## **PRODUCTION OF ETHANOL FROM DIFFERENT BANANA BIOMASS WASTE THROUGH BIOCHEMICAL CONVERSION**

---

Author: Jesuven V. Rosique

Year: 2020

Adviser: Nila Nanette S. Revilla, Ph.D

The study was conducted at the AE Laboratory and distillation was conducted in Research and Science Laboratory Center (RLSC) of Southern Philippine Agri-Business, Marine and Aquatic School of Technology, Digos Campus, Mati, Digos City last April 2019. It aimed to produce ethanol from different banana biomass waste through biochemical conversion.

This study was carried in three treatments with three replications. Those treatments were banana meat, banana peel, and banana pseudo stem. Data gathered was analysed using the Analysis of Variance (ANOVA) for Completely Randomized Design (CRD) at 1 % and 5 % level. Significant treatment means was done using Least Significant Difference (LSD). Data was determined using SPSS Statistics.

The data gathered were the glucose content of different banana biomass waste at various time duration of hydrolysis. The percent alcohol recovery (ethanol recovery) was also gathered. The data includes the alcohol density. The alcohol content were analysed using specific gravity technique. There are no significant result for glucose content, alcohol content, ethanol recovery and biochemical conversion however, a significant difference in alcohol density was present.

# **GROWTH AND YIELD OF PECHAY (*BRASSICA CHINENSIS*) UNDER HYDROPONIC VERTICAL PLANTING USING OIL PALM EMPTY FRUIT BUNCH MIXED WITH WASTE EGG SHELL AS GROWTH MEDIA**

---

Author: Mary Catherine M. Saplagio

Year: 2020

Adviser: Engr. Razel Allan R. Valleser, MOP

The study on the "Growth and Yield of Pechay (*Brassica chinensis*) under Hydroponic Vertical Planting using Oil Palm Empty Fruit Bunch Mixed with Waste Egg Shell as Growth Media" was conducted last February 28, 2019 – April 13, 2019 at SPAMAST – Digos Campus, Matti, Digos City.

A Completely Randomized Design was used as the experimental lay-out of the study with three treatments replicated three times. The treatment used were as follows: Treatment 1 (T<sub>1</sub>) - 100% oil palm empty fruit bunch, Treatment 2 (T<sub>2</sub>) - 80% oil palm empty fruit bunch + 20% waste egg shell and Treatment 3 (T<sub>3</sub>) - 90% oil palm empty fruit bunch + 10% waste egg shell.

Data gathered were the plant height, number of leaves, leaf surface area, yield and production per unit area of pechay. There was also a daily monitoring of the temperature and relative humidity inside and outside the greenhouse, and pH and electrical conductivity level of the fertigation solution.

Data gathered were the plant height, number of leaves, leaf surface area, yield and production per unit area of pechay. T<sub>2</sub> the highest final plant height with an average of 9.53 cm, followed by T<sub>1</sub> with final average height of 7.05 cm and T<sub>3</sub> with 6.96 cm average height. In terms of number of leaves, results showed that T<sub>2</sub> produced the most number of leaves with an average mean of 6.73 leaves. It was followed by T<sub>1</sub> with a mean of 5.6 leaves and T<sub>3</sub> with a mean of 5.47 leaves. The biggest leaf surface area was attained by T<sub>2</sub> with average mean leaf surface area of 25.32 cm<sup>2</sup>. It was followed by T<sub>3</sub> and T<sub>1</sub> with average mean leaf surface area of 9.85 cm<sup>2</sup> and 4.87 cm<sup>2</sup> respectively. At the time of harvest, T<sub>2</sub> produced the highest average mass of T<sub>2</sub> – 0.034 kilograms, followed by T<sub>1</sub> with an average mass of 0.017 kilograms and T<sub>3</sub> with an average mass of 0.013 kilograms.

Results showed that plants sown in T<sub>2</sub> were consistent to have produced higher plant height, number of leaves, leaf surface area, yield and production per unit area. However, statistical analysis showed that there was no significant difference among treatments in terms of plant height, number of leaves, leaf surface area, yield and production per unit area of pechay. However, report also shows that the amount on egg shell mixed with the oil palm empty fruit bunch has no bearing to the growth of pechay. All growth parameters and

yield did not reach the ideal yield of pechay due to the immobilization of soluble Nitrogen that is needed for plant growth.

## **EVALUATION OF POTASSIUM PERMANGANATE, CLAY AND ACTIVATED CHARCOAL MIXED POWDER AS FRUIT RIPENING DECELERATOR**

---

Author: Marjem S. Serrano

Year: 2020

Adviser: Teresa S. Lumansoc, PAE

This study was conducted to evaluate the performance of potassium permanganate, clay and activated charcoal mixed-powder as fruit ripening decelerator. It was conducted from April 1, 2019 to April 22, 2019 at SPAMAST-Digos Campus, Matti, Digos City. The study aimed to determine if there any significant change on the temperature, relative humidity, and moisture content kg/kg dry air inside the storage, peel color, weight loss of fruit after storage, and moisture content of fruit before and after storage among treatments.

The study aimed also to determine the difference on the Total Soluble Solids (TSS), Titratable Acids (TA) and Potential Hydrogen (pH) of the fruit among the treatments by means of laboratory analysis. The study was carried out using a Completely Randomized Design (CRD) with three treatments ( $T_1=10$  days of storage;  $T_2= 15$  days of storage and  $T_3= 20$  days of storage) replicated three times. Analysis of Variance (ANOVA) was used in data analysis in determining the significant difference between treatments. The results revealed that there was significant difference ( $p<0.05$ ) on the weight loss of mango, relative humidity inside the storage and the peel color of mango after storage. No significant difference was observed on the temperature and moisture content kg/kg dry air inside the storage. The results of the laboratory analysis showed that there were changes in the chemical characteristics of mango after stored at different storage duration. The results of all parameters revealed that the mixture of potassium permanganate, clay and activated charcoal, can decelerate fruit ripening but capability was not maximized due environmental factors like high temperature and low relative humidity.

## **GROWTH AND YIELD OF PECHAY USING DESALINATED SEAWATER AS AN ALTERNATIVE IRRIGATION WATER**

Author: Mary Fe R. Silvano

Year: 2020

Adviser: Engr. Ryan Art M. Tuling,EnP

The study was conducted to determine the growth and yield of pechay using desalinated seawater as an alternative irrigation water under greenhouse condition. This study was conducted in Southern Philippines Agri-Business and Marine and Aquatic School of Technology, Digos Campus (SPAMAST-Digos Campus), Institute of Computing, Engineering and Technology (ICET), Matti, Digos City, March to April 2019.

Parameters used are growth of pechay in terms of number of leaves, leaf width, and yield and also the temperature and relative humidity. The treatments are the water to be irrigated the first treatment was tap water, the second treatment was the solar desalinated water, and the third treatment is the solar desalinated water with water filter. No significant variations among treatments were observed in number of leaves, leaf width and its yield. Therefore, the desalinated water can be used as an alternative irrigation water.

## **PROCESSING OF CROWN OF THORNS (*Acanthaster Planci*) MIXED WITH CHARCOAL AS ODOR NEUTRALIZER**

---

Author: Sarah Jade M. Sumabat

Year: 2020

Adviser: Nila Nanette S. Revilla, Ph.D

The study on processing of Crown of thorns (COTs) Mixed with Charcoal as Odor Neutralizer was conducted in Lubo, Santa Cruz Davao del Sur where COTs were procured. Evaluation was done in SPAMAST-Digos Campus, Matti Digos City from March to April 2019. A Completely Randomized Design (CRD) was used in this study with three (3) treatments and replicated three (3) times, namely, T1 (having 100 % of powdered COTs), T2 (having 90 % of powdered COTs and 10 % powdered charcoal) and T3 (having 80 % of powdered COTs and 20 % powdered charcoal).

Parameters used were percent recovery, moisture loss, sensory characteristics in terms of color, odor and texture, and nutrient composition in terms of nitrogen, phosphorus, potassium, carbon, pH, magnesium, calcium, and salinity.

No significant variations among treatment means were observed in percent recovery and moisture loss. In terms of sensory characteristics, significant difference among treatment means were observed in color and odor and no significant difference in texture. In terms of nutrient composition, no significant difference in nitrogen, phosphorus and potassium while carbon content showed significant difference. Moreover, no significant variations among treatments were observed in pH, magnesium and calcium. However, the salinity of pure powdered COTs was found to be highest.

Inclusion level of charcoal up to 20 % to powdered COTs did not affect texture except color and odor and nutrient composition except carbon. It is recommended that COTs with charcoal can be used for soil amendment rather than fertilizer as  $N+P+K=4.97$ .

## **GIS-BASED MECHANISM LEVEL AND INDEX EVALUATION OF RICE IN MAGSAYSAY, DAVAO DEL SUR**

---

Author: Christine M. Watin  
Adviser: Marvin T. Lopez, PAE

Year: 2020

The study was conducted to identify the areas of rice production, determine the location and corners of the production area with the use of geo- tagging, determine the mechanization level and index and its correlation with the total production area of rice production in Magsaysay, Davao del Sur with the use of GIS-based mapping operation.

This study was using a survey questionnaire to determine the demographic profile, farmer's profile, and input power per hectare of the farmers. It also used Global Positioning System (GPS) to get the tracks and coordinates of the boundaries of the unsurvey rice area in the municipality. In addition, the research used software like Garmin Map Source, MS Excel, Quantum Geographic Information System (QGIS), and Arc Geographic Information System (ArcGIS) to extract, tabulate, integrate, convert, and process data and to create maps of the production area, mechanization level, and mechanization index.

Results revealed that mechanization level and mechanization index in the municipality of Magsaysay, Davao del Sur was still low especially in crop planting and establishment, crop care and maintenance, and post-harvest operations. Thus, mechanization in the farm should be imposed and support from the government was needed. And the desired machineries for this operation should be available so that farmers may utilized these certain machineries. Also, land preparation and harvesting shows greater amount of mechanization level and index but this result was still belonged to a fair mechanization. Thus, to improve the mechanization in the farm, farmers should adapt machineries which was needed in all the operations performed in the farm.

## **ASSESSMENT OF POTENTIAL HYDROGEN AND TEMPERATURE AS FACTORS INFLUENCING FERMENTATION OF CRESCENTIA CUJETE WITH BIOETHANOL PRODUCTION ENHANCERS**

---

Author: Jessie Rose L. Aboyot

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

The study was designed to assess the temperature and pH value as factors that may influenced the fermentation of *Crescentia cujete* with Bioethanol Enhancers. The study was carried out using Completely Randomized Design (CRD) with three treatments and three replications. The *Crescentia cujete* mixtures were added with yeast as Treatment 1 (T1), combination of yeast and baking soda as Treatment 2 (T2) and baking soda only for Treatment 3 (T3) and were fermented within 21 days.

Data gathered in terms of pH value were analyzed using the Analysis of Variance (ANOVA) and Tukey's test at 1 % and 5 % level of significance. Comparison between the pH value before and after fermentation process on every treatment was performed using T-test.

Based on the results, T1, T2 and T3 have temperature before and after fermentation of 27.1 °C and 25.13 °C, 25.27 °C and 28.1 °C and 28.3 °C and 28.1 °C, respectively. For pH value, T1, T2 and T3 have acidity level before and after fermentation of 4.89 and 7.28, 7.61 and 4.7, and 7.91 and 7.5, respectively. The total cost incurred from material preparation to fermentation was highest in T2 with P904.07 followed by T3 with P829.07 and T1 with the lowest total cost of P800.94.

The ANOVA results for pH level before and after fermentation process revealed that the mean differences of the treatments are highly significant at 1% and 5% level. The Tukey test results revealed further that the mean difference in the pH value before fermentation between T1 and T2, T1 and T3, and T2 and T3 have high significant difference at 1% and 5%. Also, the mean difference of pH value after fermentation between T1 and T2, and T1 and T3 are highly significant at 1% and 5% level but not significant between T2 and T3. The T-test results for T1, T2 and T3 showed no significant difference on the pH level before and after fermentation process.

Most of acidic mixtures could possibly attain high percentage of ethanol than alkaline mixtures thus T1 samples (added with yeast) are maybe better than T2 and T3 samples which were added with baking soda.

## **PROCESSING AND EXTRACTION OF COCOA POTASH FROM COCOA POD HUSK**

---

Author: Rawen G. Abrea

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph.D.

The study was conducted to determine the potash content of cocoa pod husk according to its quality and quantity.

This was carried out in Analysis of Variance (ANOVA) with four treatments replicated three times. The treatments were: A1B1 – 8 kg. of fresh CPH under Charcoal burning process; A1B2 – 8 kg. of fresh CPH under Direct burning process; A2B1 – 8 kg. of dry CPH under Charcoal burning process, and; A2B2 – 8 kg. of dry CPH under Direct burning process with three replications in every treatment.

The result revealed that there was a significant difference among all treatments in terms of potash content and color quality rating. However, the analysis of data also revealed that there is no significant difference among treatments in terms of texture quality rating. The minimum amount of air applied on burning the dried CPH than in fresh CPH, results in high quantity and quality of potash obtained. Thus, can be concluded that charcoal burning process on dried CPH produced more potash than direct burning process on fresh CPH.

## **EVALUATION ON BURI (*Corypha Elata*) LEAF FIBER UNDER DIFFERENT DRYING METHODS**

---

Author: Leah A. Acebedo

Year: 2020

Adviser: Mark Jude F. Trondilio, PhD

The study was conducted at Sta. Cruz Davao del Sur Last January 2020 to June 2020 to evaluate the buri (*Corypha elata*) leaf fiber under different drying methods.

This study was carried out using Descriptive Research Design and T- Test was used as the Statistical tool for the comparison of means of the two treatments. Each treatment was replicated three (3) times. Data were analyzed to know the significant difference on the drying rates and also on the drying time of buri fiber as affected by different drying methods using T-test. Treatments were Treatment 1 or air drying and Treatment 2 or sun drying.

The results showed that Treatment 2 (sun drying method) has the highest drying rate with an average of 12.5 g/hr and has an average drying time of 1.5 hours and Treatment 1 (air drying) having the lowest average drying rate of 3.4 g/hr with an average drying time of 4.3 hours. The total percent fiber recovery of buri was 61.65% following the percent fiber recovery formula.

The data showed that there was a significant difference on the drying rates of buri fiber under different drying methods. Also, there was a significant difference on the drying time of buri fiber under different drying methods.

## **WICKING HYDROPONICS SYSTEM WITH MILKFISH (*Chanos chanos*) BASED BIOFERTILIZER EFFECTS ON THE GROWTH AND YIELD OF PECHAY (*Brassica chinesis*)**

---

Author: Kryzelou R. Aguelo

Year: 2020

Adviser: Mark Jude F. Trondilio, PhD

The Study was conducted at Davao del Sur State College to determine the effects of growth and yield of pechay using milkfish-based biofertilizer through wicking hydroponics system.

This was carried in a Completely Randomized Design (CRD) with five treatments replicated thrice. Treatments were T1- Pure water; T2- 2 tbsp. of biofertilizer per li. of water; T3- 4 tbsp. of biofertilizer per li. of water; T4- 6 tbsp. of biofertilizer per li. of water; T5- Commercial liquid Biofertilizer.

The results showed that there is a significant difference on the yield and pH value of the solution among its treatments. Treatment 3 has the highest average mean in terms of height and number of leaves compared to other treatments.

## **EFFECTS OF ELECTROLYZED WATER FOGGING OF SUGARCANE (*Saccharum officinarum*) AT DIFFERENT LEVELS OF SODIUM CHLORIDE**

---

Author: Lovely Marie D. Amarillo

Year: 2020

Adviser: Mark Jude F. Trondilio, PhD

The study was conducted to investigate the effects of electrolyzed water at different levels of sodium chloride to suppress the proliferation of microorganisms that occurred on freshly harvested sugarcane when cut-to-crush delay happened. The study also covers the shrinkage ratio by weight of sugarcane after fourteen days of treatment of electrolyzed water and the measurement of pH and oxidation-reduction potential (ORP) of electrolyzed water.

This study was carried in a Complete Randomized Design (CRD). T1 = 0g/L of sodium chloride, T2 = 3g/L of sodium chloride, T3 = 6g/L of sodium chloride and T4 = 9g/L of sodium chloride and replicated four times applied on freshly harvested sugarcane and observed the results for fourteen days. Data gathered were further analysed using the Analysis of Variance (ANOVA) at 5% confidence interval. Comparing significant treatment means were further analysed using post-hoc analysis the Tukey's test.

Based on result showed, the lowest and highest average percentage of shrinkage ratio by weight after fourteen days of treatment of electrolyzed water was Treatment 3 at 1.75% and Treatment 1 at 1.84%, respectively. The highest and lowest pH of electrolyzed water was obtained by Treatment 4 which had 10.2 and 4.8. While the highest and lowest oxidation-reduction potential of electrolyzed water was obtained by Treatment 4 which had 238 millivolt and -438 millivolt, respectively.

The study revealed that the average shrinkage ratio by weight of the study was observed to be not significant at 5% level of significance among treatments. It means that the different levels of sodium chloride to make electrolyzed water to be applied to the sugarcane did not vary and found to be not affecting to suppress the weight loss of the sugarcane.

## **PHYSICAL QUALITIES OF FIBER-BASED ECOSEEDLING BAG FROM SNAKE PLANT (*Sansevieria trifasciata*)**

---

Author: Verra Myza C. Arat

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study was conducted in Florida, Kapalong, Davao del Norte. It aimed to evaluate the physical qualities in the fiber-based eco-seedling bag at different levels of snake plant fiber with constant mixture of corn starch and water. The color, texture, odor, general acceptability eco-seedling bag was determined.

The study was carried out using Descriptive Research Design. The physical qualities were determined using questionnaire rated by ten (10) respondents. The Eco-seedling bags were produced with the following: Process 1: 80 grams Snake Plant Fiber; 400 grams mixture of corn starch 60% and water 40%, Process 2: 70 grams Snake Plant Fiber; 400 grams mixture of corn starch 60% and water 40% and Process 3: 60 grams Snake Plant Fiber; 400 grams mixture of corn starch 60% and water 40%.

Process 1 color had the rating of 3.37 which was acceptable and falls the descriptive rating of dirty white, texture rated 2.70 which is also acceptable falls the descriptive rating of hard, odor rated 4.4 which was most acceptable falls the descriptive rating of o weak and the acceptability had the of 3.9 which was more acceptable that falls the descriptive rating of good quality and recommended.

Process 2 color had a rating of 3.8 which was more acceptable falls the descriptive rating of pale white, texture rated 2.73 which was also acceptable falls the descriptive rating of hard, odor rated 4.33 which was more acceptable falls the descriptive rating of weak and the acceptability had rated of 4.2 which was more acceptable that falls the descriptive rating of good quality and recommended.

Process 3 color had a rating of 4.57 which was most acceptable falls the descriptive rating of creamy white, texture rated 3.50 which was more acceptable falls between the descriptive rating of smooth, odor rated 4.4 which was more acceptable falls the descriptive rating of weak and the acceptability had rated of 4.6 which was most acceptable that falls the descriptive rating of excellent quality and recommended.

## **BIOGAS YIELD OF OIL PALM EMPTY FRUIT BUNCHES CO-DIGESTED WITH SWINE MANURE AT DIFFERENT RATIO**

---

Author: Ivy Grace P. Arcena

Year: 2020

Adviser: Eduardo F. Aquino, MA, MS

Swine manure and oil palm empty fruit bunches (OPEFB) are massively produced agricultural wastes that can be managed properly by anaerobic co-digestion. The main objective of this study was to determine the biogas yield from anaerobic co-digestion of pig manure and OPEFB at different ratios, and the parameters affecting the digestion process including the substrate pH, temperature, and pressure.

The experiment was carried out using floating-type gas holder setup operated at an open environment for 30 days added with 50 mL seeder for each 4 treatments having 3 replications. A completely randomized design was followed in the study. The statistical tool used in the analyzing and interpretation of the results was One-way Analysis of Variance (One-way ANOVA) at 1% and 5% level of significance while Least Significant Difference (LSD) was used to compare the means of each treatment.

The substrate's initial pH levels of Treatments 1, 2, 3, and 4 were 6.57, 6.59, 6.65, and 6.72 respectively. Treatment 4 obtained the highest biogas yield of 44.41 L higher than that of the digestion of Treatments 1, 2, and 3 with 3.93 L, 7.86 L and 18.50 L biogas yield respectively. The recorded digester temperature ranges from 32.19 °C to 33.59°C which averaged out to 32.89 °C. Obtained digester pressure ranged from 0.112 psi to 0.134 psi with an average of 0.125 psi. Among all the treatments, Treatment 4 had the longest retention time which produced biogas pass the 30-day retention period.

The one-way analysis of variance (ANOVA) showed that there was a highly significant difference among the treatments in terms of biogas yield while LSD result showed that there is significant difference between all treatments, except between Treatments 1 and 2. The digester temperature showed highly significant difference among the treatments and showed significant differences between all treatments. In terms of pressure, statistical result also showed highly significant difference among treatments and significant differences between all treatments.

## **QUALITY OF BURI FLOUR AS AFFECTED BY DIFFERENT DRYING METHODS**

---

Author: Romelita C. Arriaga

Year: 2020

Adviser: Mark Jude F. Trondillo, PhD

The study entitled, "Quality of Buri Flour as Affected by Different Drying Methods" was successfully conducted at DSSC, Matti, Digos City. Complete Randomized Design (CRD) with three (3) treatments and three (3) replicates of each treatment with same amount of initial weight was used for sun drying, solar drying and oven drying.

The buri trunk was peeled and cut into smaller pieces and divided into nine portions (1000g each) for different drying method. Among treatments, the Treatments 1, Treatment 2 and Treatments 3 have a significant difference in 5% level of significance in terms of quality. Means from drying rate and sensory characteristic were calculated for all the samples. Statistically drying rate of Treatment 3 (oven drying) is the highest among all the Treatments. Treatment 2 (solar drying) has the highest drying rate compared to Treatment 1 (sun drying). Sensory characteristic evaluation shows that Treatment 2 was the most favorable.

## **EVALUATION OF WATER LETTUCE (*Pistia stratiotes*) POWDER AS A POTENTIAL MATERIAL IN BIOPLASTIC PRODUCTION**

---

Author: Jenebeve D. Babatuan

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study was designed to evaluate the potential of water lettuce powder as a material in the production of bioplastic. Different levels of water lettuce powder and corn starch with fixed amount of water, glycerol and vinegar were mixed and processed according to the desired mixture of each treatment. The processed bioplastics were subjected to solubility and flammability test and cost per unit production analysis. The data gathered were analysed through Complete Randomized Design (CRD) in a one-way (Analysis of Variance) ANOVA at 1% and 5% level of significance.

The results showed that Treatment 2 with solubility in alcohol and water of 38.73% and 44.443% respectively has a high significant difference when compared to Treatment 4 (0% and 0%) and Treatment 5 (0% and 0%), but has no significant difference when compared to Treatment 1 (41.11% and 46.667%) and Treatment 3 (45.24% and 50%). Treatment 3 showed high significant difference when compared to Treatment 4 and Treatment 5, but showed no significant difference when compared to Treatment 1 and Treatment 2.

In vinegar, Treatment 2 with solubility of 42.06% has a high significant difference when compared to Treatment 4 (0%) and Treatment 5 (0%) and has a significant difference at 5% level when compared to Treatment 1 (50%) and Treatment 3 (52.385%). Treatment 3 showed a high significant difference when compared to Treatment 4 and Treatment 5 and has a significant difference at 5% level when compared to Treatment 2 but showed no significant difference when compared to Treatment 1.

In flammability test, results showed that Treatment 1 with a flammability of 0.0967 in/sec has a high significant difference when compared to Treatment 2 (0.127 in/sec), Treatment 4 (0 in/sec) and Treatment 5 (0 in/sec), but has no significant difference when compared to Treatment 3 (0.108 in/sec). On the other hand, the flammability result of Treatment 2 was seen to have a high significant difference when compared to the rest of the treatments.

In Unit Cost Production Analysis, Treatment 3 with Php 20.97/pc has the least production cost and Treatment 1 with Php 21.00 has the highest production cost among the treatments.

## **IDENTIFICATION OF WATER PH LEVELS IN FISH CAGES AREAS IN TAGABULI, SANTA CRUZ DAVAO DEL SUR**

---

Author: Kaye S. Bello

Year: 2020

Adviser: Marvin T. Lopez

This study was undertaken in order to determine the different pH level in fish cages areas in Tagabuli, Santa Cruz, Davao del Sur. A total of 33 sampling points were generated with each corresponding pH values within the fish cage areas. The test showed that the pH level in fish cages area ranged from 7.47 to 7.96 with an average pH value of 7.8. By the use of Inverse Distance Weighing (IDW) method the 7.765 to 7.862 pH range has the largest pH spatial distribution while 7.47 to 7.568 pH range has the smallest pH spatial distribution in the fish cages area in Tagabuli Bay. Moreover, the extent of fish cages area in Tagabuli has an area of 518,179.44 square meters. The pH level in the mariculture area were found to be within the Philippines standards set by Department of Environment and Natural Resources (DENR) Administrative Order No. 2016-08 for usage of marine waters as Class SC as for the 5th of June 2020.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF A CONTINUOUS CONTROLLED COFFEE BEAN DRYER**

---

Author: Louise Jan G. Bohol

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study was undertaken to design, fabrication and performance evaluation of a continuous controlled coffee bean dryer. The parameters that were determined were the following; air temperature, relative humidity, moisture content loss, drying rate, drying efficiency, drying duration, specific energy consumption and cost analysis of the continuous controlled coffee bean dryer.

The continuous controlled coffee bean dryer was made of glass, aluminum, G.I sheet, inlet and exhaust fan, incandescent bulb and screen mesh. The continuous controlled coffee bean dryer was having a dimension of 75 cm width x 160 cm length. The housing was made of coco lumber, cellophane cover and black G.I plane sheet in a dimension of 1 m width, 2.6 m, and 2 m high and the roof span of 1 m x 2.6 m.

The continuous controlled coffee bean dryer was equipped with embedded system to provide monitoring of the temperature and relative humidity inside the dryer and to control the air temperature inside the dryer to not exceed to 40°C.

The study was analyzed using mean to evaluate the performance of the continuous controlled coffee bean dryer.

According to the data that was gathered the average air temperature and relative humidity inside the drying chamber of the continuous controlled coffee bean dryer was 38°C and 64.82% MC. The drying rate of the dryer was 13.35g/hr with a drying efficiency of 3.6%. the continuous controlled coffee bean dryer has a drying capacity of 0.15kg/hr and 0.00613kW-hr/g specific energy consumption each tray. The data gathered was conducted at a drying duration of 193 hours lowering the moisture content of the coffee bean from 80% to 34.82%MC. The average moisture content loss in 3 trays was 45.18% MC. The operating cost of the continuous controlled coffee bean dryer was 124.235Php/day and the total cost of the continuous controlled coffee bean dryer was Php 18,635.4.

## **EVALUATION OF FISH WASTE ASH AS A POTENTIAL REPLACEMENT OF CEMENT IN CLAY BRICK PRODUCTION**

---

Author: Richard B. Bravo

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study was conducted to evaluate the fish wastes ash as potential replacement of cement in clay brick production. This study was carried out in a Completely Randomized Design (CRD) with three treatments replicated three times. Treatment 1 (T1) was a mixture of 92% clay and 8% cement, Treatment 2 (T2) was a mixture of 92% clay, 4% cement and 4% fish wastes ash and Treatment 3 (T3) was a mixture of 92% clay and 8% fish wastes ash.

The quality of brick was tested in terms of bulk unit weight, bulk density (dry) and specific gravity. The data gathered was statistically analyzed using the Analysis of Variance (ANOVA) at 1% and 5% level of significance. Test for significant difference between treatments was further analyzed through Least Significant Difference (LSD).

Based on the data gathered, Treatment 3 had the highest mean bulk unit weight, mean bulk density (dry) and mean specific gravity of 1215.53g, 1.45 g/cm<sup>3</sup> and 1.45 respectively. Treatment 1 had a mean bulk unit weight of 1,048.00g while treatment 2 had a mean bulk unit weight of 1,035.40 g/cm<sup>3</sup> which is the lowest among the treatments. The mean bulk density (1.29 g/cm<sup>3</sup>) and mean specific gravity (1.29) were recorded the same for Treatment 1 and Treatment 2.

The ANOVA results revealed that the bulk unit weight, bulk density (dry) and specific gravity of the bricks produced from the treatments showed significant differences at 1% and 5% level of significance with a P-value of 0.001, 0.003 and 0.003 respectively. The results from LSD test revealed further that Treatment 3 differed significantly among all treatment in all parameters. However, no significant difference was observed between Treatment 1 and Treatment 2.

In terms of cost incurred during production, Treatment 3 had the lowest computed cost which is Php 20.83/pc followed by Treatment 2 with Php 22.08/pc and Treatment 1 with Php 23.31/pc of brick.

## **DETERMINATION OF PH LEVEL OF THE WASTEWATER TREATED WITH CARDAVA (*Musa acuminata x balbasiana*) BANANA PEELS UNDER DIFFERENT TREATMENT PROCESS**

---

Author: Adela Grace V. Bustos

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study entitled was conducted in Santa Cruz, Davao del Sur. It aimed to determine the pH level of the wastewater treated with Cardava (*Musa acuminata x balbasiana*) banana peels under different treatment process. Slaughterhouse wastewater was taken at Santa Cruz Slaughterhouse, Santa Cruz, Davao del Sur.

The study was carried out using Descriptive Research Design with three (3) treatments and replicated three (3) times. The following were the different treatments in the study: Treatment 1 (wastewater), Treatment 2 (300 grams sundried banana peels/ 1liter of wastewater) and Treatment 3 (300 grams modified dried banana peels/ 1liter of wastewater).

The result showed that before applying treatments it was observed that Treatment 1 constantly had the pH mean value of 7.67 in just 6 hours, it indicated that without all treatments applied in the wastewater in the slaughterhouse of Santa Cruz, Davao del Sur had already reach Ph level required by DENR to dispose of wastewater. While in after applying treatment. Treatment 3, the modified dried banana peels has observed the highest reading of the indicator paper with pH mean value of 9.0, it indicated that other classification of water quality does not suitable for wastewater disposal. While Treatment 2, which was the sundried had level the acidic part of pH level with pH mean value of 6.33, it indicated alsothat this sundried banana peels were at critical range of pH level for disposal which was not recommended.

Based on the findings, wastewater treated with Cardava (*Musa Acuminata x balbasiana*) banana peels under different treatment process may significantly affects its pH level.

## **UTILIZATION OF CORN HUSK ASH AS PARTIAL REPLACEMENT OF CEMENT IN CONCRETE HOLLOW BLOCK**

---

Author: Rey Jim L. Cayabyab

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

A study on the Utilization of Corn Husk Ash as Partial Replacement of Cement in Concrete Hollow Block was conducted at PMS Hollow Block and Sand and Gravel located at Santolan Road, Tres de Mayo, Digos City. The study aimed to determine the properties such as bulk unit weight, bulk density, specific gravity, compressive strength, and the cost per unit production of CHB.

The study was carried out with two factor combination with three replications. Corn husk ash was used as partial replacement of cement in CHB also added with 5% molasses in constant level. Factor A was the mixture proportion of CHB with 5% corn husk ash and 95% Portland cement (A1), 10% corn husk ash and 90% Portland cement (A2), and 15% corn husk ash and 85% Portland cement (A3). Factor B was the curing time of which the sample CHBs were subjected for 14 days, 21 days, and 28 days. The mixture proportion used was 1:9 (cement aggregate).

The results revealed that the increasing amount of corn husk ash used resulted to the decrease in bulk unit weight, bulk density, and specific gravity hence making the CHBs lighter. Also, test result showed that A1 with 2.31 Mpa (355.04 psi) had the highest compressive strength and A3 with 1.86 Mpa (269.7702 psi) had the lowest compressive strength after 14 days curing period which mean that as the amount of corn husk ash increase also decreases the compressive strength of CHB. In terms of cost per unit production, CHBs with corn husk ash has higher unit cost than conventional CHB. The increased amount of corn husk ash also increased the cost per unit production of CHB. Nevertheless, partial replacement of cement with corn husk ash in CHB has a positive impact to the environment as it helps in proper agricultural waste disposal.

## **IDENTIFICATION ON WATER PH LEVEL IN MANGROVE AREAS IN IN SITIO BIAO, BARANGAY COGON, DIGOS CITY**

---

Author: Emmalou D. Chiu

Year: 2020

Adviser: Marvin T. Lopez

This study was conducted to identify the water pH level in mangrove areas in Sitio Biao, Brgy Cogon, Digos City. The study was conducted in Sitio Biao in Barangay Cogon, Digos City. The existing mangrove area surveyed was about 31,622.2924 square meters or 3.162 hectares dominating Rhizophora and Sonneratia mangrove species. The water pH level values were ranges from 7.12 to 8.14 which shows that the water is slightly alkaline. The average pH level value is 7.47. The interpolated data shows that the areas having pH values of 7.1203 to 7.3541 has the largest spatial distribution. The results showed that Rhizophora and Sonneratia are well adapted to grow within this pH values having high rate of survival. The water also conforms to the standard pH range for acceptable for fish and wildlife sanctuaries. However, the growth and adaptability of the mangroves and aquatic organism does not only depend on the water pH level of water.

## **NON-CIRCULATING HYDROPONIC GROWING OF CUCUMBER (*Cucumis sativus* L.) AS AFFECTED BY DIFFERENT LEVELS OF BANANA PEDUNCLE JUICE AND KD FOLIAR**

---

Author: John Charlo Cobol

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph D

The study was conducted to examine the effect of Banana peduncle juice and Kappaphycus drippings foliar as an alternative nutrient solution. It was conducted at Davao del Sur State College, Mati, Digos City. The data gathered was limited from transplanting until the flowering stage of cucumber plants due to the national declaration of enhance Community quarantine.

Complete Randomized design (CRD) was used in the study with five treatments replicated 5 times. The parameters used on this study were flowering time and root formation. Based on the results and finding of the study, it can be concluded that the use of Banana Peduncle Juice and Kappaphycus drippings Foliar as a nutrient solution can support the growth of cucumber. However, it has no significant effect on the flowering time of Cucumber in hydroponic culture. It must be concluded that the nutrients present in banana peduncle juice does not affect the development of female flowers of the cucumber plant.

## **EFFECT OF DIFFERENT PRE-TREATMENTS ON THE PHYSICAL QUALITY AND DRYING RATE OF BREADFRUIT (*Artocarpus altilis*) FRUIT FLOUR**

---

Author: Jessa G. Danduan

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

The study was conducted to examine the effect of different pre-treatments on the physical quality and drying rate of breadfruit (*Artocarpus altilis*) fruit flour. The pre-treatments used were T1 (raw), T2 (blanched) and T3 (fermented). Data were analyzed using the Complete Randomized Design in one way Analysis of Variance (ANOVA) at 1% and 5% level of significance. The samples were evaluated by randomly selected employee of Coco Davao Inc. in terms of their physical quality specifically its color, odor, texture and general acceptability. Mature but unripened breadfruit fruit was used. All treatments were equally undergone with the same oven temperature of 60°C and weighed at every 15 minutes interval until the desired moisture content level of 10%-14% was reached. The highest drying rate was observed in Treatment 1 (raw) with 126.74 g/hr among the treatments. The drying rate of Treatment 2 (blanched) was 99.13 g/hr for Treatment 3 (fermented).

The results of the sensory evaluation of the respondents to the breadfruit fruit flour revealed that T1 (raw) has the highest mean average among the treatments in terms of color, odor, texture and general acceptability with the average rating of 3.28 (acceptable), 3.22 (acceptable), 3.4 (acceptable) and 3.69 (more acceptable), respectively. While Treatments 2 has the average rating of 1.76 (less acceptable) for color, 2.38 (less acceptable) for odor, 2.18 (less acceptable) for texture and 2.87 (acceptable for general acceptability). In the other hand, Treatment 3 (fermented) has the average rating of 2.38 (less acceptable) for color, 2.69 (acceptable) for odor, 2.6 (acceptable) for texture and 3.02 (acceptable) for general acceptability.

The statistical results on the sensory evaluation implied that different pre-treatments could provide significant effects on the physical attributes of the breadfruit fruit flour in terms of color, odor, texture and general acceptability.

## **MODIFICATION AND PERFORMANCE EVALUATION OF MOTORIZED PEANUT (*Arachis Hypogaea*) ROASTER-HULLER**

---

Author: Jeneae Delos Santos

Year: 2020

Adviser: Eduardo F. Aquino, MA, MS

The modification and performance evaluation of motorized peanut roaster – huller was conducted at Tagum City, Davao del Norte. The peanut roaster – huller was mostly made of stainless steel, angle sbars, square bars, and a blower. The stainless steel was bent to form a cylinder which installed in the stainless solid shaft to serve as a peanut roaster – huller.

The study was given emphasis on varying the operating time and at different shaft speed (rpm) to determine its capacity, efficiency and quality of roasted peanut in terms of color/appearance and flavor.

The study used One – Way Analysis of variance to determine if there is significant difference among treatments. There were nine treatments replicated three times.

The results revealed that the capacity and efficiency showed highly significant difference among treatments. It was found out that the use of 96 rpm at 10 min roasting time showed a best result in terms of quality and acceptability.

## **IDENTIFYING DISCHARGE AND WATER USER OF THE SELECTED RIVER OF DIGOS CITY, DAVAO DEL SUR**

---

Author: Niño G. Diestro

Year: 2020

Adviser: Razel Allan R. Valleser, MOP

The study was conducted to show the sampling site of the specified upstream and downstream area of Balutakay river and Digos river, determine the average discharge of the selected rivers and their tributaries and identify the water user of Digos City, Davao del Sur.

This study was using Global Positioning System (GPS) device to get the coordinates of the upstream and downstream area of the selected river and processed and analyzes using mapping software Quantum Geographical Information System (QGIS) platform. The determination of discharge of the Balutakay river and Digos river was used a current/flow meter and a survey questionnaire was provided to identify the water user of the area.

The results revealed that Balutakay river has a smallest generated average discharge compared to the generated average discharge of Digos river. Tributary 1 of Balutakay river contributes the highest average discharge and tributary 3 which contributes least average discharge to main river. While tributary 1 of Digos river contributes the highest average discharge and tributary 2 contributes least discharge to the main river. On the other hand, San Agustin Communal Irrigation System and Balutakay Communal Irrigation System were the identified water users in the area.

## **DESIGN AND PERFORMANCE TEST OF PROTOTYPE MANUAL BANANA PEDUNCLE JUICER**

---

Author: Ronel M. Egido

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph D

This study aimed to design, fabricate and performance test of the prototype manual banana peduncle juicer. The parameters considered in accomplishing the study was the manual banana peduncle juicer input capacity, juice recovery, test material meal recovery, extraction rate, extraction recovery, extraction losses, potential juice content, and extraction efficiency.

The data gathered using the formula given in (PAES). There were four trials in this study and each trial composed of one banana peduncle. The average input capacity is 6.69 kg/h, average juice recovery is 40.98%, average test material meal recovery is 55.31%, average extraction rate is 2.69 kg/h, average extraction losses is 10.05%, average extraction recovery is 89.95%, average potential juice content is 1.34 kg/h, and average extraction efficiency is 56.82%. Hence, the prototype manual banana peduncle juicer is functional and manually operated at specified capacity.

## **UTILIZATION AND PROCESSING OF POMELO (*Citrus maxima*) PEEL FOR BAR SOAP**

---

Author: Rey Ann M. Embodo

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph D

The Study entitled, "Utilization and Processing of Pomelo (*Citrus maxima*) Peel for Bar Soap", was successfully conducted at DSSC, Matti, Digos City.

The Study was analyze statistically using T-Test with two (2) treatments and three (3) replicates each treatment with the same weight with Treatment 1 for fresh and Treatment 2 for dried. Fresh Pomelo fruit were selected and prepared. The Pomelo fruit was peeled and slice into ¼ to ½-inch pieces samples was divided into 6 portions (150g each) for fresh and air dried. The extracted oil on each sample was prepared and poured into a 50g grams of melted glycerin soap.

In the Sensory evaluation, the color, odor and texture were favored in T1 (fresh) with average mean rating of 33.69, 4.53 and 3.10 (more acceptable). The pH value of two treatments and its replicates were recorded the same value of 7 pH level.

## **EVALUATION OF WHITE SILK COTTON (*Ceiba pentandra*) FIBER PAPER USING MAGNESIUM HYDROXIDE WITH CASSAVA STARCH AND SEAWEED POWDER**

---

Author: Merje Faye L. Enerio

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study examined the potential of White Silk Cotton (*Ceiba pentandra*) Fiber as an alternative material for paper production. The White Silk Cotton Fiber was cooked with Magnesium hydroxide for 1 hour. The cooked fibers were added with different binders according to the desired mixture of each treatment. The mixtures were then blended and separately placed in a vat.

The study was established with three (3) treatments and three (3) replicates. The Treatments were: Treatment 1: 8% Cassava Starch, Treatment 2: 8% Seaweed powder, and Treatment 3: 4% Cassava Starch and 4% Seaweed powder. Using the molder, the pulp was layered and was sundried for 8 hours. The quality of paper was then tested in terms of Color, Odor, Texture, Grammage, and Water Absorption. The data gathered was statistically analyzed using One-way Analysis of Variance (ANOVA) at 1% and 5% level of Significance.

The ANOVA results for Color, Texture, Grammage, and Water Absorption of the produced paper from all treatments shows no significant difference with a P-value of 0.374, 0.950, 0.209, and 0.157 respectively. While the ANOVA results for Odor shows a significant difference with a Pvalue of 0.036. It shows further in the LSD result for Odor that Treatment 1 to Treatment 3 and Treatment 2 to Treatment 3 were both significant with a P-value of 0.031 and 0.018 respectively. Meanwhile, Treatment 1 to Treatment 2 (with Cassava Starch as binder) is not significant with a Pvalue of 0.702. Moreover, Treatment 1 had the lowest Unit Production Cost Analysis which is P8.3 per piece of paper.

Based on the analysis of the results, the binding properties of all treatments do not have any significant difference in terms of Color, Texture, Grammage, and Water Absorption. Meanwhile, the Odor is the only parameter that shows significant difference on the binding properties of all treatments. In addition, the results show that the approximate overall grammage ranges from 100-200 gsm. The product produced can be classified as paper because according to ISO standardization body, a paper product is about 70-200 gsm and anything over 200 g/m<sup>2</sup> is called paperboard. Thus, White Silk Cotton (*Ceiba pentandra*) fiber is a potential material for paper production.

## **EVALUATION OF ARATILIS FRUIT (*Muntingia calabura* linn) AS A POTENTIAL SOURCE OF BIOETHANOL**

---

Author: Joezel A. Entienza

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study "Evaluation of Aratilis Fruit (*Muntingia calabura* linn.) as a Potential Source of Bioethanol" was conducted at Magugpo West, Tagum City, Davao del Norte, last May-June.

The treatment involve in this study was Treatment 1 - 500g aratilis fruit juice with 10g yeast at 7 days fermentation duration Treatment 2 – 500g aratilis fruit juice with 10g yeast at 14 days fermentation duration Treatment 3 – 500g aratilis fruit juice with 10g yeast at 21 days fermentation duration. Each sample has 3 replications. The data obtained include the pH of before and after fermentation process, and cost of fermentation. The data collected were evaluated at 1% and 5% using variance (ANOVA) for Complete Randomized Design (CRD).

Based on the result pH value before fermentation was Treatment 1 with acidity level of 6.0 pH, Treatment 2 of 6.2. Thus Treatment 3 has an acidity level of 6.1 pH. On the pH value after fermentation, the result shown was Treatment 1 with acidity level of 4.43 pH. Treatment 2 of 4.5. Thus Treatment 3 has acidity level of 4.43 pH.

Both pH before and after fermentation with different length of days T1 – 7 days, T – 14 days, and T3 – 21 days was within the range of 4.0- 6.5. It clearly indicates that the result belongs to the acidic solution and displayed the characteristics of an acid. The pH value after fermentation has the most acidic, rather that pH before fermenting the mixture.

The result of the pH before and after fermentation was in the optimum range which can produce ethanol. Statistically, the minor variations of the pH values within before and after fermentation process resulted to no significant difference. Results implied that the different fermentation duration of each treatment T1 – 7 days, T2 - 14 days, and T3 - 21 days may not significantly affect or influence the pH value and may increase the yield of the production of bioethanol.

For T-test, the interpreted data resulted in no significant difference of treatments T1, T2 and T3 comparison of the pH value before and after fermentation process. Thus, the null hypothesis was rejected.

For the cost of production, from the materials used in the study up to the fermentation process, the total cost was equal to ₱324.90.

## **PROPERTIES OF CLAY BRICKS MIXED WITH ABACA RESIDUE ASH**

---

Author: Edda Louise M. Fiel

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study was inked with the focal point eyeing on the utilization of Abaca Residue in Bansalan for making this waste into a useful and profitable product, as an additive material in fired clay brick. The parameters evaluated for this study were percentage volumetric shrinkage, bulk unit weight, dry density, specific gravity and cost per unit production.

The study was analyzed in a Completely Randomized Design (CRD with four (4) treatments replicated three (3) times. Treatment 1 was a mixture of clay (80%) and sand (20%), Treatment 2 was a mixture of clayash-sand which is 70%, 10% and 20 % respectively, Treatment 3 was a mixture of clay (60%), abaca residue ash (20%) and sand (20%), and Treatment 4 was a mixture of 20% abaca residue ash with an amount of pure clay which is 80%. Data was analyzed statistically using One-way analysis of variance (One-way ANOVA) at 1% and 5% level of significance and Least Significance Difference (LSD) to further test the significant difference between the treatments.

Based on the results, Treatment 3 had the highest value of volumetric shrinkage followed closely by Treatment 4 which had the same mixture of 20% abaca residue ash then Treatment 2 and Treatment 1. Treatment 4 had the lowest value for bulk unit weight, dry density and specific gravity followed by Treatment 3, 2, 1, respectively.

ANOVA results revealed that there was no significant difference in the Percentage Volumetric Shrinkage, Bulk Unit Weight, Dry Density, and Specific Gravity of the treatments. It was also observed that the treatment with abaca residue ash has slight difference in bulk unit weight, density and specific gravity from commercial clay bricks without great changes in volume. It can be distinguished further that additional mixture of Abaca residue ash resulted to lighter clay bricks without greatly affecting its volumetric shrinkage.

## **QUALITY OF CACAO (*Theobroma cacao* L.) POD HUSK AS A BIOPLASTIC AT DIFFERENT LEVELS OF MIXTURES**

---

Author: Karen Rizza C. Foronda

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study was undertaken to determine the physical characteristics of the bioplastic from cacao (*Theobroma cacao* L.) pod husk at different levels of mixtures in terms of its color, texture, transparency, odor, and general acceptability. In addition, this study also determined its cost analysis.

The study involved five (5) treatments according to the different levels of mixtures and were replicated thrice. The determination of the physical characteristics from cacao (*Theobroma cacao* L.) pod husk at different levels of mixtures were determined after surveying selected respondents it was performed after the said bioplastic had dried for seven days. On the other hand, the cost analysis' of the bioplastic from cacao (*Theobroma cacao* L.) pod husk at different levels of mixtures were analyzed. The study was carried out using completely randomized design (CRD) and was statically analyzed using the frequency distribution analysis.

The results showed the highest mean rating on color was the Treatment 5 of 3.66 which falls to the descriptive rating of dirty white to white. On the other hand, the highest mean rating on texture was the Treatment 4 of 4.07 which falls between a descriptive rating of smooth or matt to glossy. The highest mean rating on transparency was the Treatment 5 of 1.73 which falls to the descriptive rating of opaque to slightly translucent. Further, the highest mean rating on odor was the Treatment 1 of 3.87. Furthermore, the result showed that the highest mean rating on the general acceptability was Treatment 1 of 4.13 with a descriptive rating that falls between good quality and recommend to excellent quality and recommend.

In addition, the unit production cost in Treatment 1 was Php280, compared to Treatments 2,3,4, and 5 with Php290.33.

## **QUALITY OF ALKALI PRETREATED LEAF MIDRIB FIBERS FROM DIFFERENT BANANA (*Musa spp.*) CUTIVLARS**

---

Author: Francis L. Cabigas

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study was conducted to evaluate the different properties of banana leaf midrib fiber from Cavendish and Lakatan. The fibers were evaluated through strand size, density, percent recovery and fineness determination. Banana leaf midrib fibers were extracted manually using manual stripper and were dried to its desired moisture content of 11% to 12%. The dried fibers of Cavendish and Lakatan (Factor A) were soaked to 0%, 6%, and 12% Sodium Hydroxide (NaOH) solution (Factor B).

The study was carried out using Complete Randomized Design (CRD) in two-way analysis of variance (ANOVA) at 1% and 5% level of significance. The ANOVA result showed that there was a significant difference in the mean strand size and mean density among the Factor B (NaOH pretreatment) at 5% level of significance. However, there was no significant difference observed among the Factor A and Factor combination in both 1% and 5% level of significance. LSD result for mean strand size and mean density of Factor B revealed that B1 has significant difference ( $P < 0.05$ ) to B3 while B2 has high significant difference ( $P < 0.01$ ) to B3. The ANOVA result showed that there was a high significant difference in the mean percent recovery and mean fineness among the Factor A in both 1% and 5% level of significance. There were no significant difference among the Factor B and factor combination in both 1% and 5% level of significance. The highest and the lowest mean strand size was observed in A1B2 (0.358 mm) and A1B3 (0.151 mm) respectively while the highest and the lowest mean density were observed A1B3 (0.042099 g/mm<sup>3</sup>) and A1B2 (0.005839 g/mm<sup>3</sup>) respectively. The highest and the lowest mean percent recovery were observed in A2B1 (34.77%) and A1B2 (31.39%) respectively. The highest and the lowest mean fineness were observed in A1B1 (601.49 dtex) and A2B1 (364.54 dtex) respectively.

Based on the result of the study, the fibers of Cavendish and Lakatan pretreated to 6% NaOH solution is the most acceptable among the different factor combination in terms of quality. However, further test for the tensile strength of the fibers is still required to determine the most acceptable among different factor combination in terms of mechanical property.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF WATER FLOW DRIVEN WASTE COLLECTOR FOR IRRIGATION CANALS**

---

Author: Georgy G. De Castro, Jr.

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study was carried out to design, fabricate and evaluate the efficiency of the Water Flow Driven Waste Collector For Irrigation Canals. The study had five (5) trials to determine its filtering capacity and how the machine works. The machine has a dimension of 1.50m x 0.70m x 1.0m where gauge 22 G.I sheet casing and angle bar frame was used. Components of water Flow Driven Waste Collector for Irrigation Canals were composed of driver and driven pulley, chain conveyor, shafts, sprockets, screen, brush and paddle wheel.

The Water Flow Driven Waste Collector was evaluated by its filtering capacity where it was analyzed using Descriptive Research Design. As the study was conducted, the machine works well in terms of collecting and filtering the waste but there are times that the paddle wheel rotates slowly due to the current of water and some wastes were not collected. It worked slowly because some wastes were being stocked and also because of the pressure of water. Some wastes were collected and some were not because the brush was too small. It was observed that the machine works dependently to the water flow rate. The mean flow rate of water of the irrigation canal when the study was conducted was 2.29 meter per seconds.

In terms of filtering capacity, the highest filtering capacity recorded was on Trial 1 with 3 kilogram per minute capacity. Followed by Trial 4, which took an average filtering capacity of 2.5 kilogram per minute of waste collected and Trial 5 having the lowest average filtering capacity in which 1.5 kilogram per minute were only collected. As a result, the overall average filtering capacity of the Water Flow Driven Waste Collector was 2.2 kg per minute.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF PROTOTYPE MECHANICAL MILKFISH (*Chanos chanos*) SORTER**

---

Author: Christhelle G. Gerona

Year: 2020

Adviser: Eduardo F. Aquino, MA, MS

This study aimed to design, fabricate and evaluate the performance of the prototype mechanical milkfish sorter at different feeding and roller pulley size. It was conducted in Mankilam, Tagum City, Davao del Norte.

The parameters evaluated in this study were sorting capacity (kg/hr) and precision (%). Batch-type sorting operation was used in the conduct of this study. The prototype mechanical milkfish sorter was designed to sort three different sizes of milkfish such as small (below 4.2 cm), medium (4.2 cm to 4.8 cm) and large (above 4.8cm).

The data gathered were analyzed using analysis of variance at 5% level of significance. There were three treatments replicated three times evaluated in this study: T1 (10" feeding pulley, 6" roller pulley), T2 (10" feeding pulley, 10" roller pulley) and T3 (10" feeding pulley, 8" roller pulley).

The results of the statistical analysis showed that Treatment 1 has significant difference in terms of sorting capacity on Treatments 2 and 3. However, it showed no significant difference between Treatment 2 and Treatment 3.

The results showed that Treatment 1 has the highest sorting capacity of 565.27 kilograms per hour. However, it was observed that with higher revolutions per minute, Treatment 1 resulted lower precision. On the other hand, it was observed that there was only a minimal difference in size between large-sized and medium-sized milkfish which resulted the medium sized milkfish being sorted under large size category in Treatment 1. Hence, the prototype best operates in Treatment 1 with high sorting capacity and sorting precision.

## **PROPERTIES OF FIBERBOARD FROM CAVENDISH BANANA (*Musa acuminata*) EMPTY FRUIT BUNCH FIBERS AS INFLUENCED BY DIFFERENT LEVELS OF CORNSTARCH BINDER**

---

Author: Danielle Justice Marie T. Gica  
Adviser: Teresa S. Lumansoc, MSAE

Year: 2020

The study was conducted to observe the properties of fiberboards from different level of fibers and binders. The fibers were extracted from the empty bunch of cavendish banana and the binders used was cornstarch. The combinations of fiber and binder were 90% and 10% for Treatment 1, and 85% and 15% for Treatment 2 respectively. The treatments were replicated thrice. Each fibre board was evaluated in terms of water absorption capacity and cost of production. The study used Ttest: Paired Two Sample for Means to compare the data gathered from Treatment 1 and Treatment 2.

Based on the result, water absorption capacity revealed that Treatment 1 has higher water absorption of 62.64% than Treatment 2 with 27.22% of water absorption capacity.

Statistical analysis through T-test revealed that the mean difference in water absorption capacity has significant difference at 5% level between the two treatments. The result of the unit cost analysis revealed that Treatment 2 has the higher cost per unit production with Php 6.54/pc compared to Treatment 1 with Php 6.02/pc.

## **GIS DATABASE ON SOIL NUTRIENT, SOIL AND WATER MANAGEMENT AND PRODUCTION YIELD OF ARABICA COFFEE**

---

Author: Lorecris L. Gilvero

Year: 2020

Adviser: Mark Jude F. Trondillo, PhD

The data gathering of soil and water management and production yield per farm size area was conducted at Prk. Pluto, Sitio Balutakay, Brgy. Managa, Bansalan, Davao del Sur and Brgy. Kapatagan, Digos City. It was conducted via one-on-one interview with the farmers through farm survey using a survey questionnaire. This study was conducted to know and determine the soil and water management practices, production yield per year and farms size area of the both barangay in their coffee farms through a farm survey.

The results revealed that both barangay have the same practices in soil management, in terms in land preparation. The farmers in both barangays, uses a manual clearing and manual cultivation with hand tools. In water management, in terms on wSater sources and type of irrigation system they used. The Balutakay coffee farmers rely on spring as a source of water and locally made sprinkler for irrigation type system for their irrigations while the Kapatagan coffee farmers both rivers and spring are their source of water and commercial sprinkler for their irrigation in their farms. In terms of the production yield per year the Balutakay coffee farmers can harvest an 800 kg to 1000 kg per hectare while Kapatagan coffee farmers can harvest a 500 kg to 750 kg per hectare in a year. The survey in Balutakay area shows that the area is suitable in planting coffee trees in the future than the area of kapatagan in terms in the survey result on the production yield per year.

## **PROCESSING AND DRYING OF LEMON GRASS (*Cymbopogon citratus*) AS POTENTIAL SOURCE OF ESSENTIAL OIL**

---

Author: Christian Dominique A. Iyog

Year: 2020

Adviser: Mark Jude F. Trondillo, PhD

The study entitled, "Processing and Drying of Lemon Grass as Potential Source of Essential Oil" was successfully conducted at Mabini Extension, Digos City.

Complete Randomized Design (CRD) with two (2) treatments and with same amount of initial weight was used in this study, namely T1 (Simple Distillation of fresh and dried lemon grass) and T2 (Steam Distillation of fresh and dried lemon grass).

The lemon grass was cleaned and cut into smaller pieces and divided into 4 portions (100g each) for the fresh and dried sample of different distillation method. Samples were dried by sun drying. Means from drying rate was calculated for the two dried samples. Based on the observation the lemon grass can reach its equilibrium moisture content faster. The two sample finish drying at the same time.

## **PROPERTIES OF BIOPLASTIC MADE FROM DIFFERENT MIXTURE OF TARO (COLOCASIA ESCULENTA) CORM STARCH AND PROTEIN**

---

Author: Ma. Victoria Jegremosa

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study was carried out to evaluate the taro corm starch and protein as an alternative source of material in making bioplastic. Every samples of bioplastic were mixed with different level of taro corm starch and protein that were added with fixed amount of glycerol and sun dried for about 24 hrs. The processed bioplastic were then characterized according to its flammability and acid reaction. Data were analyzed through Complete Randomized Design (CRD) in a one way ANOVA at 1 % and 5 % level of significance.

Result of the analysis revealed that Treatment 5 (T5) (0.15 inch/sec) has the highest burning rate and Treatment 1 (T1) (0.075 inch/sec) was the slowest. Acid reaction was highest (50.57%) in T5 and lowest (14.90%) in T1.

ANOVA result revealed highly significant difference ( $p < 0.01$ ) in the burning rate and acid reaction among the treatments. The unit production cost calculated was in T1 (27.927 Php/pc) and highest in T5 (31.152 Php/pc). Based on the general results, it can be calculated that taro corm could be a potential source of natural starch that could be made into bioplastic. The protein could be made into bioplastic but with the mixture of taro corm starch or any source of starch in order to improve its durability.

## **QUALITY OF CHARCOAL FROM CALABASH (*Crescentia cujete*) FRUIT SHELL**

---

Author: Jesa M. Lausa

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

Calabash (*Crescentia cujete*) fruit shell is a waste with no specific purpose and a type of biomass. Biomass, were commonly used for energy purposes and can be in a form of solid such as charcoal, hence this study was conducted to determine the quality of charcoal produced from calabash fruit shell in terms of its charcoal yield and bulk density and to compare it to coconut shell charcoal in terms of burning rate and water boiling time. The data gathered for yield and bulk density were analyzed and presented through descriptive statistics and T-test was employed for the comparison of burning rate and water boiling time between calabash fruit shell charcoal and coconut shell charcoal.

The results revealed that the mean charcoal yield of calabash fruit shell charcoal was 20.31% and the mean bulk density was 0.10 g/cm<sup>3</sup>. Between the two types of charcoals, coconut shell charcoal showed higher burning rate with 3.21 g/min and lower boiling time with 33.36 minutes per 2100g of water compared to calabash fruit shell charcoal with burning rate of 3.03 g/min and boiling time of 34.23 minutes per 2100g of water.

The results showed that there was no significant difference in the burning rate and water boiling time of calabash fruit shell charcoal and coconut shell charcoal. Therefore, the calabash fruit shell charcoal can be a new source of fuel.

## **UTILIZATION OF JUTE (*Corchorus olitorius*) STEM FIBER AND CHAYOTE (*Sechium edule*) STEM FIBER WITH THE INCLUSION OF PAPER WASTE AND CORN STARCH FOR PAPER BOARD PRODUCTION**

---

Author: Ryan E. Lolipay

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study was undertaken to determine the physical characteristics of the paper board using jute and chayote stem fiber with the inclusion of paper waste and corn starch in terms of grammage, color, texture, odor and general acceptability.

The study involves three (3) treatments according to the different levels of fibers and were replicated three (3) times. The determination of the physical characteristics of the paper board were determined after surveying selected respondents. The study was carried out using completely randomized design (CRD) and was statistically analysed using analysis of variance (ANOVA) and Least Significant Difference (LSD).

The result showed that there was highly significant difference among treatments in terms of grammage, color, texture, odor and general acceptability. In grammage the result showed that Treatment 1 is more preferable compare to the other Treatments in terms of grammage, with a mean rating of 0.08 g/cm<sup>2</sup>. For color the result showed that the respondents prefer Treatment 1 compared to the other Treatments in terms of color, with a mean rating of 4.67 and with a descriptive rating that falls between yellow to warm yellow. For texture the result showed that the respondents prefer Treatment 3 compared to the other Treatments in terms of texture, with the mean rating of 4.57 and with the descriptive rating that falls between laid to linen. For odor the result showed that the respondents prefer Treatment 2 compared to the other Treatments in terms of odor, with a mean rating of 4.97 and with a descriptive rating that falls between fragrant to odorless.

For general acceptability the result showed that the respondents prefer Treatment 3 compared to the other Treatments in terms of acceptability, with a mean rating of 4.97 and with a descriptive rating that falls between excellent quality and recommended to good quality and recommended.

## **EFFECT OF DIFFERENT LEVELS OF GLYCEROL ON THE QUALITY OF BIOPLASTIC USING PINEAPPLE (*Ananas Comosus L.*) STEM STARCH**

---

Author: Jireh L. Loquinario

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study was conducted to determine the effects of different levels of glycerol on the quality of bioplastic using pineapple (*Ananas comosus L.*) stem starch. This study was carried out using Complete Randomized Design (CRD) with four treatments and three replications. Treatments were T1 – 0% Glycerol, T2 – 10% Glycerol, T3 – 20% Glycerol and T4 – 30% Glycerol. The processed bioplastic was then characterized according to color, odor, texture, transparency, general acceptability and biodegradability. Results of the analysis revealed that T2 (1.79 average rating) has the highest evaluation and T3 (1.55 average rating) was the lowest evaluation in terms of color. T1 (3.28 average rating) has the highest evaluation and T3 (2.67 average rating) was the lowest evaluation in terms of odor. T1 (3.09 average rating) has the highest evaluation and T4 (2.69 average rating) was the lowest evaluation in terms of texture. T2 (2.18 average rating) has the highest evaluation and T1 (1.96 average rating) was the lowest evaluation in terms of transparency. T4 (3.47 average rating) has the highest evaluation and T1 (3.11 average rating) was the lowest in terms of general acceptability. In Biodegradability, all the treatments were buried in 6 days and result shows that T3 (100%) and T4 (100%) were completely degraded while T1 (52.49%) and T2 (63.64%) were not completely degraded. The Unit Production Cost was lowest for Treatment 1 with P43.45 per piece of produced bioplastic and highest for Treatment with P47.00 per piece.

ANOVA result shows that texture, transparency, general acceptability and biodegradability don't have a significant effect of the bioplastic. Further, there is a significant on the Color and Odor.

## **QUALITY OF CONCRETE HOLLOW BLOCKS WITH CRUSHED COCONUT SHELL AND MOLASSES**

---

Author: Christine D. Maghanoy

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

The study on the Quality of Concrete Hollow Blocks (CHB) with Crushed Coconut Shell and Molasses was conducted to determine the bulk unit weight, bulk density, specific gravity, and the cost per unit production of CHB. Crushed coconut shells were used as partial replacement of aggregates and molasses as time retarding admixture in concrete hollow block (CHB). The treatments were 10% crushed coconut shell and 90% aggregates (T1), 15% crushed coconut shell and 85% aggregates (T2) and 20% crushed coconut shell and 80% aggregates (T3). Each treatment was added with 5% molasses by weight of cement and was cured for 28 days. Conventional CHB was also produced in the study for comparison of the test results.

The ANOVA result showed that there was a highly significant difference in the mean bulk unit weight among the treatments and the conventional CHB. Further investigation on the mean differences between treatments through LSD at 1% and 5% significant level showed that high significant differences are evident between T2 and T3, T1 and T3, T1 and conventional CHB, T2 and conventional CHB, and T3 and conventional CHB. However, T1 showed no significant difference when compared to T2.

For bulk density and specific gravity, the ANOVA results showed that there was a high significant difference among treatments and conventional CHB. Further investigation on the mean differences between treatments through LSD at 1% and 5% significant level showed that high significant differences is evident between T1 and conventional CHB, T2 and conventional CHB, and T3 and conventional CHB. On the other hand, T2 and T3 showed significance at only 5% level. However, T1 and T2, and T1 and T3 had no significant difference.

The results of the study revealed that the higher the amount of crushed coconut shell replaced to aggregates resulted to a more lightweight CHB. However, the cost incurred per unit in the production of CHB using crushed coconut shell as partial replacement to aggregates was higher than conventional CHB. But based on the results of this study, CHBs with crushed coconut shells is more recommendable as it lessens the load of CHBs itself. In addition, it reduces the use of natural aggregates and lessens its detrimental effect to the environment.

## **UTILIZATION OF RICE (*Oryza sativa*) STRAW PRODUCTS MIXED WITH DIFFERENT SOURCES OF STARCH FOR THE PRODUCTION OF BIOPLASTIC MATERIAL**

---

Author: Anthony Bryan Q. Mallari

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

This study was carried out to evaluate the potential of different rice straw products particularly the rice straw powder and rice straw fiber as material for bioplastic production. Every samples of rice straw products were mixed with different sources of starch (corn starch and cassava starch) and fix amounts of glycerol, vinegar, and distilled water and sun dried for two days. The processed bioplastics were characterized according to its solubility, burning rate, and cost per unit production. Data were analyzed through Complete Randomized Design (CRD) and a two-way Analysis of Variance (ANOVA) at 1 % and 5 % level of significance.

The results of the analysis revealed that the factor combination A1B1 had the slowest rate (4.9053 cm/min) in terms of burning. The factor combination A2B2 had the fastest rate (26.3856 cm/min) of burning. The ANOVA result on the burning rate of the bioplastic material showed that all factor combinations were highly significant at 1% and 5% level of significance.

The results for solubility test showed that the factor combination A1B2 has the lowest percentage (16.08%) of solubility in distilled water and the factor combination A2B2 has the highest percentage (19.98%) of solubility in distilled water. However, in vinegar, the factor combination A1B1 has the lowest percentage (7.59%) of solubility and the factor combination A2B1 has the highest percentage (23.98 %) of solubility.

The ANOVA result on the solubility of the bioplastic material in distilled water shows that all factor combinations are not significant at 1% and 5% level. The ANOVA result on the solubility of the bioplastic material in vinegar shows that all factor combinations are highly significant at 1% and 5% level of significance. The LSD result further revealed that the mean solubility of the interaction of vinegar between factor combinations A1B1 and A1B2 were significantly different at 5% level and the mean difference between factor combinations A1B2 and A2B1, A1B2 and A2B2, A2B1 and A1B1, and A2B2 and A1B1 were highly significant at 1% level.

In terms of cost per unit production, the factor combinations A2B1 and A2B2 are cheaper (30.27 Php/pc) than A1B1 and A1B2 (31.71 Php/pc).

## **THE EFFECTS OF ORGANIC FRUIT COATING FROM SEaweEDS (*Kappaphycus alvarezii*) EXTRACT ON THE SHELF LIFE AND QUALITY OF LAKATAN BANANA (*Musa acuminata*)**

---

Author: Arjun R. Mampusti

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study entitled, "The effects of organic fruit coating from seaweeds (*Kappaphycus alvarezii*) extract on the shelf life and quality of lakatan banana (*Musa acuminata*)" was successfully conducted.

The study consists of three (3) treatments with five (5) replicates each and a total of fifteen (15) samples. Treatment 1 contains 200 mL seaweed extract; 400 mL of distilled water; 20 grams alum powder; 100 grams of starch; 5 mL Ethrel 480 SL. Treatment 2 contains 400 mL seaweed extract; 400 mL of distilled water; 20 grams alum powder; 100 grams of starch; 5 mL Ethrel 480 SL. Treatment 3 contains 600 mL seaweed extract; 400 mL of distilled water; 20 grams alum powder; 100 grams of starch; 5 mL Ethrel 480 SL.

After 11 days of treatment, losses on weight and shrinkage were observed from all treatments. Though Treatment 2 & 3 yielded better results with lower shrinkage and weight loss percentage than Treatment 1, the minor variations from the gathered data shows no significant difference was observed among treatments. In terms of physical quality such as texture, color, odor and general acceptability of the treated lakatan banana, the minor variations on the sensory rating from the respondents showed no significant difference among treatments. Thus it was concluded that the nature of the seaweed (*Kappaphycus alvarezii*) as coating material for lakatan banana was ineffective at 200 ml, 400 ml and 600 ml added with 400 mL distilled water and other ingredients such as starch and alum in reducing physiological weight loss and shrinkage percentage. The Organic fruit coating was also ineffective in improving sensory and physical quality of the experimented lakatan banana samples. Unit production cost analysis was also determined and the results show that in every litre of production of organic fruit coating from seaweed (*Kappaphycus alvarezii*) of Treatment 1, Treatment 2 and Treatment 3; it cost Php230.17, Php191.38, and Php168.10 respectively.

## **SENSORY CHARACTERISTICS OF BREADNUT (*Artocarpus camansi*) SEED FLOUR AS AFFECTED BY DIFFERENT DRYING METHODS**

---

Author: Edilyn G. Maniapao

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

The study entitled, "Sensory Characteristics of Breadnut (*Artocarpus camansi*) Seed Flour as Affected by Different Drying Methods" was successfully conducted at DSSC, Matti, Digos City. The study was carried out through Completely Randomized Design (CRD) with three (3) treatments and three (3) replicates. Data were analysed in one way Analysis of Variance (ANOVA) at 1% and 5% level of significance. Test for significant differences between treatments were further tested through Least Significant Difference (LSD) at 1% and 5% level.

Breadnut seeds were peeled, cut into smaller pieces and were dried into different drying methods such as oven drying at set temperature of 70°C (T1), sun drying (T2) and solar drying (T3). Means for drying rate and sensory characteristics were calculated for all samples. Results show that mean drying rate of Treatment 1 (66.82 g/hr) was significant at 5% level II ( $p$  value  $<0.05$ ) when compared to Treatment 2 (52.97 g/hr) and Treatment 3 (47.44 g/hr). However, Treatment 2 was observed to have no significant difference ( $p$  value  $>0.05$ ) to Treatment 3.

Sensory characteristics evaluation showed that treatments were not significantly different with each other. Results of the sensory characteristics revealed that oven drying has the highest mean scale rating of 3.31 in terms of texture, sun drying method with the highest mean scale rating of 2.513 in terms of color, solar drying method has the highest mean scale rating of 3.0 in terms of odor and sun drying and solar drying with an equal highest mean scale ratings of 3.42 in terms of general acceptability.

Cost analysis were calculated based on the production cost of the breadnut seed flour produced for each treatment and result revealed that sun drying and solar drying methods has least production cost of 1.74 Php/g.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF A NON-OPERATED PROTOTYPE PORTABLE SOIL SIEVER FOR SAND, SILT AND CLAY**

---

Author: Anthony E. Merquita

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph D

A study on the Design, Fabrication and Performance Evaluation of a Non-operated Prototype Portable Soil Siever for Sand, Silt and Clay was conducted at Brgy. Matti, Digos City, Davao del Sur. The study was intended to determine the effectiveness of a non-operated prototype portable siever to sieve silt and clay. And, it was intended to compare the particle size distribution of linear-type and circular-type portable soil siever.

The results of the study showed that both linear-type and circular type manual soil siever were ineffective in sieving silt and clay soil particles. However, the functionality of the soil siever for sand particles can be operational at minimum cost.

## **BREWED QUALITY OF NATURALLY PROCESSED ROBUSTA COFFEE IN DIFFERENT ROASTING PROFILE**

---

Author: Anna Mae S. Naol

Year: 2020

Adviser: Mark Jude F. Trondillo, Ph D

The quality of Robusta coffee under different roasting profiles was investigated and analyzed. The data was subjected to analysis of variance at 5% level of significance and Least Significant Different test for pH, and descriptive method for sensory evaluation in terms of fragrance/aroma, flavor and aftertaste were used in this study with four(4) treatments (T1-Light roast, T2 - Medium roast, T3 -Medium-dark roast and T4 - Dark roast) and three (3) replicates.

The Robusta green coffee beans were roasted in different roasting profiles, light, medium, medium-dark, and dark, with 200g for each samples. In brewing of coffee, 1g of coffee in 15g of water ratio was used.

In the Sensory evaluation, the fragrance/aroma, flavor and aftertaste were at very good level of quality ranges from 7.0-7.75 rating in all treatments. While in pH , analysis of variance shows that there is a significant different in all the treatments, but in Least Significant Different test, between T1-Light roast and T2- Medium roast, T2- Medium roast and T3-Medium-dark roast, and T3-Medium-dark roast and T4- Dark roast shows no significance while between T1-Light roast and T3-Medium-dark roast, T1-Light roast and T4 - Dark roast, and T2- Medium roast and T4- Dark roast are said to have significant difference.

## **UTILIZATION OF DIFFERENT RATIO OF CARDAVA BANANA (*Musa balbisiana*) PEEL AND SWINE MANURE FOR BIOGAS PRODUCTION**

---

Author: Vincent Jay S. Padillo

Year: 2020

Adviser: Eduardo F. Aquino, MA, MS

This paper was inked with the focal point eyeing on the utilization of different ratio of cardava banana (*Musa balbisiana*) peel and swine manure for biogas production. The parameters for this study were pH of the substrates, pressure (psi), temperature of the substrate digester ( $^{\circ}\text{C}$ ), biogas production in liters, and retention period. A floating type setup was used as a gas holder.

The study was analyzed in a Complete Randomized Design and used one-way analysis of variance with 5% level of significance. The treatments were Treatment 1: (100%) Banana Peel at 7kg, Treatment 2: (75% + 25%) Banana Peel at 5.25kg + Swine Manure at 1.75kg, Treatment 3: (50% + 50%) Banana Peel at 3.5kg + Swine Manure at 3.5kg, Treatment 4: (25% + 75%) Banana Peel at 1.75kg + Swine Manure at 5.25kg. The ratio of the treatment combination is 1:1 water to substrate mixture.

According to the data gathered from the treatments of the biogas yield production for 30 days it was recorded that treatment 4 obtained the highest amount of total biogas yield of 59 L. While treatment 1, 2, 3 obtained lower production of total biogas yield with 6.5L, 10.06L, and, 12.1L, respectively. The average substrate temperature ranges from  $32.5^{\circ}\text{C}$  to  $34.6^{\circ}\text{C}$  having an average temperature of  $33.59^{\circ}\text{C}$  which proved that the digestion is under mesophilic digestion. The initial pH level of the Treatments 1,2,3 and 4 were 6.84, 6.65, 6.62 and 6.68 respectively, which conform to the standard pH in biogas production. The maximum pressure obtained was 0.1367psi in Treatment 1 and the minimum pressure obtained was 0.093psi in Treatment 4.

Study revealed that there is a significant difference in average daily biogas yield, average temperature digester, and average daily pressure. It is concluded that the biogas production is inversely proportional to the digester pressure.

## **WEIGHT LOSS AND SENSORIAL QUALITY OF LAKATAN BANANA (*Musa acuminata*) TREATED UNDER WET AND DRY OZONATION PROCESSES**

---

Author: Kobe B. Partol

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The general objective of this study was to evaluate the effect of dry and wet ozonation on the weight loss and sensorial quality of the Lakatan (*Musa acuminata*) banana variety. The study focused on the effects of dry and wet ozonation on the weight loss and sensorial quality Lakatan banana variety, using constant volume of ozone from a 230V 200 mg/H ozone generator.

Based on the result after the evaluation, only texture made a significant difference between the treatments with a P-value of 0.00378, obtained using the analysis of variance. Tukey-Kramer test showed that controlled treatment was found less acceptable in terms of texture, followed by wet ozonation treatment. Bananas treated under dry ozonation process were found more acceptable, in terms of texture.

In in terms of weight loss, it was found that there was no significant difference between the treatments. There was also no significant different between the treatments, in terms of color, with a P value of 1.89. Further, there was also no significant different between the treatments, in terms of aroma.

Therefore, based on the data gathered, it was concluded that bananas treated under dry ozonation process was more acceptable compared to bananas treated under wet ozonation process, in terms of texture. However, there were no significant difference between the treatments in terms of weight loss, color, and aroma. The cost analysis also showed, A2B3 (Wet ozonation in 7 days) had the highest cost as A3B1 (Controlled in 3 days) also had the lowest cost. Laboratory analysis for Total Soluble Solids, pH, and Pulp to Peel ratio, of Lakatan banana, under wet and dry ozonation processes, were recommended by the researcher, to determine the chemical changes of Lakatan in relation to its ripening.

## **QUALITY OF BROCCOLI (*Brassica oleracea var. italica*) Using Different Precooling Operations and Packaging Materials**

---

Author: Baltazar M. Nicolas

Year: 2020

Adviser: Mark Jude F. Trondillo, PhD

The study entitled, "QUALITY OF BROCCOLI (*Brassica oleracea var. italica*) Using Different Precooling Operations and Packaging Materials" was conducted to determine the weight loss and sensory characteristics in terms of color, odor, texture; and general acceptability. The data were analyzed using Two Way ANOVA with Replications for completely randomized design. The following were the treatments used in the study: Factor A; Hydro Cooling and Ice Cooling as precooling treatments and Factor B; Paper, Plastic Bag, Stretch film as the packaging materials. The results revealed that the samples from the hydro cooling have the most weight loss in terms of combined mean values. Sensory characteristics were also affected by the precooling methods and packaging material. In terms of color, the samples from the ice cooling treatment is more favorable and in terms of odor, texture and general acceptability, both treatments are almost the same.

## **DESIGN, FABRICATION AND TESTING OF THE PROTOTYPE BRICK-WALLED EVAPORATIVE COOLER WITH DIFFERENT CAVITY FILLER FOR CUCUMBER (*Cucumis sativus*)**

---

Author: Cloyd D. Pepito

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study entitled, "Design, Fabrication and Testing of the Prototype brick-Walled Evaporative Cooler with different Cavity Filler for Cucumber (*Cucumis sativus*)" was successfully conducted at DSSC, Matti Digos City.

The storage or preservation chamber had a dimension of 0.7m length, 0.6m width, and a 0.8m height. The top of the storage chamber was made of heat insulator. It was a double wall chamber made of bricks where the cavity was filled with sand. Two prototype brick-walled evaporative cooler was fabricated for the different cavity fillers such as the sand and the coco coir. The inner and outer wall were separated by 7.5cm. The overhead tank (pail) was filled with water with the capacity of four gallons. It was connected to the rubber hose to the top of the sand in the cavity between the double walls. The performance of evaporative cooler was evaluated in terms of temperature, relative humidity, shrinkage, weight loss, physical quality and cost analysis. The testing was done by keeping freshly harvested cucumber in full load condition for the observation and evaluation of different quality parameters in terms of physiological weight loss, shrinkage, temperature and relative humidity.

The effect of temperature and relative humidity inside the brick-walled evaporative storage structure with different cavity fillers was observed with the difference in temperature drop and respective differential change in relative humidity, the highest temperature drop was 7.8°C and difference in relative humidity at 8% for 10 days period storage study. Recorded weight loss was higher in the ambient condition. Based on the result, the brick-walled evaporative cooler can be used to store commodities with sand as cavity fillers for a desirable period of time with minimum significant loss and will be beneficial to maintain a regular market flow for a marginal farmer.

## **DESIGN, FABRICATION AND TESTING OF HAND-HELD DRIVEN MECHANICAL CACAO BEANS EXTRACTOR**

---

Author: Mark Bryan C. Quiao

Year: 2020

Adviser: Eduardo F. Aquino, MA, MS

The design, fabrication and testing of hand-held driven mechanical cacao beans extractor was conducted at Purok 5-a Matti, Digos City, Davao del Sur. The cacao beans extractor was mostly made of G.I sheet, angle bars, flat bars, pillow block and V-pulleys. The rubber which form into rubber spoon installed and serve as the beans extractor of machine.

The parameters considered in accomplishing the study were the Extracting capacity, Extracting efficiency, Percent damage and Operational loss. The Hand-Held Driven Mechanical Cacao Beans Extractor was operated in different pulley diameter. The treatment was, Treatment 1 with pulley diameter of 2 inches; Treatment 2 with pulley diameter of 3 inches; and Treatment 3 with pulley diameter 4 inches. The driven pulley that were used was 10 inch remain in constant.

The result showed that the most recommended treatment was Treatment 2 (3-inch diameter pulley) it has the most effective results of the extracting capacity, Extracting efficiency, Percent damage and Operational loss. The Hand-held Driven Mechanical Cacao Beans Extractor was functional and more advantageous over the manual operation. The performance also of the machine was affected by the quality of cacao pods, the better the quality the better the performance of the machine.

## **DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF PROTOTYPE TWO SPINDLE TYPE ABACA (*Musa textilis nee*) WINDING MACHINE**

---

Author: Junell Jayson E. Quisto

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study was undertaken to design, fabricate, and evaluate the performance of prototype two spindle type abaca winding machine. The study evaluated the performance of the prototype two spindle type abaca winding machine in terms of the winding capacity, winding efficiency, and quality of the wound fibers at different revolution per minute (100, 200, and 300).

The study was analyzed using an Analysis of Variance (ANOVA) at 1% and 5% level of confidence with three (3) treatments and replicated four (4) times in every treatment. Data gathered were winding capacity, winding efficiency, and cost of production.

The prototype two spindle type abaca winding machine measured a total length of 24 inches, a width of 12 inches, and a height of 28 inches. It consisted mainly of two (2) spindle, idler adjuster and tensioner, and a single switch. This machine used an electric motor with a 0.8 horsepower (Hp) as a driver.

The recommended revolution per minute (rpm) on winding an abaca fiber strand using this prototype two spindle type abaca winding machine was treatment 3 which was 300 rpm, since it showed a highly significant on winding capacity in terms of meters per minute (m/min) among the other treatments. The winding efficiency of the machine showed an equal data result of 100 percent (%) in which no breakage occurs in all the replicated treatments.

## **DESIGN OF A HOUSEHOLD – TYPE COFFEE BEAN HULLER**

---

Author: Michael Jhonny A. Rama

Year: 2020

Adviser: Marvin T. Lopez, PAE

The study was conducted to determine the sizes of structural and mechanical components and power requirement to design a household type coffee bean huller. The study was based on the standard as stipulated in Philippine Agricultural Engineering Standard (PAES). Angle bars: equal legs (1.5" x 1.5"), thickness of 4 mm, steel, weldable; Flat bar: thickness of 4 mm, width 1.5", steel, weldable; Sprockets: steel, chain no. 35, no. of teeth = 11, pitch d. = 33.83 mm, outer d. = 38.18 mm, max bore = 15.08 mm, max hub = 21.83 mm, width = 4.76 mm; Roller chains: steel, length = 372 mm, pitch 9.23 mm, width = 4.76 mm; V-pulley: steel, single grooved, pulley cross section = a, pitch d. = 65 mm, top width = 12.5 mm, bore = 16 mm, hub length = 30 mm; V-belts: rubber, length designation = 35, length 924.34 mm; Galvanized iron sheet: steel, thickness of 2 mm; Bolts and nuts: steel, hexagonal heads and nuts, bolt size = 10; round bars: steel, AISI 1020, d = 25 mm; Paint: solvent, color (silver, orange, green); Metal screen: steel; Pillow blocks: steel, bolt hole centres (J) = 105 mm, bore = 25 mm, height (H) = 115 mm, housing width (A) = 85 mm, total length (L) = 136 mm.

The power required to operate the coffee bean huller was equal to 1 horsepower. The estimated cost for fabrication of household – type coffee bean huller was Php. 23,327.85.

## **FORMULATION AND EVALUATION OF PLANT-EXTRACT BASED NATURAL DYE**

---

Author: Gine C. Redido

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The processing of plant-extract based natural dye was conducted at Brgy. Goma, Digos City. It was evaluated and analyzed by the selected residents of Brgy. Goma, Digos City. A study was conducted to know the color and odor quality of the plant extract-based natural dye from Achuete (*Bixa orellana* L.) seeds, Turmeric (*Curcuma longa*) rhizomes, Yellow Flag Iris (*Iris pseudacorus*) rhizomes, using the newly extraction method and Mahogany (*Swietenia*) barks, Turmeric (*Curcuma longa*) rhizomes, and K'nalum leaves using the traditionally extraction method. To determine the significant difference on the color, odor, and texture quality of the abaca fiber dyed from the plant extract-based natural dye. In the color quality of dye, traditional extraction process of making a dye produced darker color than newly formulated extraction process.

The odor quality of the plant-extract based natural dye that was extracted by the newly formulated extraction process was better than the odor produced by the dye that was extracted from the traditional method of extracting the dye. In the color quality of the dyed abaca fiber, the traditionally extracted dye that was applied to the abaca fiber produced darker red and yellow color than the newly formulated dye but except to the yellow color. The yellow and black traditionally extracted dye that was applied to the abaca fiber produced unpleasant odor than the newly formulated dye. Lastly, the texture quality of the dyed abaca fiber from the newly formulated dye produced rougher surface than from the traditionally extracted dye.

## **DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF PROTOTYPE AGRI - SONIC BIRD REPELLENT DEVICE ON RICE FIELD**

---

Author: Rex Adrian S. Natingga

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study was carried out to design, fabricate and to evaluate the potential of the Prototype Agri - Sonic Bird Repellent Device on Rice Field as an alternative in repelling birds. The device was fabricated with a casing that was made of plywood with a dimensions of 25cm x 35cm and 1 inch thick and a tripod which was made of 1inch x 1inch square tube.

The inside components was composed of snail horn, motorcycle lead battery, relay, fuse and wires. There were three (3) treatments having three (3) observation per replications and was conducted for 3 days. The Prototype Agri - Sonic Bird Repellent Device was evaluated by the numbers of birds repelled and the repellent efficiency. Data were analyzed in one way ANOVA at 1% and 5% level of significance. Statistically, results revealed that there were significant difference in terms of groups repelled to the levels of sound intensity. Treatment 3 (100db) has the highest number of group of birds repelled. Moreover, there was a significant difference recorded in terms of repellent efficiency where Treatment 3 (100 db) has a 100% repellent efficiency.

The fabrication of the Prototype Agri - Sonic Bird Repellent Device Machine has a total investment cost of Php 2,600 equal to the material and fabrication cost of the machine.

The machine operates eight (8) hours a day which measured a total fixed cost of Php 0.71 per day from repair and maintenance – ten percent (10%) of investment cost and a total variable cost of Php 400 per device. The summation of the total fixed cost and total variable cost which resulted to the total cost of Php 400.71.

## **POTENTIAL HYDROGEN (PH) VALUE DETERMINATION ON THE FERMENTED MIXTURE OF CARDAVA BANANA (MUSA ACUMINATA OR BALBISIANA) FLOWER FOR BIOETHANOL PRODUCTION**

---

Author: John Virg A. Rosal

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

This study was undertaken to determine the ph value of the fermented mixture from cardava banana (Musa Acuminata or Balbisiana) Flower for Bioethanol Production. This was carried in a Completely Randomized Design (CRD) with three (3) treatments and three (3) replications that according to the amount of yeast (10 grams, 13 grams and 15 grams). Potential hydrogen (pH) determinations were performed before and after fermentation to determine if the mixture's Ph has change after 21 days of fermentation. Data gathered were further analyzed using the Analysis of Variance (ANOVA) at 1 % and 5 % level of significance. Significant treatment means were further analyzed using Least Significant Difference (LSD).

Based on the data gathered, fermented mixture of 250 g of banana flower, 250 ml of distilled water with 10 g yeast fermented with duration of 21 days has a lesser ph among treatments after fermentation.

Results showed that there's no significant difference among treatments means on the ph values before fermentation. As what observe proper execution of procedure can affect the fermentation process. On the other hand, the ph values after fermentation were highly significant difference at 1% and 5% level of significance.

The total amount of the fermentation process of cardava banana (Musa Acuminata or Balbisiana) flower for bioethanol production was 455.00 pesos.

## **QUALITY CHARACTERIZATION OF PAPER PRODUCED FROM DIFFERENT CANNA PLANT SPECIES**

---

Author: Saysay A. Rosillo

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study was conducted to characterize the quality of paper produced from different Canna plant species and was conducted in Poblacion, Santa Cruz Davao del Sur.

The study was carried out using a Complete Randomized Design (CRD) in One Way Analysis of Variance (ANOVA) at  $1\% \pm 5\%$  level of significance. The treatments were the Canna indica leaves (T1), Canna flaccida (T2) and Canna generalis (T3). The pulp from Canna plant Species was produced through the use of thermomechanical pulping process added with magnesium hydroxide. The parameters evaluated were the grammage and water absorption of the produced paper and cost per unit production per treatment.

The results indicate that Canna flaccida and Canna generalis has the highest mean of grammage of 179.3933 g/m<sup>2</sup>. Canna indica linn had a mean grammage value of 175.2g/m<sup>2</sup>. In water absorption test, Canna flaccida has the highest mean value of 553.33%. Canna generalis had a mean water absorption value of 520% and Canna indica linn had the lowest mean absorption value of 506.667%. Among all treatments, Canna generalis had the highest unit cost (P3.70 per piece) while Canna flaccida had the lowest unit cost (P2.59 per piece).

ANOVA analysis revealed that there was no significant difference on the paper produced from different Canna plant species in terms of grammage and water absorption. Based on the results of the parameters evaluated the researcher concluded that the three Canna plants species (Canna indica linn, Canna flaccida, Canna generalis) could be a potential material for paper making.

## **PROCESSING AND EVALUATION OF GUYABANO (*Annona Muricata* L.) LEAVES AS POTENTIAL TEA POWDER UNDER DIFFERENT DRYING CONDITIONS**

---

Author: Precious C. Solosod

Year: 2020

Adviser Mark Jude F. Trondillo PhD

Herbal plants have been part of human cultures and practices for a long period of time. Guyabano has been scientifically and traditionally proven to have great natural benefits. Consuming guyabano extract can also safely prevent cancer cells from forming while effectively slowing down tumor growth. The study was conducted to determine the processing and evaluation of guyabano (*annona muricata* l.) leaves as potential tea powder under different drying conditions.

This study aimed to process and evaluate the guyabano leaves as potential tea under different drying methods. The effect of four drying treatments (air, sun, solar, oven) were evaluated with respect to the sensory characteristics according to its color, aroma, texture and general acceptability.

The study has four (4) treatments and replicated three (3) times. Treatment 4 (oven dry) has the fastest drying rate recorded and the Treatment 1 (air dry) with the slowest drying rate, the fastest drying rate is the shortest drying time based on the data results.

The data gathered revealed that the drying method for the sensory evaluation, Treatment 2 (sun drying method) favored by the respondents with good sensory characteristic output of guyabano tea leaves powder.

The data from different drying methods were analyzed for drying rate, sensory evaluation, and the cost production. The data revealed that the drying rate of dried guyabano tea leaves powder of Treatment T1, T2, T3, T4 are significantly different at 5% level of significance with P-value of 0.005.

## **EXTRACTION AND EVALUATION OF FERMENTED JUICE FROM GMELINA ARBOREA SP. LEAVES HOT PRESS METHOD AND COLD PRESS METHOD**

---

Author: Aljer O. Tanduyan  
Adviser Mark Jude F. Trondillo PhD

Year: 2020

This study was conducted to compare the two method which was cold press and hot press method by extracting fermented juice from *Gmelina Arborea* sp. The study aimed to evaluate the physical characteristics of extracted juice in terms of color, odor, pH value, density and its quantity (ml of oil/kg of leaves used).

The study used two treatments of extracting *Gmelina Arborea* leaves in the study. Treatment 1 the cold press method mixed with normal water and Treatment 2 the hot press method where heat was added. The treatments were replicated five times.

The study revealed that the density for cold press method had the lower average value of 0.945 g/cm<sup>3</sup> than Treatment 2 or T2 (Cold press method) of 0.857 g/cm<sup>3</sup>. For the color quality of extracted juice, it was observed that both treatments obtained the same odor quality at the value of 2 which was rated of having bad odor based on the sensory evaluation. For the pH value, it was observed that extracted juice from Treatment 1 using Hot press method was more acidic compared to Treatment 2 using Cold press method which had 5 and 6.4, respectively. T-test results showed that there was a significant difference between Cold Press and Hot Press method in terms of density and pH value. Further, for the color and odor, T-test result revealed that there was no significant difference in both treatments. For amount of juice extracted, hot press method had more amount of juice extracted than cold press method that had 188ml/kg and 130ml/kg, respectively. Furthermore, the cost of extracted juice per ml produced from hot press method was cheaper than the cost of extracted juice per ml produced from cold press method. For hot press method, the cost was ₱3.24 per ml while the cold press method was ₱4.69 per ml.

## **BIODEGRADABILITY AND PHYSICAL PROPERTIES OF SUGARCANE BAGASSE AS SEEDLING BAG**

---

Author: James Toledo

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study was conducted to determine the biodegradability and physical properties in terms of texture, odor and general acceptability of sugarcane bagasse as seedling bag at New Quezon, Hagonoy, Davao del Sur last JUNE 2020 to July 2020. This was carried out using Complete Randomized Design (CRD) with three treatments replicated thrice. Treatments were T1 – 80% Sugarcane Bagasse, 20% of corn starch (600 grams); T2 - 75% Sugarcane Bagasse, 25% of corn starch (600 grams); T3 - 70% Sugarcane Bagasse, 30% of corn starch (600 grams).

Results showed a different levels of sugarcane bagasse and cornstarch showed comparable results in biodegradability and physical properties in terms of texture, odor and general acceptability. However, no significant difference was observed among treatment means.

## **CHARACTERIZATION OF ARABICA COFFEE USING DIFFERENT PROCESSING METHODS**

---

Author: Krystal Mae A. Torres

Year: 2020

Adviser: Mark Jude F. Trondillo Ph.D

The study on the Characterization of Arabica Coffee Using Different Processing Methods was conducted to determine the size, mass, density, percent recovery and waste of parchment of coffee. The study was carried out using Complete Randomized Design (CRD) and T-test with two treatments particularly, sizes of the cherries and on the processes performed, respectively.

The sizes, mass, density, percent recovery and waste of parchment of cherries of Arabica coffee showed that there is no significant difference among the treatments in both natural and washed methods for processes on fresh cherries and green beans. The result showed, that there is a significant difference fermented and dried beans. However, data of each parameter vary from the different processes of each treatment.

# **PHYSICAL PROPERTIES ASSESSMENT OF FIBER CEMENT BONDED BOARD PREPARED FROM EXTRACTED NON-WOODY CELLULOSIC PLANT FIBERS, CEMENT AND DIFFERENT FILLERS**

---

Author: Golda Myra Velasco

Year: 2020

Adviser: Teresa S. Lumansoc, MSAE

The study was conducted to determine the bulk unit weight, bulk density, specific gravity and unit cost production of fiber cement bonded board prepared from non-woody cellulosic plant fibers, cement and different fillers. This was carried out with two factor combination with three replications. The mixture proportion used in every factor combination was 240g (60%) of cement, 120g (30%) of filler and 40g (10%) of fiber with three replications. Factor combination A1B1 was a mixture of 60% Portland cement + 10% pseudostem fiber + 30% sand, A1B2 was a mixture of 60% portland cement + 10% pseudostem fiber + 30% crushed glass, A2B1 was a mixture of 60% portland cement + 10% corn stalk fiber + 30% sand, A2B2 was a mixture of 60% portland cement + 10% corn stalk fiber + 30% crushed glass, A3B1 was a mixture of 60% portland cement + 5% pseudostem fiber + 5% corn stalk fiber + 30% sand and A3B2 was a mixture of 60% portland cement + 5% pseudostem fiber + 5% corn stalk fiber + 30% crushed glass.

Results showed that in terms of bulk unit weight, bulk density, and specific gravity, there was no significant difference among treatments at 1% and 5% level. For bulk unit weight, A1B2 had the highest value and A2B1 and A3B1 with the least value. For bulk density and specific gravity, A2B2 had the highest value and A1B1 with the least value. Furthermore, A1B1 has the lowest unit cost production while A2B2 has the highest unit cost production.

Based on the general findings of the study, it can be concluded that wastes from banana pseudostem's sheath and corn stalk as source of fibers, sand and crushed bottle glass as fillers, with cement can be a potential material for fiber cement bonded board production. Further test is still recommended to determine the mechanical properties to assess which among the samples will have the potential in producing good quality fiber cement bonded board.

## **PH DETERMINATION ON THE FERMENTED MIXTURE OF WASTE-MATURED COCONUT JUICE (*Cocos Nucifera L*) AS POTENTIAL SOURCE OF BIOETHANOL**

---

Author: Honey Lyn T. Villamor

Year: 2020

Adviser: Eric Z. Del Rosario, MSAE

The study of bioethanol production using waste-matured coconut juice (*Cocos Nucifera L.*) was conducted at Tanglaw B.E. Dujali, Davao del Norte. This study was carried out in a Randomized Completely Block Design with 2 factors. Factor A was on fermentation process (A1 – 10 grams of yeast, 500 mL waste-matured coconut juice, A2 – 13 grams of yeast, 500mL waste-matured coconut juice, A3 – 15 grams of yeast, 500 mL waste matured coconut juice and factor B was on fermentation duration (B1 – 7 days, B2 – 14 days, and B3 – 21 days) with 3 replications. Data gathered were further analyzed using the Analysis of Variance (ANOVA) at 1% and 5% confidence interval.

Based on the result of the statistical analysis before fermentation was revealed that A1B1 (10 grams of yeast; 7 days duration) was not significant to A1B2 (13 grams of yeast; 14 days duration) and A1B3 (15 grams of yeast; 21 days duration) at 1 % and 5 % level of significance while A2B1 (10 grams of yeast; 7 days duration) was not significant to A2B2 (15 grams of yeast; 14 days duration) and A2B3 (15 grams of yeast; 21 days duration) at 1 % and 5 % level of significance and A3B1 (10 grams of yeast; 7 days duration) was not significant to A3B2 (13 grams of yeast; 14 days duration) and A3B3 (15 grams of yeast; 21 days duration).

Based on the result of the statistical analysis after fermentation was revealed that A1B1 (10 grams of yeast; 7 days duration) was not significant to A1B2 (13 grams of yeast; 14 days duration) and A1B3 (15 grams of yeast; 21 days duration) at 1 % and 5 % level of significance while A2B1 (10 grams of yeast; 7 days duration) was not significant to A2B2 (15 grams of yeast; 14 days duration) and A2B3 (15 grams of yeast; 21 days duration) at 1 % and 5 % level of significance and A3B1 (10 grams of yeast; 7 days duration) was not significant to A3B2 (13 grams of yeast; 14 days duration) and A3B3 (15 grams of yeast; 21 days duration).

The pH determination on the fermented mixture of waste-matured coconut juice (*Cocos Nucifera L*) as potential source of bioethanol could be possible but the procedures and methods must be improved to maximize the production. Especially it must undergo Laboratory procedure for distillation process in order to identify the Bioethanol Yield, Bioethanol Recovery and Percent Alcohol Content.

## **EXTRACTION AND EVALUATION OF DWARF VARIEGATED AGAVE (*Desmettiana variegata*) LEAF FIBER UNDER DIFFERENT DRYING METHODS**

---

Author: Jc O. Yabis

Year: 2020

Adviser: Mark Jude F. Trondillo PhD

This study was conducted to compare the different drying methods which are the Sun dry, Solar dry and Air dry on drying the fibers that are extracted from Dwarf variegated agave leaves. The study aimed to evaluate the fiber's physical property in terms of color, texture and general acceptability.

The extraction of fibers used a manual abaca stripper. The Air dried, Sun dried and Solar dried fibers was replicated three times. The highest rating in terms of color and texture of fibers are the Solar-dried fibers. The data in the study revealed that Solar-dried fibers is the best in terms of its physical property and comes to be more acceptable to the respondents.

# **Bachelor of Science in Information Technology**

# **ENHANCEMENT OF WEB-BASED GENERAL FACILITY MANAGEMENT SYSTEM OF SPAMAST DIGOS CAMPUS WITH BARCODE TECHNOLOGY**

---

Author: Bobby Carillo Jr.

Year: 2020

Adviser: April Jay C. Diolata

A proper management and maintenance of facilities can help provide quality education by investing in strong preventive maintenance program. However, the previous Web-based general facility management system doesn't have the SMS notification to notify the laboratory in-charge during the Inspection and Preventive Maintenance (IPM) schedule. The project entitled Enhancement of Web-based General Facility Management System of SPAMAST Digos Campus with Barcode Technology was designed to develop a web-based system that can save the maintenance and transaction activity of the equipment. Also, to develop a desktop application that will notify the laboratory incharge during IPM schedule using SMS notification. The software used was the Visual Studio for developing the web-based and desktop application. The hardware used was the Arduino and GSM module. The result of the study gathered a consolidate mean of 4.0 for reliability. Therefore, it is recommended to improve design of the print report, SMS ii notification should send to multiple in charge and SMS notification should be automatically sent in logging in.

## **ADVANCE FARMING MONITORING SYSTEM**

---

Author: Eric Dela Calzada  
Adviser: April Jay C. Diolata

Year: 2020

Growth of the Mushroom can be inadequate if its temperature and humidity are not well controlled. Automated monitoring system was an alternative solution for controlling the mushroom bed's temperature and humidity. The project entitled Advance Farming Monitoring System was designed to develop an automated real-time monitoring system that monitors real-time graph of the farmers harvest and production.

Furthermore, the system was lodged as web-based system. The system can monitor the production of the farmer if it is increase and if it is brought by the market, it can add products and also it can add market and it can add vegetable crops to sale. The system was developed with a user friendly interface and factual information.

Thus, the researcher concluded that monitoring the farmer's production was very important. The system can help farmers produced crops with less time and effort but with the same results.

Moreover, the study found out its functionality, reliability and usability by the fifty respondents who evaluated the said project. The project came up with a totaled rating scale of 3.27, remarked as agree which means that the Web-Based Advance Farming Monitoring system was successful.

Therefore, it is highly recommended to conduct monitoring system in other and different crops.

Lastly, for future works, it is recommended to create an Android Application out of this study.

## **AUTOMATED PIGLETS FEEDER WITH FEEDS WEIGHT MONITORING SYSTEM AND SMS NOTIFICATION**

---

Author: Lyca Janice Pasa

Year: 2020

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

Automated Piglets feeder with feeds weight monitoring system and sms notification is developed to help the piggery farmers to automate the feeding process of the piglets instead of manual method. In developing the study, the researcher used a prototype to automate the feeding three times a day. The prototype is consisting of ultrasonic sensor to determine the level of feeds in the container and servo motor that is responsible for the opening and closing of the container for the releasing of feeds. By automating feeding and monitoring processes while integrating real-time alerts, this system contributes to more effective and efficient piglet management. This solution holds the potential to revolutionize modern pig farming practices by enhancing animal care, optimizing resource utilization, and ultimately increasing farm productivity. The effective detailed that the system is very beneficial, but it needs more adjustment, developments for the features and edge of the desktop application. Some of the inputs from this study is that there must be a duration for the releasing of feeds longer and must use load cell instead of ultrasonic sensor.

## **DEVELOPMENT OF EGG CLASSIFIER USING PIXY CAMERA AND LOAD CELL**

---

Author: Jeneby G. Reyes

Year: 2020

Adviser: Noel P. Sobejana

This exploration project is a confirmatory analysis on many studies about classification of eggs to set the standard of classifying the eggs in the market. The study used Arduino Uno R2 kit with two devices namely a load cell (HX711) kit and the Pixy Camera to have variation in getting the data. The main goal of the study is to introduce new way of processing egg classifier. Specifically, to develop a project that classifies the three categories of the eggs, identify the different sizes and weight of the eggs and display the realtime number of classified eggs in a tabular and graphical representation in both desktop and Web application. The prototype was successfully designed with small changes from the materials and other positioning of devices because of the adjustment with the characteristics of the devices that are sensitive in nature. The major contribution of the study is the new way of processing that displays the sorted information based on the logic activity on classifying the eggs. A sophisticated desktop application used for collecting data and a functional website were the highlight of this study.

*Keywords: Egg Classifier, Load Cell, Arduino Uno R2, Pixy Camera*

## **ANDROID-BASED MONITORING SYSTEM: A CASE ON QUALITY DRIED OF MANGO CHIPS**

---

Author: Genivie E. Sarsona

Year: 2020

Adviser: Noel P. Sobejana

This study is to develop an android-based classroom monitoring system for teacher using QR code technology for classroom management of the institutions administration and easy access of information for report generation regularly. The study is simply development of the system and tested through developmental process which is tested and implemented successfully. The major output is to (1) develop a module in using QR code in smartphone; (2) to develop module in saving information into the device locally; and (3) to develop a module that retrieves into the local server. The result of the project management where very successful using the JavaScript Object Notation (JSON) which serves as the imported library in the development. The study implemented successfully during the class scheduled last term of school year 2019-2020.

*Keywords: Android-based, JavaScript Object Notation, QR Technology*



Davao del Sur State College  
Matti, Digos City

[www.dssc.edu.ph](http://www.dssc.edu.ph)

