MITIGATING SOIL EROSION USING PINEAPPLE (*Ananas cumusus*) LEAVES MULCH

College of Agriculture and Natural Resources
BOHOL ISLAND STATE UNIVERSITY
Zamora, Biler, Bohol

JOSUA G. GAUDICOS

June 2022

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A Thesis
Presented to the Faculty of the
College of Agriculture and Natural Resources
BOHOL ISLAND STATE UNVERSITY
Zamora, Bilar, Bohol

In Partial Fulfillment
of the Requirements for the Degree in
Bachelor of Science in Agricultural and Biosystems Engineering

Josua G. Gaudicos

July 2022

APPROVAL SHEET

This thesis entitled "**MITIGATING SOIL EROSION USING PINEAPPLE** (*Ananas cumusus)* **LEAVES MULCH"** prepared and submitted by **Josua G. Gaudicos.**, in partial fulfillment of the requirements for the degree in Bachelor of Science in Agricultural and Biosystems Engineering has been examined and recommended for acceptance for oral defense.

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July 18, 2022
Date of Oral Defense

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-josua

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ABSTRACT

Soil erosion is a naturally occurring process that affects all landforms. In agriculture, soil erosion refers to the wearing away of a field's topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage. Therefore, this study has been proposed to mitigate soil erosion using pineapple leaves mulch and its significant different considering also the time interval from the time of water sample collection upon the simulation of runoff surface water. The plots were categorized into treated and untreated group with pineapple and without pineapple, respectively. Water discharge collection were done every 15, 30, 45, 60, 90, and 120 minutes. The data were analyzed using T-test to determine the significance difference between treatments and, Analysis of Variance (ANOVA), Tukey's Honest Significant Difference test to find the significance difference of their time interval in both treated and untreated plots. Specifically, it sought to answer the following questions; 1.) Which treatment has better resistance of soil erosion; 2.) Which period has the highest amount of soil loss occurred in each treatment; 3.) Is there a significant difference on the amount of soil loss in terms of: Time of water sample collection and Treated and Untreated plots? Based on the results of the study, the soil medium mulching with pineapple leaves has a better resistance of soil erosion. And the untreated soil medium was higher amount of soil loss than the treated soil medium. There was a significant difference most of the time interval in both treated and untreated plots, whereas, there was a significant difference at 1% level of confidence between treated and untreated plots, thus the null hypothesis was a rejected. This provides sufficient evidence that mulching pineapple leaves to the soil medium can mitigate soil erosion.

Chapter 1

THE PROBLEM AND ITS SCOPE

Rationale

Soil erosion is a naturally occurring process that affects all landforms. In agriculture, soil erosion refers to the wearing away of a field's topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage.

Agricultural land degradation is a widespread problem in the Philippine uplands that has persisted despite decades of conservation farming projects (Cramb, R., Catacutan, D., Arellano, Z. and Mariano, K. 2000). The approach centers on the formation of community Land care groups, supported to varying degrees through partnerships with government and non-government agencies. Such groups identify problems at the local level and mobilise information, community effort, and finances to help improve the management of their soil, water, vegetation, and other natural resources.

Agricultural Waste is unwanted or unsalable materials produced wholly from agricultural operations directly related to the growing of crops or raising of animals for the primary purpose of making a profit or for a livelihood. One of this is a pineapple leaves.

Pineapple leaves is made of fibre from the waste leaves of the pineapple plant. These leaves are a by-product from existing pineapple harvest. It is one of the most agricultural waste, also it is difficult to dispose properly. Thus this study intends to mitigate soil erosion using mulching pineapple leaves.

Mulching technically means covering of soil. Mulch provide the conditions that are favourable for the growth of plant and crop production. Mulch can be organic or inorganic. Agro-waste can be used as organic mulch. Agro-waste usually used for mulching are paddy straw, rice husk, bagasse, ground nut shell, saw dust, soybean husk, cotton stalk, sunflower husk, jute waste, chana husk etc. Mulch helps in saving water use for irrigation by keep the watering frequency down, suppress weeds, protect against high temperature, reduce erosion, retain moisture, provide nutrients.

LITERATURE BACKGROUND

Legal Basis

In response to the growing problems on waste management in the country, the Philippine's Republic Act 9003 (RA9003), also known as the Ecological Solid waste Management Act of 2000, was enacted in January 26, 2001. This chapter hopes to provide the brief background of the country particularly on the issue related to waste management such as population, economic situations, urbanization, and modernization, among others. It will also discuss the definition, classification and generation of waste both in urban and rural areas.

with the coconut husk buffer were slightly higher than that from control plot without any treatments in the initial stage of rainfall events after the installation of coconut husk buffer strip.

THE PROBLEM

Statement of the Problem

This study was conducted to mitigate soil erosion using pineapple leaves mulch to the soil medium.

Specifically, it sought to provide answer on the following questions:

1. Which treatment has better resistance of soil erosion?
2. Which period has the highest amount of soil loss occurred in each treatment?
3. Is there a significant difference on the amount of soil loss in terms of;
    a. Every time of water sample collection; and
    b. Treated and Untreated plots.

Null Hypothesis

There is no significant difference on the amount of soil losses between each treatments and their time interval.

Significance of the study

This study is comprehensively designed and experimented for the benefits of the following:

Farmers. The result of this study would help farmers on how to properly dispose their agricultural waste and helps on how mitigate soil erosion using agricultural waste such as pineapple leaves.

Administrators. The result of this study will help the Agriculture and Engineering Department to provide support on pursuing this kind experiment to conduct other research in solving the problem of disposing agricultural waste and soil erosion.

Engineer. This study would be helpful by providing the knowledge that will be useful in the future and the innovative uses of pineapple leaves as an alternative way in minimizing the soil erosion in the area.

Students. Through the finding of this study, the students will have an idea on about their research on how to conserve agricultural waste that can be used for something beneficial.

Future researcher. Upon the findings of this study, future researcher will be encouraged to conduct future research about possible uses of agricultural waste on applying it to prevent soil erosion.

Scope and Limitation of the Study

The main focus of this study is to determine the amount of soil losses in every slope model plot and their time interval with mulching pineapple leaves. This study was done at BISU -Bilar, Bohol.

RESEARCH METHODOLOGY

Environment

This study was conducted at Bohol Island State University – Bilar Campus, Zamora, Bilar, Bohol. The soil sample to examined was come from Katipunan, Carmen, Bohol, and the determination of the amount of soil losses was done at the Soil Laboratory of Bohol Island State University-Bilar Campus, Zamora, Bilar, Bohol.

Design

This study used two factorial experimental research in which subject for oven drying method to determine the amount of soil losses upon the surface runoff water simulation in the provided slope model plot with mulching pineapple leaves to the soil medium. The factors included the treated and untreated soil medium in every plot and the amount of soil loss in every different time of water discharge collection of 15, 30, 45, 60, 90, 120 minutes. Each treatment was replicated three (3) times.

Materials

The materials needed to use or conducting the study are pineapple leaves (strip), G.I sheet, wood lumber, steel tube, clamp, record book, and the camera will be used to facilitate the gather data.

Procedure

In order to evaluate the effects of mulching pineapple leaves in the soil medium on mitigating soil erosion, constructing the slope model plot with a dimension of (120cm x 15cm x 20cm) made of G.I sheet and shall be constructed at Bohol Island State University Bilar,Bohol.

The pineapple leaves were about to be collect at the farms of Katipunan, Carmen, Bohol, and was stripped. The soil medium was collected at the upland areas of Katipunan, Carmen, Bohol. The soil type was a clay loam and brown color, with a soil properties of; Water Content is 41.47%, Wet Density is 1.28 g/cm^3, Dry Density is 0.90 g/cm^3, Porosity is 65.94%, Void Ratio is 1.95, Degree of Saturation is 56.9%, Solid Phase is 34.056%, Liquid Phase is 37.39% and the Gas Phase is 28.56%.

Set up the soil model stand which is made of steel tube and clamp to construct 8^0 slope, the latter is the maximum slope of upland ground surface recommended for the safety of agricultural machines. When the stand is already done, the plot was put at the top of the stand and it was filled with soil. 18 kg amount of soil was placed at the soil model plot, and the amount of the pineapples

was 20% of its area of the plot. When the slope model plot are already filled, the simulation of artificial rainfall was follow with 18 liters amount of water, assuming that the rain intensity 60mm/hr.

Figure 1. Slope model plots mounted at 8^0

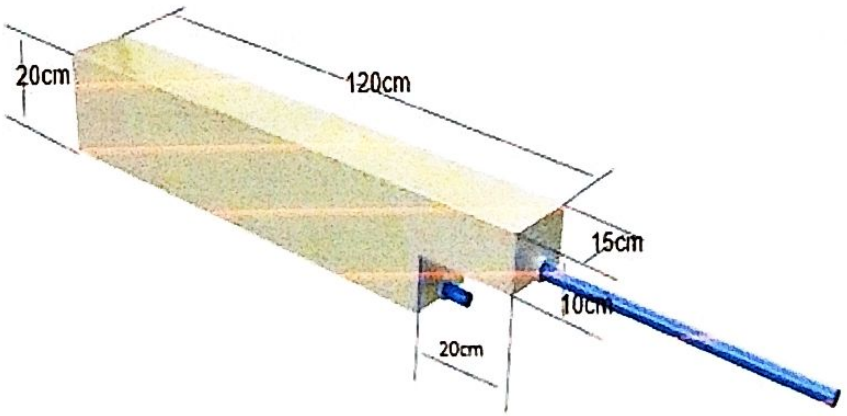


Figure 2. Isometric View of slope model plot

Collecting the amount of the water discharge from surface runoff at 15, 30, 45, 60, 90, 120 minutes upon the rain simulation. Collect water samples of 200ml only in every water discharge of surface runoff in every collecting period.

The collected water samples of 200ml will be used to find the amount of soil losses through oven drying method. It will be done at the Soil Laboratory of Bohol Island State University – Bilar campus.

Data Processing and Analysis

Data gathered includes:

1. Surface runoff water simulation to collect the water samples in every 15, 30, 45, 60, 90, and 120 minutes; and
2. Amount of soil loss was determined thru oven drying method.

Statistical Analysis and Test of Significance

The amount of soil loss between treatment was analyze using T test. To test the significance difference between time interval, analysis of variance (ANOVA) was used. Further analysis using Tukey's Honest significance difference (HSD) was used to determine which time interval shows significant result.

DEFINITION OF TERMS

Mulching – refers to the applying of strip pineapple leaves at the top of soil.

Pineapple leaves - refers to the byproduct of the pineapple plant which is considered as an agricultural waste.

Soil Medium- refers to the medium that will be used for planting and or farming.

Slope Model Plot- refers to the constructed structure that will be filled with the soil and pineapple leaves.

Oven Drying- refers to the method that will use an oven to determine the amount of soil in weight.

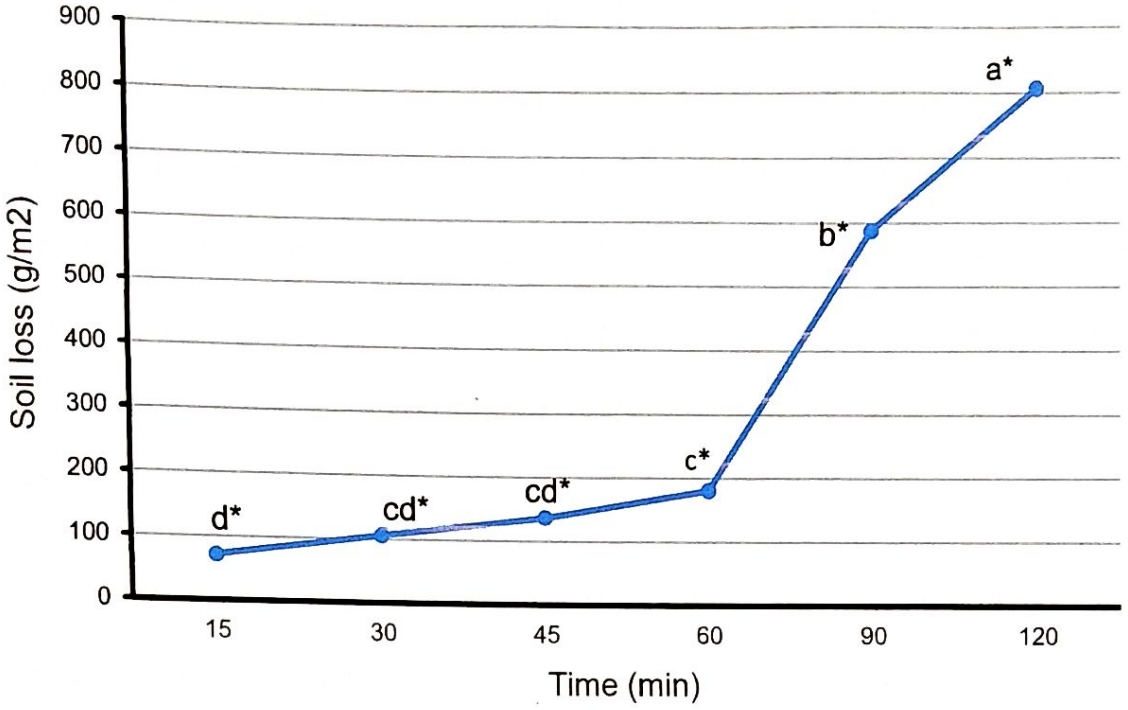
Chapter 2

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

The soil medium incorporated with and without pineapple leaves were putted at a slope model plot with an 8^0 slope and were undergone by a surface water runoff simulation to determine the amount of soil loss in each plot. In determining the soil loss, collecting the water discharge in every 15, 30, 45, 60, 90 and 120 minutes were done and were subjected for oven drying. The data gathered on the amount of soil loss in each plot in every time interval were tabulated and analyzed.

Figure 3 presents the comparison of soil loss in between time interval in the treated soil medium. It was observed that the time 15, 30 and 45 minutes has a significant difference at time 90 and 120 minutes. Also the time 30, 45 and 60 has a significant difference at time 90 and 120 minutes. The time 90 minutes has a significant difference at time 15, 30, 45, 60 and 120 minutes. And the time 120 minutes has a significant difference at time 15, 30, 45, 60 and 90 minutes.

As observed at the graph, the lowest amount of soil loss was obtained at the time 15 minutes with the mean value of 71.67 g/m^2 which is shown in table 1, and the highest amount of soil loss was obtained at the time of 120 minutes with the mean value of 806.67 g/m^2, which is shown in Table 1. It simply state that, as the time increases the amount of soil losses also increases.



*Significant difference at p<0.05
Means with the same letters are not significantly different

Figure 3. Graphical Presentation of the Soil loss on the Treated Soil medium

Table 1

Tukey's Honest Significant Difference (HSD) Test for significant difference between time interval in both treated soil and untreated soil medium.

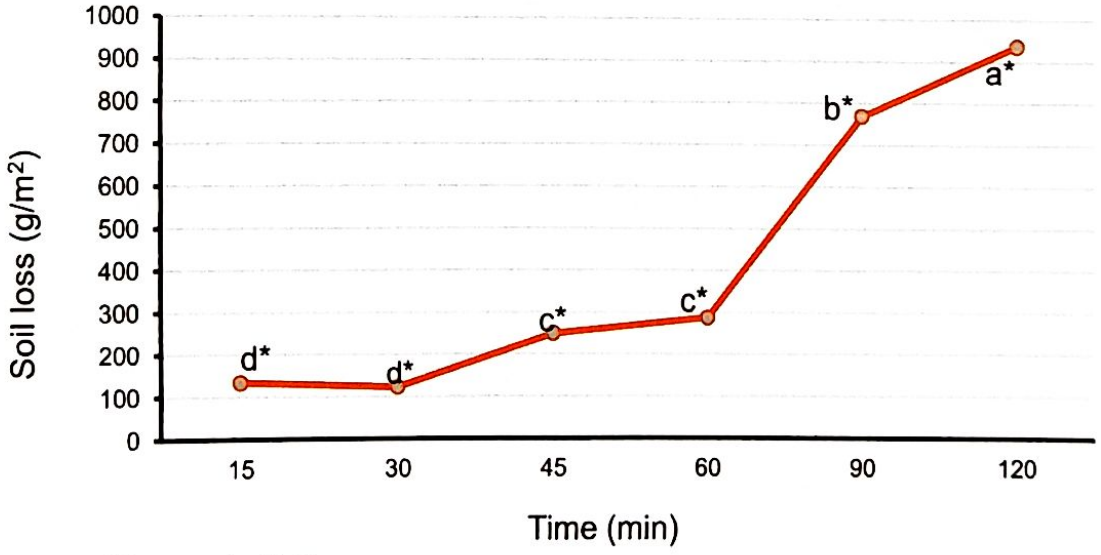
Time	N	Treated = 1 group	Untreated =2 group
15	3	71.67 d	134 d
30	3	106.33 cd	123 d
45	3	137.33 cd	249 c
60	3	181.33 c	286.67 c
90	3	587.67 b	769 b
120	3	806.67 a	936.67 a

Means with the same letters are not significantly different

Alpha	0.05
Error Degrees of Freedom	24
Error mean Square	1013.39
Critical value	4.37
Test Statistic	80.37

Figure 4 show the comparison of soil loss between time interval in the untreated soil medium. It was observed that the time 15 and 30 minutes has a significant difference at time 45, 60, 90 and 120 minutes. The time 45 and 60 minutes has a significant difference at time 15, 30, 90 and 120 minutes. The time 90 minutes has a significant difference at time 15, 30, 45, 60 and 120 minutes, and also the time 120 minutes has a significant difference at 15, 30, 45, 60 and 120 minutes.

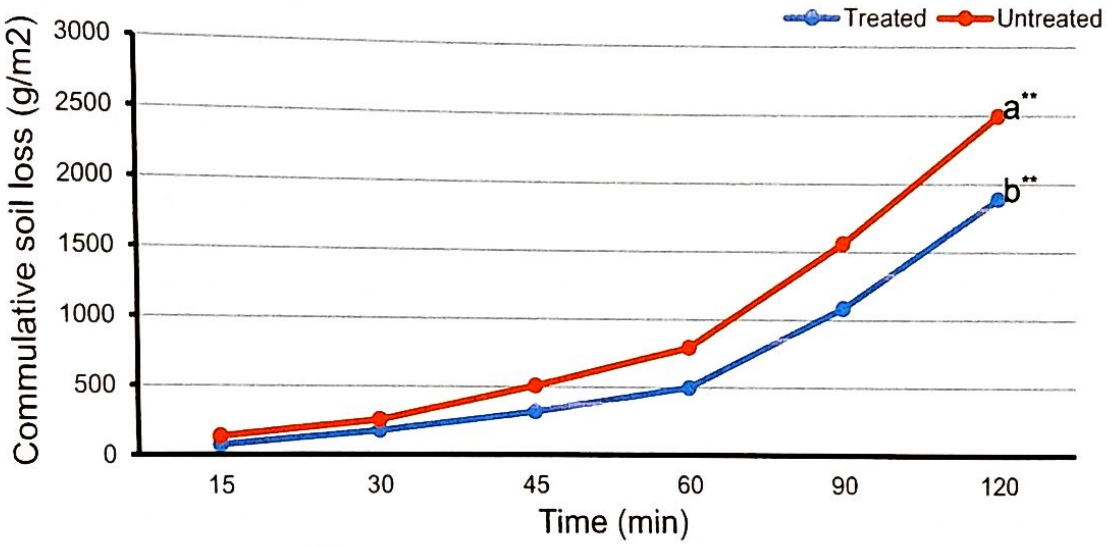
As observed at the graph, the lowest amount of soil loss was obtained at the time 30 minutes with the mean value of 123 g/m^2 which is shown in Table 1, and the highest amount of soil loss was obtained at the time 120 minutes with the mean value of 936.67 g/m^2.



* significant difference at p≤0.05
Means with the same letters are not significantly different

Figure 4. Graphical Presentation of Soil loss on the Untreated Soil medium

Figure 5 shows the cumulative amount of soil losses between treatments. It was observed that the soil loss of untreated soil medium was higher than the treated soil medium in every time interval. Further, statistical results using T-test shown in Table 2, revealed that the means of soil loss between treated and untreated was significantly different at 1% level of confidence. This provides sufficient evidence that using pineapple leaves as mulch to the soil can mitigate soil erosion.



** significant difference at p≤0.01

Figure 5. Cumulative amount of soil losses in Treated and Untreated plots

Table 2. Analysis of the significant difference between treatment using T-test

Source of Variation	Df	T- value	T- Tabular	
			5%	1%
T1 (with pineapple leaves)				
T2 (without pineapple leaves)	4	8.39	2.776	4.604

Chapter 3

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of findings

The study aims to mitigate soil erosion by mulching pineapple leaves to the soil medium. Specifically, this study wants to determine if there a significant difference between each treatment and also the significant difference in every time interval in both treatments.

This study covered from conducting an experiment by making of the slope model plot which was made at Bohol Island State University-Bilar Campus, Zamora, Bilar, Bohol. The soil medium and the pineapple leaves were collected at Katipunan, Carmen, Bohol, which is the main parts of the study. The experiment was done by applying artificial rainfall and collection of surface water runoff in every 15, 30, 45, 60, 90,and 120 minutes in both treatments.. The collected water samples will undergo an oven drying method to measure the amount of soil losses in every different time in both treatments. The duration of oven drying method is at least 24 hours at it will be done at Soil Laboratory of Bohol Island State University-Bilar Campus, Zamora, Bilar, Bohol.

There were two only treatments of this study, the treated and untreated soil medium. The two plots will occupy with soil medium with the amount of 18k kgs. per plot and the treated plots will be mulch of pineapple leaves with the amount of 20% of its surface area.

T-Tests that revealed that the means of soil loss between treated and untreated was significantly different at 1% level of confidence. This provides sufficient evidence that using pineapple leaves as mulch to the soil can mitigate soil erosion.

Tukeys Honest significant Difference (HSD) test for the significant difference between time interval in the treated soil medium, revealed that the time 15 and 30 minutes has a significant difference at time 45, 60, 90 and 120 minutes. The time 45 and 60 minutes has a significant difference at time 15, 30, 90 and 120 minutes. The time 90 minutes has a significant difference at time 15, 30, 45, 60 and 120 minutes, and also the time 120 minutes has a significant difference at 15, 30, 45, 60 and 120 minutes.

Tukeys Honest significant Difference (HSD) test for the significant difference between time interval in the untreated soil medium, revealed that time 15 and 30 minutes has a significant difference at time 45, 60, 90 and 120 minutes. The time 45 and 60 minutes has a significant difference at time 15, 30, 90 and 120 minutes. The time 90 minutes has a significant difference at time 15, 30, 45, 60 and 120 minutes, and also the time 120 minutes has a significant difference at 15, 30, 45, 60 and 120 minutes.

Conclusions

Based on the result of the study, the following conclusions were drawn;

1. In the untreated soil medium, the higher amount of soil loss was obtained at the time 120 minutes and the lowest amount of soil loss was obtained at the time 30 minutes.
2. In the treated soil medium, the higher amount of soil loss was obtained at the time 120 minutes, and the less amount of soil loss was obtained at the time 15 minutes
3. The untreated soil medium was higher amount of soil loss than the treated soil medium.
    a. The means of soil loss between treated and untreated was significantly different at 1% level of confidence. Thus, the null hypothesis was rejected.

Recommendations

Attached on the conclusion drawn in the study, the following recommendations are forwarded;

1. Apply some artificial rain simulator to evenly distribute the water dops.
2. Apply higher percent of pineapple leaves to mulch to the soil medium.
3. Conduct same study with different time of water sample collection.
4. Implement another study that can properly dispose agricultural waste and can apply it to the soil medium to determine the ways on how to mitigate soil erosion.
5. Same study should be conducted in the actual field scenario.

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APPENDICCES

Table 1. Appendix A- Raw Data

Can no.	Can Mass (g)	Can + Dried Sidements (g)	Mass Difference (g)	Soil loss concentration (mg/l)
TP1 -15-1	16.91	17.04	0.13	6500
TP1 -15-2	15.47	15.57	0.1	5000
TP1 -15-3	16.56	16.67	0.11	5500
TP1 -30-1	16.64	16.79	0.15	7500
TP1 -30-2	17	17.15	0.15	7500
TP1 -30-3	16.7	16.87	0.17	8500
TP1 -45-1	16.62	16.82	0.2	10000
TP1 -45-2	16.54	16.73	0.19	9500
TP1 -45-3	17	17.21	0.21	10500
TP1 -60-1	16.94	17.22	0.28	14000
TP1 -60-2	16.55	16.8	0.25	12500
TP1 -60-3	16.6	16.87	0.27	13500
TP1 -90-1	16.55	16.97	0.47	23500
TP1 -90-2	16.51	16.93	0.42	21000
TP1 -90-3	16.5	16.9	0.4	20000
TP1 -120-1	16.66	17.29	0.63	31500
TP1 -120-2	16.54	17.16	0.62	31000
TP1 -120-3	17.41	18.04	0.63	31500
P2 -15-1	15.68	15.91	0.23	11500
P2 -15-2	17.03	17.27	0.24	12000
P2 -15-3	16.7	16.92	0.22	11000
P2 -30-1	16.57	16.76	0.19	9500
P2 -30-2	16.94	17.13	0.19	9500
P2 -30-3	17.16	17.35	0.19	9500
P2 -45-1	16.76	17.2	0.44	22000
P2 -45-2	16.59	16.92	0.33	16500
P2 -45-3	15.72	16.06	0.34	17000
P2 -60-1	16.66	17.07	0.41	20500
P2 -60-2	16.87	17.31	0.44	22000
P2 -60-3	14.93	15.38	0.45	22500
P2 -90-1	16.98	17.58	0.6	30000
P2 -90-2	16.55	17.1	0.55	27500
P2 -90-3	15.66	16.22	0.56	28000
P2 -120-1	1.89	17.62	0.73	36500
P2 -120-2	16.79	17.47	0.68	34000
P2 -120-3	16.64	17.44	0.8	40000

Can no.	Discharge amount (l)	specific load (g/m2)	Average (g/sq.m)	Cumulative amount (g/sq.m)
TP1 -15-1	1.9	82.3		
TP1 -15-2	1.9	63.33	71.76333333	71.76333333
TP1 -15-3	1.9	69.66		
TP1 -30-1	2.03	101.5		
TP1 -30-2	2.03	101.5	106.01	177.7733333
TP1 -30-3	2.03	115.03		
TP1 -45-1	2.06	137.03		
TP1 -45-2	2.06	130.47	137.2333333	315.0066667
TP1 -45-3	2.06	144.2		
TP1 -60-1	2.04	190.4		
TP1 -60-2	2.04	170	181.3333333	496.34
TP1 -60-3	2.04	183.6		
TP1 -90-1	4.1	642.33		
TP1 -90-2	4.1	574	587.6666667	1084.006667
TP1 -90-3	4.1	546.67		
TP1 -120-1	3.86	809.55		
TP1 -120-2	3.86	796.7	805.2666667	1889.273333
TP1 -120-3	3.86	809.55		
P2 -15-1	1.75	134.17		
P2 -15-2	1.75	140	134.1666667	134.1666667
P2 -15-3	1.75	128.33		
P2 -30-1	1.94	122.87		
P2 -30-2	1.94	122.87	122.87	257.0366667
P2 -30-3	1.94	122.87		
P2 -45-1	2.02	296.27		
P2 -45-2	2.02	222.2	249.1333333	506.17
P2 -45-3	2.02	228.93		
P2 -60-1	1.985	271.283		
P2 -60-2	1.985	291.13	286.721	792.891
P2 -60-3	1.985	297.75		
P2 -90-1	4.07	814		
P2 -90-2	4.07	732.6	768.7766667	1561.667667
P2 -90-3	4.07	759.73		
P2 -120-1	3.815	928.32		
P2 -120-2	3.815	864.73	936.7933333	2498.461
P2 -120-3	3.815	1017.33		

Determination of Physical Properties of Soil Sample

Can Mass (g)	Can + Raw Soil (g)	Can + Dried Soil (g)	Can Volume (cm^3)	Water Content W (%)	Wet Density ρ_t (g/cm^3)	Dry Density ρ_d (g/cm^3)	Porosity n (%)	Void Ratio e	Degree of Saturation S_r (%)	Solid Phase SP (%)	Liquid Phase LP (%)	Gas Phase GP (%)
93.12	210.65	175.94	98.18	41.91	1.20	0.84	68.17	2.14	51.86	31.83	35.35	32.81
90.92	212.22	176.51	98.18	41.72	1.24	0.87	67.10	2.04	54.20	32.90	36.37	30.73
98.04	235.15	195.45	98.18	40.76	1.40	0.99	62.56	1.67	64.64	37.44	40.44	22.12
			average	41.46	1.27	0.90	65.94	1.95	56.90	34.06	37.39	28.56

Statistical Tables

Table 2. Appendix B-Statistical Tables

Comparison of time at each level of group

Tukey's Honest Significant Difference (HSD) Test

Alpha	0.05
Error Degrees of Freedom	24
Error mean Square	1013.39
Critical value	4.37
Test Statistic	80.37

Summary;

Time	N	Treated = 1 group	Untreated =2 group
15	3	71.67 d	134 d
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90	3	587.67 b	769 b
120	3	806.67 a	936.67 a

Means with the same letters are not significantly different

Table 3. ANNOVA TABLE

Response Variable: Soil Loss

Source	DF	Sum of Square	Mean Square	F value	Pr (> F)
1.. Group	1	339173611.1111	339173611.1111	153.59	0.0000
Time	5	2986618055.5556	597323611.1111	270.49	0.0000
1.. Group :time	5	47451388.8889	9490277.7778	4.30	0.0062
Error	24	53000000.0000	2208333.3333		
Total	35	3426243055.5556			

Comparison of group at each level of time
Least Significant Difference (LSD) Test

Alpha	0.05
Error Degrees of Freedom	24
Error mean Square	2208333.3333
Critical value	2.0639
Test Statistic	2504.2347

Summary of the Result:

Treatment	N	T- 15	T- 30	T- 45	T- 60	T-90	T-120
1	3	5665.667 b	7833.333 a	10000.000 b	13333.333 b	21500.000 b	31333.333 b
2	3	11500.000 a	9500.000 a	18500.000 a	21666.667 a	28500.000 a	36833.33333 a

Means with the same letters are not significantly different

Table 4. Analysis of the significant difference between treatment using T-test

Source of Variation	Df	T- value	T- Tabular	
			5%	1%
T1 (with pineapple leaves) T2 (without pineapple leaves)	4	8.39	2.776	4.604

T- test statistic

Homogeneity of Variances

Variable	Method	Number DF	Den DF	F Value	Pr (.>F)
Cumulative amount of specific load (kg/l)	Folded F	2	2	2.83	0.5227

Two independent sample t-test, h0: mean diff=0

Variable	Method*	Variances	DF	T value	Pr (> l t l)
Cumulative amount of specific load (kg/l)	pooled	Equal	4	-8.39	0.0011

Appendix C

Letter and Requests

Republic of the Philippines
Bohol Island State University
BILAR Campus, Zamora, Bilar, Bohol

Vision: A premiere Science and Technology University for the formation of a world class and virtuous human resource for the sustainable development of Bohol and the country.

Mission: BISU is committed to provide quality higher education in the arts and sciences as well as in the professional and technological fields, undertake research and development and extension services for the sustainable development in Bohol and the country.

Dr. Noel T. Lomosbog
CANR DEAN
BISU Bilar Campus
Zamora, Bilar, Bohol

Sir:

Greetings!

As a requirement for graduation, we are currently conducting our individual thesis entitled:

"STUDY ON QUALITY OF COMPOST FROM VEGETABLE RESIDUES BY MILLIPEDES"

"SOIL PHYSICO-CHEMICAL CHARACTERISTICS OF RAIN FED AND IRRIGATED PADDIES IN KAGAWASAN, DAGOHOY, BOHOL"

"SOIL EROSION CONTROL THRU CORN COB INCORPORATION IN UPLAND AREAS OF MONTEVIDEO, CARMEN, BOHOL"

"MITIGATING SOIL EROSION USING PINEAPPLE LEAVES MULCH"

In this connection, we would like to request from your good office to allow us to use the Soil Laboratory as a venue for the analysis of soil physical parameters, during weekdays. We are hoping for your approval with this request. Your usual support is of great help to realize our dreams.

Thank you so much and GOD bless.

Respectfully yours,

RONALD CLAVITE
BSABE Student

JOSUA GAUDICOS
BSABE Student

HILBETH JEAN MELENCION
BSABE Student

CINDELYN PALMA
BSABE Student

Noted by:

ENGR. ERWIN G. LUDEVESE
DABE Chairperson

JORGE CABELIN
SOIL LAB INCHARGE

JULIAN E. TORILLO JR., Ph.D.
Thesis Adviser

Approved by:

NOEL T. LOMOSBOG, Ph.D.
CANR DEAN

Republic of the Philippines
Bohol Island State University
BILAR Campus, Zamora, Bilar, Bohol

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DR. MARIETTA C. MACALOLOT
Campus Director
BISU Bilar Campus
Zamora, Bilar, Bohol

Ma'am:

Greetings!

As a requirement for graduation, we are currently conducting our individual thesis entitled:
"QUALITY OF COMPOST FROM VEGETABLE RESIDUES BY MILLIPEDES"
"SOIL EROSION CONTROL THRU CORN COB INCORPORATION IN UPLAND AREAS OF MONTEVIDEO, CARMEN, BOHOL"
"MITIGATING SOIL EROSION USING PINEAPPLE LEAVES MULCH"

In this connection, we would like to request from your good office to allow us to use the Civil Technology Building as a venue for the fabrication of our individual compost beds and soil beds, during weekdays. We are hoping for your approval with this request. Your usual support is of great help to realize our dreams.

Thank you so much and GOD bless.

Respectfully yours,

RONALD CLAVITE
BSABE Student

JOSUA GAUDICOS
BSABE Student

HILBETH JEAN MELENCION
BSABE Student

Noted by:

ERWIN G. LUDEVESE, MSAE
DABE Chairperson

MELVIN T. MAGDALES, CE
PPFD Officer

JULIAN E. TORILLO JR., Ph.D.
Thesis Adviser

Approved by:

DR. MARIETTA C. MACALOLOT
CAMPUS DIRECTOR

Appendix D

Photoducumentation

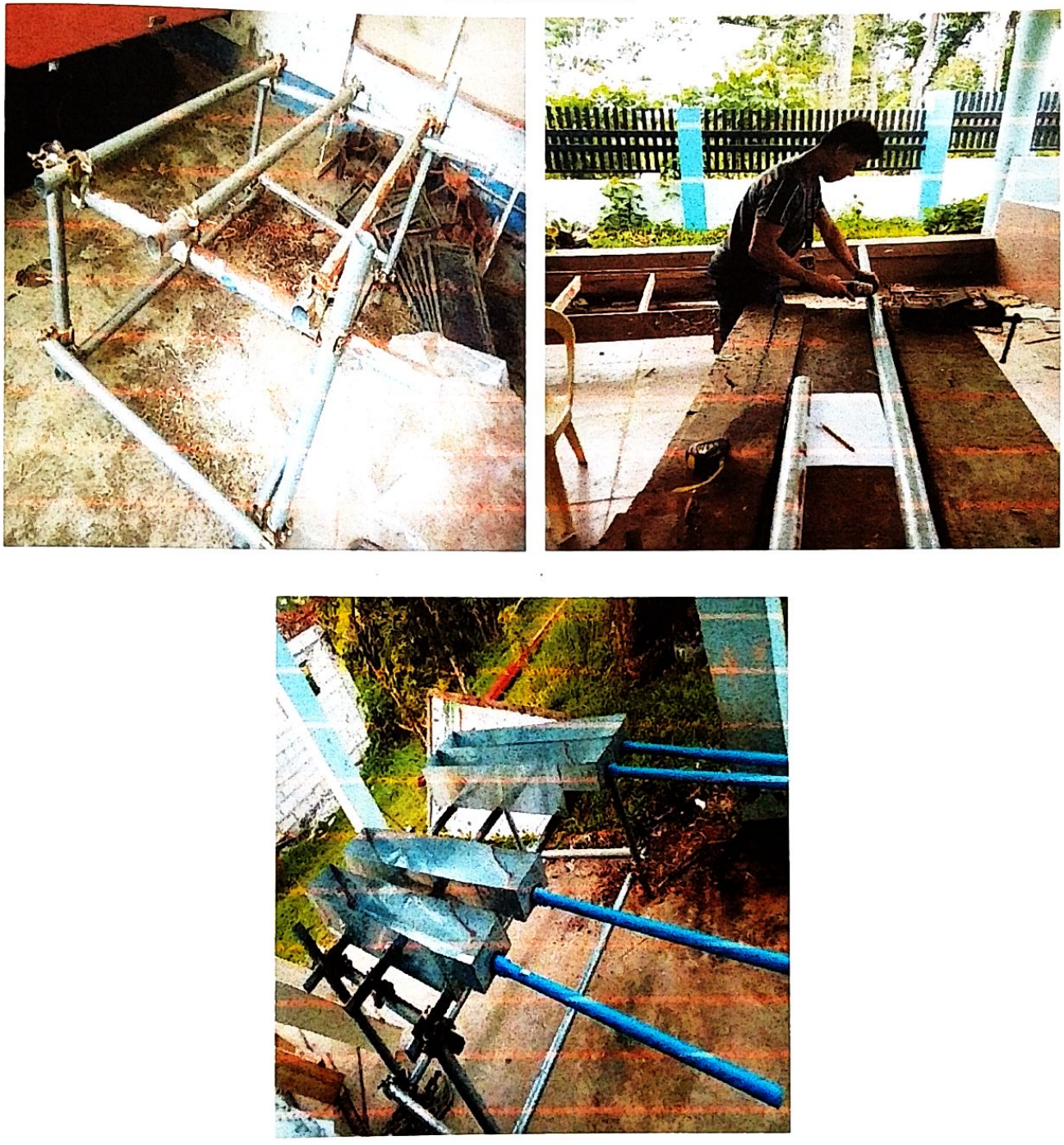

Figure 6. Constructing soil model stand and soil model plot.

Figure 7. Preparation of Soil medium and pineapple leaves. Filling of soil medium to soil model plot and application of pineapple leaves to the soil medium.

Figure 8. Preparation of materials to be used in the experiment.

Figure 9. conducting expirement and collection of water sample.

Figure 10. Set up the weighing balance, and weighing the can that will be used for oven drying method

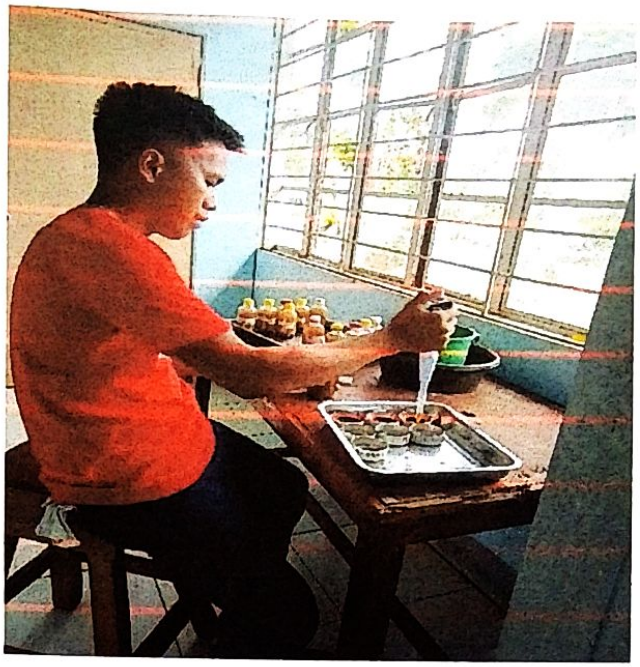

Figure 11. Preparation of water sample to be ready for oven drying.

Figure 12. Loading of water sample at oven

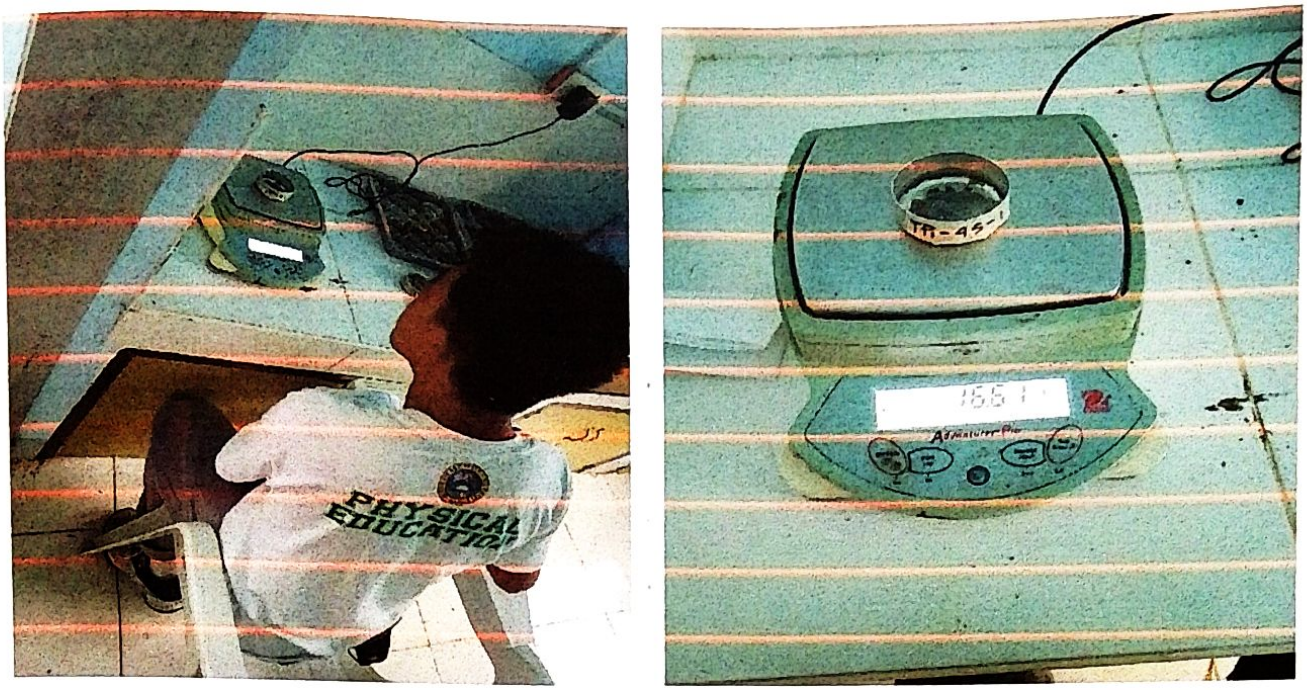

Figure 13. Weighing the can after oven drying of atleast 24 hours.