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MULCHED IPIL-IPIL (LEUCAENA LEUCOCEPHALA) LEAVES AS A GROWTH ENHANCER FOR PECHAY (BRASSICA RAPA) PLANT

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ABSTRACT

Agriculture of vegetables is critical for feeding the world and making it healthier by increasing economic opportunities. In the Philippines, pechay (Brassica rapa) is a popular leafy vegetable that is widely consumed in the Philippines. It provides farmers with a valuable source of income. This study aimed to find the effectiveness of ipil-ipil (Leucaena leucocephala) leaves as growth enhancer and fertilizer substitute for pechay plants. Specifically, it aimed to find out the effectiveness of the ipil-ipil mulch to the pechay's growth in terms of weight. Four set-ups which has three replicates each were prepared for the experiment. The collected data from these trials were recorded and used to know whether there exists a significant difference and relationship among each set-up. The experiment lasted for 4 weeks. Findings found that pechay plants treated with mulched ipil-ipil leaves weighed more compared to pechay plants with no mulch. Moreover, the weight of harvested pechay plants has a positive relationship with the amounts of mulch applied. This means that the more mulched ipil-ipil leaves applied to pechay, the greater its weight.

Keywords: Organic Fertilizer, Vegetable Gardening, Cash Crop, Plant Growth Supplement, Pak Choy.

I. INTRODUCTION

As a significant aspect of the economy, vegetable production substantially impacts farmers' financial circumstances [1]. Vegetable crops effectively generate cash from a small piece of land in a short period, allowing farmers to improve their living conditions [2]. Vegetable production is on par with, if not exceeding, cereal production in terms of value [3]. As vegetables are preferred cash crops, vegetable cultivation is likely to support livelihoods by supplying food, income, and employment [4]. Vegetable farming is vital for feeding the world and making it healthier through improving economic opportunities [1]. Vegetables are an essential and necessary source of food that enhances the quality of our diet by providing a wide range of nutrients [5]. Vegetables are high in vitamins, minerals, and antioxidants, all healthy for humans [6].

Pechay (Brassica rapa) is a widely known leafy vegetable crop in the Philippines from the Cruciferae family [5]. Pechay is a high-nutrient green vegetable popular in the Philippines. It provides an excellent source of income for farmers because of its short harvest period (30-45 days) [7]. Growing Pechay is a wonderful way to make money while having fun, although you only have a limited space because you can use recycled containers as potting media [8]. Pechay farming is becoming more popular in the Philippines as a source of food and income. However, increasing the crop's productivity in an environmentally friendly manner can be difficult. Farmers and gardeners face two significant challenges: controlling aggressive weeds and ensuring adequate soil nutrient levels [9].

One of the crucial factors that significantly affect crop yield and quality is soil fertility. The best way to maintain a sustainable and productive vegetable production enterprise is to manage optimal soil nutrient levels [10]. Weeds are another serious agricultural issue that reduces crop yields worldwide [11].

Mulching is one of the most effective techniques of weed control, according to studies [12]. Mulching is the process of covering the soil with organic materials such as bark, wood chips, leaves, and other organic matter in order to retain moisture and improve the soil's condition [11]. Mulching's primary goal is to keep light from reaching the weeds, thereby halting their growth [13]. Mulches can be made from various materials, including live plant ground cover and loose organic or inorganic matter spread over the soil.

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These mulches are known for improving soil fertility by adding nitrogen, reducing soil erosion, and conserving soil moisture in addition to weed control [14]. When it comes to planting vegetables, many farmers now use mulches. Ipil-ipil (Leucaena leucocephala) leaves are high in protein and nitrogen, suggesting they could be used as an alternative fertilizer [15]. According to studies, mulched ipil-ipil leaves can provide a great source of soil nutrients [16].

Thus, this study aimed to determine the effectiveness of ipil-ipil leaves as a growth enhancer of the pechay plant. This study also showed an alternative way of growing pechay instead of using commercial fertilizers.

II. METHODOLOGY

Research Environment

The area where the researchers conducted their study is situated at Aggies Poblacion Compostela – one of the 17 barangays in Compostela. The researchers chose this place because there were many ipi-ipil trees available in the area and was a good spot to grow the pechay plant. Furthermore, farming is one of the main sources of income for the people living there, so it is an ideal research environment.

Research Method

The study was designed with three replicates per sample using a Randomized Complete Block Design (RCBD). Dried ipil-ipil leaves were collected from nearby ipil-ipil trees, pulverized, and weighed into 100 grams, 200 grams, and 300 grams, respectively. Pechay seeds were planted on a pot first, then after 10 days it was transplanted to the mini-garden with a dimension of 60 cm by 75 cm. Mulched ipil-ipil leaves were applied after transplanting.

There were a total of four set-ups. Set-up A is composed of pechay plants with no mulched ipil-ipil leaves applied. Set-up B is composed of pechay plants treated with 100 grams of mulch. Set-up C was treated with 200 grams of mulch. Lastly, set-up D was treated with 300 grams of mulch. Each set-up has three pechay replicates for observation. The experiment was monitored and observed for four weeks and was harvested after the said duration. Each plant was weighed and the results were tallied and analyze using appropriate statistical tools.

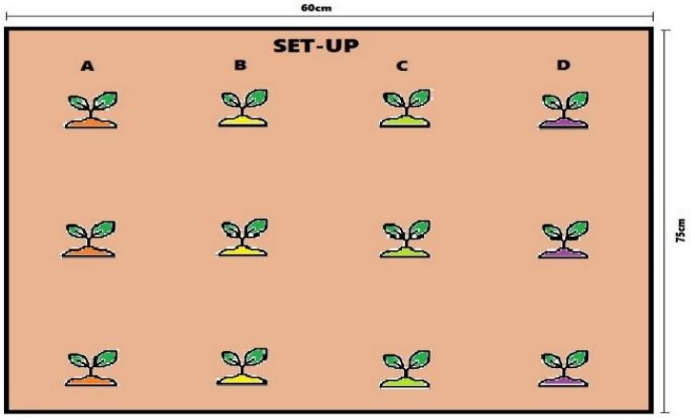

Figure 1: Experimental layout

Legend:

Set-up A - Pechay with no treatment

Set-up B - Pechay treated with 100 grams of mulched ipil-ipil leaves

Set-up C - Pechay treated with 200 grams of mulched ipil-ipil leaves

Set-up D - Pechay treated with 300 grams of mulched ipil-ipil leaves

Treatment of Data

The results were analyzed using the appropriate statistical tools. One-Way ANOVA was used to analyze whether there is any significant difference in the weight of the harvested pechay under different treatment. Lastly, Pearson Product-Moment Correlation Coefficient was used to analyze whether there is a significant relationship between the amounts of mulch applied to the weight of harvested pechay.

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III. MODELING AND ANALYSIS

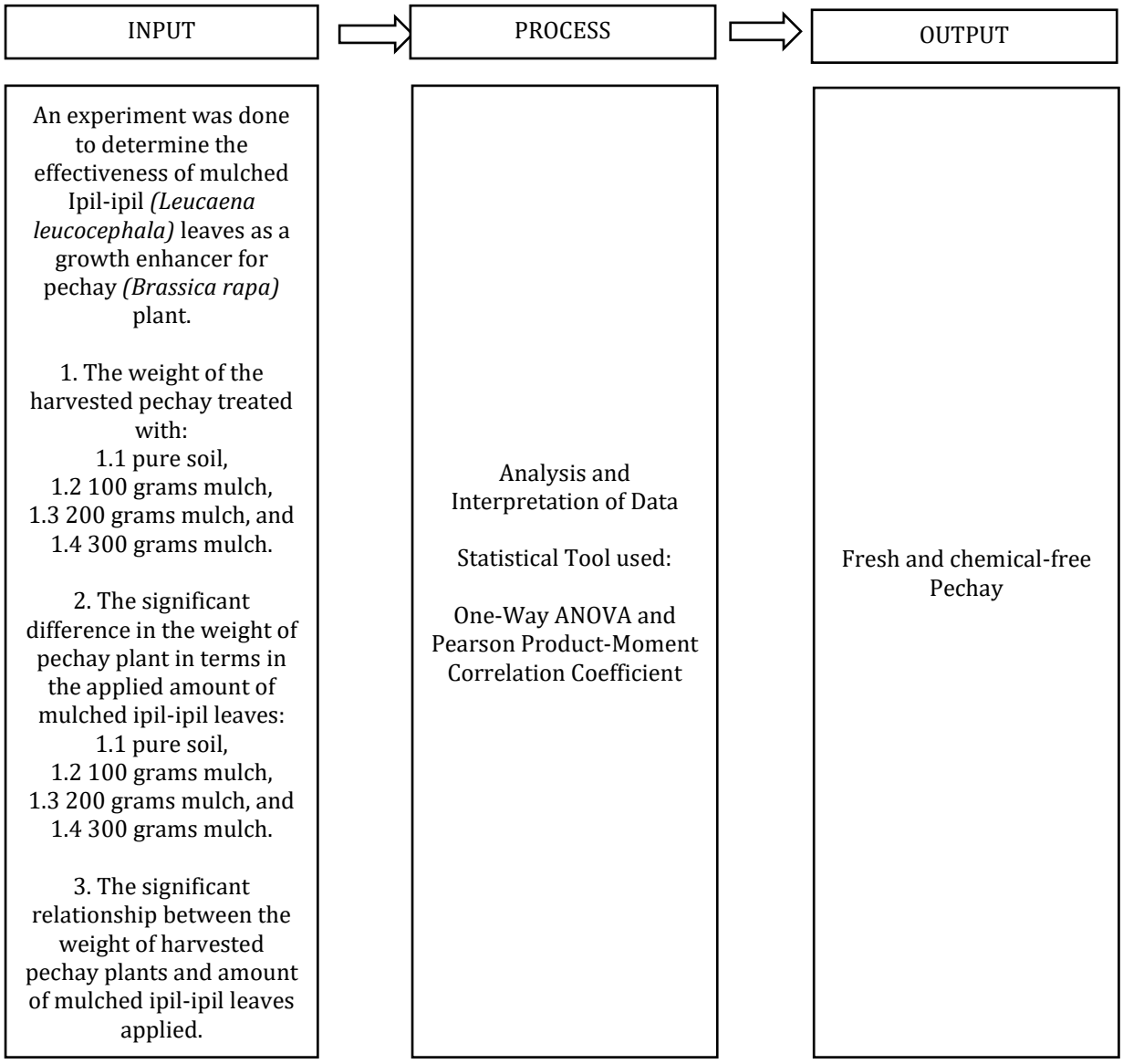

Figure 2: Process of the Study

IV. RESULTS AND DISCUSSION

Weight

Table 1. Weight of harvested pechay plant

Pechay Replicates	Weight in grams			
	Without Mulch	With 100 g mulch	With 200 g mulch	With 300 g mulch
Replicate 1	120	140.5	146	158.5
Replicate 2	117	145	150.5	160
Replicate 3	115.5	145.5	147.5	155
Mean	117.5	143.667	148	157.833

Table 1 shows the weight of harvested pechay plants without mulch, with 100 grams, 200 grams, and 300 grams mulch. The harvested pechay plants treated without mulch yield a weight of 120 g, 117g, and 115.5 g,

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with an average of 117.5 g. The harvested pechay plants treated with 100 g of mulched ipil-ipil leaves yield a weight of 140.5 g, 145 g, and 145.5 g, with an average of 143.667 g. The harvested pechay plants treated with 200 g of mulched ipil-ipil leaves yield a weight of 146 g, 150.5 g, 147.5 g, with an average of 148 g. Lastly, the harvested pechay plants treated with 300 g of mulched ipil-ipil leaves yield a weight of 158.5 g, 160 g, 155 g, with an average of 157.833 g. The table shows that the pechay plants treated with 300 grams of mulched ipil-ipil leaves yield the greatest weight. Mulch increased the weight yield of pechay by 22-34% over non-mulched pechay plants.

Based from the results, it can be inferred that pechay plants treated with mulch, specifically with 300 g, weighed more compared to those with no mulch. This is because ipil-ipil leaves are high in protein and nitrogen, and they are as good as an alternative fertilizer [16]. This result can be compared to the study conducted by Taromi et al. [17], where it showed that the tomato treated with mulches increased fruit yield by 12–46% over non-mulch conditions.

Significant difference in the weight of pechay plants under different treatments

Table 2. One-way ANOVA

SV	SS	df	MS	F	P-value	F Crit
Between Groups	2668.41	3	889.47	144.239	2.65245 E-07	4.066
Within Groups	49.3333	8	6.167			
Total	2717.75	11				

Table 2 shows the statistical tool One-Way ANOVA. It shows that the computed f-value of 144.239 is greater than the tabulated f-value of 4.066 at 0.05 level of significance. This means that there is a significant difference in the weight of harvested pechay plants treated with 100 gram mulch, 200 grams mulch, 300 grams mulch, and without mulch. Implying that the pechay plants treated with mulched ipil-ipil leaves, specifically with 300 grams, weighed more than those with no treatment.

Since ipil-ipil leaves are high in protein and nitrogen [15], then soil containing dried ipil-ipil leaves could be a good source of soil nutrients [16]. In another study by Sihombing and Handayati [18], the growth and yield of Polianthes tuberosa showed significant differences between the mulch and without mulch treatments in terms of plant growth and flower production.

Significant relationship between the weight of harvested pechay and amounts of mulch

Table 3. Pearson Product-Moment Correlation Coefficient

Variable	Mean	SD	1	2
Amount of Mulched applied	200	100	1	
Weight of Harvested Pechay	148.1667	7.086412	0.9758	1

Table 3 shows the statistical tool Pearson Product Correlation Coefficient. The analysis revealed that the amount of mulch applied has a positive relationship of 0.9758 to the weight of the harvested pechay plants. This means that there is a significant relationship between the amounts of mulch applied to the weight of harvested pechay plants, suggesting that the more mulched ipil-ipil leaves applied to pechay, the greater its weight.

V. CONCLUSION

Based from the data gathered, it was found out that the harvested pechay plants treated with mulched ipil-ipil leaves weighed more compared to those pechay plants with no mulch. Moreover, it was found that there is a significant difference in the weight of pechay plants treated with pure soil, 100 grams mulch, 200 grams mulch, and 300 grams mulch. It means that the pechay plants treated with mulched ipil-ipil leaves, especially with 300

grams, weighed more compared to the other set-ups. Lastly, there is a significant relationship between the amount of mulched ipil-ipil leaves applied and the weight of harvested pechay. It suggests that the more mulch applied to the pechay plants, the greater its weight. Therefore, the researchers concluded that mulched ipil-ipil leaves were effective growth enhancer for pechay plants. Furthermore, it was concluded that the amount of mulch has a positive relationship with the weight of pechay plants, suggesting that the more mulch is applied, the greater the pechay weighed.

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