

## **Pest Occurrence and Performance of Lettuce as Affected by the Vermicompost with Different Leguminous Crops as Nitrogen Source**

**Salvacion J. Legaspi, & Ryan T. Sarimong**

Crop Science Research and Development Center (CSRDC)

### **Abstract**

A two-cropping study was conducted at the Organic Agriculture Project of Capiz State University, Burias Campus, Mambusao, Capiz to determine the effect of vermicompost with different leguminous crops as nitrogen source on the pest occurrence and performance of lettuce. The study was laid out in 2×4 factorial experiment using Randomized Complete Block Design (RCBD) with three replications. Factor A was the cropping seasons such as A1- first cropping (June-July) and A2-second cropping (September-October). Factor B was the vermicompost with different leguminous crops as N source which comprised of B1 – Azolla, B2 – Trichanthera, B3 – Kakawate, and B4 – Mixed (Azolla, Trichanthera, and Kakawate). All the data gathered were subjected to the Analysis of Variance (ANOVA) using STAR software. Differences among treatment means were compared using the Least Significant Difference (LSD) test and Duncan Multiple Range Test (DMRT). The result of the study revealed that application of vermicompost with different leguminous crops as Nitrogen source were comparable in all growth and yield parameters of lettuce. However, cropping seasons significantly affected the number of leaves, length of leaves, width of leaves, weight of roots, length of roots, biomass, and weight of marketable part of lettuce. Lettuce grown and harvested in the first cropping which falls to the months of June-July had the most number of leaves, longer leaves, wider leaves, heavier biomass, and heavier marketable part. On the other hand, heavier and longer roots was recorded from lettuce grown and harvested in the months of September-October (second cropping). The total number of insect pests which infested the lettuce plants was not affected by the application of vermicompost with different leguminous crops as nitrogen source for two cropping seasons. Lettuce applied with vermicompost with trichanthera as N source gave the highest net profit (Php 1,737.50), and those lettuce applied with vermicompost with azolla as nitrogen source gave the lowest net profit amounting of Php 1,339.50.

**Keywords:** Lettuce, Vermicompost, Nitrogen source, Azolla, Trichanthera, Kakawate

*Corresponding author:* Salvacion J. Legaspi

*Address:* Capiz State University - Crop Science Research Development Center (CSRDC)

*E-mail:* rde@capsu.edu.ph

## Introduction

Lettuce is among the most important crops that needs to be grown organically. It is the most sought green vegetables for salad and sandwiches. It contains incredible sources of essential nutrients and its benefit to health has been confirmed by modern scientific researches. The vegetable helps in proper digestion, promotes healthy liver, decreases the threat of heart diseases and stroke, lowering cholesterol levels, cancer control, protection of neurons, sleep induction, anxiety control, lowering inflammation, and providing a supply of antioxidants (Cervantes, Laynesa, & Pacis, 2017).

In recent days, the use of different organic fertilizers, bio-fertilizers and bio-pesticides are being recommended not only to minimize the use of hazardous chemical inputs but also for sustainable crop production particularly in vegetables cultivation (Gandhi & Sundari, 2012).

Various types of composts, including vermicompost are often used in natural farming systems as to improve soil physical properties, provide plant nutrients, and recycle organic wastes. Vermicomposts are products derived from the accelerated biological degradation of organic wastes by earthworms and microorganisms. This compost is an odorless, clean organic material containing adequate quantities of N, P, K and several micronutrients essential for plant growth and crop yields (Arancon & Edwards, 2005).

The study was conducted to determine the pest occurrence and performance of lettuce as affected by the vermicompost with different leguminous crops as nitrogen source. It specifically aimed to: Determine the performance of lettuce as affected by the vermicompost with various leguminous crops as nitrogen source; Evaluate which among the leguminous crops as source of N for vermicompost would give the best growth and yield to lettuce; Determine the best cropping season in growing lettuce using the vermicompost made from various leguminous crops as N source; Find out if there is an interaction effect between the vermicompost applied and different croppings; Identify and quantify the different pests that would occur on lettuce applied with vermicompost with various leguminous crops as N source; and to Determine the profitability of growing lettuce using vermicast made from leguminous crops as nitrogen source.

## Materials and Methods

A two-cropping study was conducted at the Organic Agriculture Project of Capiz State University, Buriás Campus, Mambusao, Capiz. The study was laid out in 2×4 factorial experiment using Randomized Complete Block Design (RCBD) with three replications. Factor A was the cropping seasons such as A1- first cropping (June-July) and A2- second cropping (September-October). Factor B was the vermicompost with different leguminous crops as N source which comprised of B1 – Azolla, B2 – *Trichanthera*, B3 – *Kakawate*, and B4 – Mixed (*Azolla*, *Trichanthera*, and *Kakawate*).

Growth and yield parameters such as plant height, stem girth, number of leaves, length of leaves, width of leaves, weight of roots, length of roots, biomass, weight of marketable part, and weight of non-marketable part were gathered and analyzed using the STAR software. Differences among treatment means were compared using the Least Significant Difference test (LSD) and Duncan Multiple Range Test (DMRT).

## **Results and Discussion**

### **Growth and Yield Parameters**

Growth and parameters of lettuce such as the plant height, number of leaves, width of leaves, biomass, stem girth, weight of leaves, length of roots, weight of marketable part and non-marketable part significantly differ from the two croppings. Lettuce grown and harvested during the first cropping which falls from the months of June to July had the produced the most number of leaves, tall plant, bigger leaves, greater mass, marketable part and non-marketable part. Lettuce grown and harvested in the second cropping which falls on the months of September to October developed the most stem, increased the weight of leaves and length of the roots.

### **Effect of vermicast with various leguminous crops as N source**

Vermicompost with various leguminous crops as N source were comparable in all growth and yield parameters of lettuce. This implies that all parameters were not affected by this factor.

### **Effect of the cropping seasons**

Cropping seasons significantly affected the number of leaves, length of leaves, width of leaves, weight of roots, length of roots, biomass, and weight of marketable part of lettuce.

### **Plant height**

The analysis of variance revealed that lettuce grown and harvested in the first cropping obtained the taller plant with the mean value of 20.86 cm. compared to lettuce that were grown and harvested in the second cropping which obtained the mean value of 18.34 cm.

### **Stem girth**

The analysis of variance revealed that lettuce grown and harvested in the first cropping obtained the men value of 7.65 cm. while lettuce grown and harvested in the second cropping obtained bigger stem girth with the mean of 7.82 cm.

### **Number of leaves**

The analysis of variance revealed that lettuce grown and harvested in the first cropping had the most number of leaves with a mean of 13.79, while those lettuce grown and harvested in the second cropping obtained the least number of leaves with a mean of 10.22.

### **Length of leaves**

For the length of leaves, longer leaves were observed from the lettuce grown and harvested in the first cropping (14.50 cm) and the shorter leaves were noted from the lettuce grown and harvested in the second cropping (13.46 cm).

### **Width of leaves**

In terms of the width of leaves, lettuce grown and harvested in the first cropping obtained the wider leaves with a corresponding mean of 10.96 cm. However, narrower leaves were observed from the lettuce grown and harvested in the second cropping with a mean of 8.73 cm.

### **Weight of roots**

As to the weight of roots, lettuce grown and harvested in the second cropping had the heavier roots (3.77 grams) while the lighter roots were recorded from the lettuce grown and harvested in the first cropping (3.09 grams).

### **Length of roots**

For the length of roots, longer roots was observed from lettuce grown and harvested in the second cropping (7.30 cm) and those lettuce grown and harvested in the first cropping had the shorter roots (5.79 cm).

### **Biomass**

In terms of the result of the biomass, lettuce grown and harvested in the first cropping had the heavier biomass with a mean of 80.47 grams. However, lettuce grown and harvested in the second cropping obtained the lighter biomass (45.56 grams).

### **Weight of marketable part**

With regards to the result of weight of marketable part, lettuce grown and harvested in the first cropping had the heavier marketable part with a corresponding mean of 64.90 grams. On the other hand, lighter marketable part was recorded from the lettuce grown and harvested in the second cropping with a mean of 30.68 grams.

### **Weight of non-marketable part**

The analysis of variance revealed that lettuce grown and harvested in the first cropping had the heavier non-marketable part with the mean value of 12.35kg compared to lettuce grown and harvested in the second cropping which had the mean value of 11.77kg.

### **Plant over plant food supplement cost of Lettuce**

Among the vermicompost with different leguminous crops as nitrogen source, vermicompost with trichanthera as N source gave the highest net profit to lettuce (Php 1,737.50). Lettuce applied with vermicompost with kakawate gave the net income of Php 1,683.5, while those lettuce applied with vermicompost with mixture of azolla, trichanthera and kakawate had the net profit of Php 1,659.50. On the other hand, lettuce applied with vermicompost with azolla as nitrogen source gave the lowest net profit amounting of Php 1,339.50.

### **Prevalence of Pest**

The total number of insect pests which infested the lettuce plants was not affected by the application of vermicompost with different leguminous crops as nitrogen source for two cropping seasons. The most prevalent insect pests observed were: grasshopper, semi-lopper, flies, white flies, and orange beetle.

Conclusions

### **Conclusions**

Vermicompost with various leguminous crops as nitrogen source were comparable in all growth and yield parameters of lettuce.

Growth and yield parameters of lettuce such as number of leaves, length of leaves, width of leaves, weight of roots, length of roots, biomass, and weight of marketable part were influenced by the cropping seasons.

Lettuce grown and harvested in the first cropping which falls on the months of June-July had the most number of leaves, longer leaves, wider leaves, heavier biomass, and heavier marketable part.

There was no interaction effect between cropping season in different leguminous crops as nitrogen source.

Quantity and kinds of pest infested the lettuce plants were not affected by the application of vermicompost with various leguminous crops as N source.

Lettuce applied with vermicompost with trichanthera as N source gave the highest net profit.

## Recommendations

Based on the results of the study, the following recommendations are forwarded:

1. Use any of the leguminous crops as nitrogen source for vermicompost.
2. Use any of the vermicompost with different leguminous crops as nitrogen source in growing lettuce in the months of June to July for better growth and yield.
3. Application of vermicompost with tricanthera to obtain a profitable production.
4. Cropping season which falls on the months of June-July is appropriate in growing lettuce.
5. Conduct more relevant studies to further explore the effect of lettuce as affected of vermicompost with different leguminous crops as N source. Use the following modification: Use other root, leafy and fruit crops, utilize higher cost of vermicompost with leguminous crops as N source, and apply vermicompost with leguminous crops as N source.

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