CAPSU Research Journal • January-December 2019 • Vol. 31 (1): 1-8

Effect of Vermicompost Using Different Leguminous Crops as Nitrogen Source on the Performance of Ratooned Kangkong

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Abstract

The study was conducted at Organic Agriculture Project of CapSU Burias, Mambusao, Capiz to determine the effect of vermicompost from different plant sources with three ratoons using RCBD with three replications. The treatments used were: Treatment B1 – Azolla, Treatment B2– Trichantera, Treatment B3– Kakawate, and Treatment B4– Mixed (Azolla, Trichantera, and Kakawate). The data were subjected to Analysis of Variance using STAR software and LSD for mean comparisons.

The study revealed that among growth and yield of kangkong only the width of widest leaf, weight of marketable plant, and number of marketable plant were affected by the application of vermicompost with different leguminous crops as N source. Tricanthera and mixed leguminous crops as source of N in vermicompost when applied to kangkong gave the best result in the mentioned parameters. Likewise, the number of ratooning affected all the growth and yield parameters. Kangkong when for the second time up to the third time gave heaviest and most number of marketable plants. The total number of pest that infested the kangkong was not influenced by the application of vermicompost with different leguminous crops as source of N. Kangkong applied with vermicompost with trichantera as N source gave the highest net profit (Php 1488.80), and the lowest net profit was obtained from the kangkong applied with vermicompost with kakawate as N source (Php 749.00). Leguminous crops can be used in vermicomposting as N source and can be applied to rationed kangkong.

Keywords: Kakawate, Trichantera, Azolla

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ISSN 1908-2843 Print

Introduction

Ipomoea aquatica is a semi-aquatic tropical plant grown as a leaf vegetable. It is known in English as Water Spinach, Water Morning Glory, Water Convolvulus, or by the more ambiguous names "Chinese spinach" and "swamp cabbage". It is found throughout the tropical and subtropical regions of the world (Pinoyentre, 2015).

In the Philippines, it is popularly known as "Kangkong". Farmers grow it as a regular crop in lowland rice fields, and it is the most economical vegetable to grow. It requires less labor since it does not need careful land preparation or watering (Pinoyentre, 2015).

Kangkong has been recommended as an ideal low cost leafy vegetable in the Philippines because it is a source of minerals (Rivero, 1981). Kangkong is one of the vegetables rich in protein, calcium, phosphorous, iron and carbohydrates (Agriculture and Fisheries Information Service, 2009).

Various types of composts, including vermicompost are often used in sustainable farming systems to improve soil physical properties, provide plant nutrients, and recycle organic wastes. Vermicomposts have been shown to increase plant growth and crop yields in managed and natural ecosystems (Edwards 2004; Arancon et.al. 2003; Gutie'rrez-Miceli et. al. 2007; Pascal et.al. 2010 as cited by Zucco et.al, 2015).

Vermicompost are organic materials, broken down by interaction between earthworms and microorganisms, in a mesophilic process (up to 250C), to produce fully stabilized organic sol amendments with low C:N ratios. They also have a high and diverse microbial and enzymatic activity, fine particulate structure, good moisture-holding capacity, and contain nutrients such as N, K, P, Ca, and Mg in forms readily taken up by plants. They contain both plant growth hormones and humic acids which can act as plant growth regulators (Guerrero III & Guerrero-del Castillo, 2006).

Since the efficacy of vermicompost from different plant sources to the growth and yield performance of kangkong is still unexplored, then the study was conducted.

Objectives of the Study

The study was conducted to determine the effect of vermicompost with various leguminous crops as nitrogen source and number of ratooning on the performance of kangkong. It specifically aimed to:

1.Determine the growth and yield of kangkong as affected by vermicompost various leguminous crops as source of nitrogen;

2.Evaluate which among the leguminous crops as source of N for

vermicompost would gave the best growth and yield to kangkong;

3.Determine the effect of rationing on the growth and yield of kangkong;

4.Find out if there is interaction effect between the vermicompost applied and number of ratooning;

5.Identify and quantify the different pest that would occur on kangkong applied with vermicompost with various leguminous crops as N source;

6.Determine the profitability of growing and rationing kangkong using vermicast made from leguminous crops as nitrogen source.

Materials and Methods

The study was conducted at Organic Agriculture Project of CapSU Burias, Mambusao, Capiz using Randomized Complete Block design with three replications. The treatments used were: Treatment B1 – Azolla, Treatment B2– Trichantera, Treatment B3– Kakawate, and Treatment B4– Mixed (Azolla, Trichantera, and Kakawate). The data on the growth and yield included plant height, stem girth, number of leaves, width of widest leaf, length of longest leaf, length of longest root, weight of roots, biomass, weight of marketable part, weight of non-marketable part, number of marketable plant, and number of non-marketable plant were gathered and analyzed using the STAR software. Differences among treatment means were compared using the Least Significant Difference test (LSD).

Results and Discussion

Growth and Yield Parameter

Effect of vermicast with different leguminous crops as N source. All the growth and yield parameters of kangkong were not affected by the application of vermicast with leguminous crops as N source except the width of the widest leaf, weight and number of marketable par.

As to the width of the widest leaf, plants applied with vermicompost with mixed (azolla, tricanthera, & kakawate) leguminous crops as N source gave the widest leaf (3.77 cm) which was found comparable with the width of the widest leaf of the plants applied with vermicompost with trichantera and azolla as N source. The narrowest leaf was obtained from plants applied with vermicompost with Kakawate as N source which was also comparable with the plants applied with vermicompost with azolla as N source.

In terms of weight of marketable part, plants applied with vermicompost with trichantera (95.50 g) as N source gave the heaviest weight which was found

comparable with the weight of the marketable part of kangkong applied with mixed leguminous crops (89.25 g) as N source. The lightest weight of marketable part was recorded from plants applied with vermicompost with kakawate (55.04 g) as N source which was found comparable with the weight of marketable part of plants applied with vermicompost with azolla as N source.

For the number of marketable plants, kangkong applied with vermicompost with trichantera (7.74) as N source gave the most number of marketable plants which was found comparable with the number of marketable kangkong in plots applied with mixed leguminous crops (7.21) as N source. The least number of marketable plant was produced from plants applied with vermicompost with kakawate (5.12) as N source which was found comparable with the weight of marketable part of plants applied with vermicompost with azolla as N source (5.67).

Effect of number of ratooning. Almost all the growth and yield parameters of kangkong were affected by the number of ratooning except the width of the widest leaf, weight of marketable part, weight of non-marketable plant, weight and length of roots, number of marketable part and biomass.

For plant height, plants in the first harvest had the tallest height followed in descending order by the heights of plants in the first ratoon, second ratoon, and the third ratoon. Trend on plant height indicates a decline as number of harvesting decreases.

As to the stem girth, the biggest stem girth was recorded from plants on the first harvest (9.20 cm), which was followed by the stem girth of the plants in the first ratoon (8.55 cm) and the smallest stem girth was recorded from the plants in the second and third ratoons with similar stem girth sizes. As noted similar trend with plant height can be seen except that there was a plateau on the last two harvesting.

With regards to the number of leaves, plants on the first harvest (15.20) and on the first ratoon (15) produced the most number of leaves that are statistically similar while those plants in the third (10.57) and fourth ratoons (9.70) had produced the least number of leaves which are statistically similar as well. A decline in the number of leaves was started in the second ratooning and the trend was maintained up the third rationing.

For the length of marketable stem, the longest stem was obtained from the plants in the first harvest 27.41 cm), followed in descending order by the plants in the first ratoon 23.39 cm), second (21.11 cm) and third ratoons. It can be noted that as the number of ratooning progresses, the length of the harvested stem decreases.

As to the number of marketable plant, plants harvested in the second ratoon (7.48) gave the most number of marketable plants which was found comparable with the plants harvested in the first (6.48) and third ratoon (7.35). The fewest number of marketable plants was counted in the first harvest.

With regards to the number of non-marketable plants, the most number of non-marketable plant was obtained from the third ratoon (5.72), followed by the second ratoon (4.01), first ratoon (2.50), and the first harvest had the least number of non-marketable kangkong (1.41).

Plant over plant food supplement cost of Kangkong

Among the leguminous crops used as nitrogen source for vermicomposting, tricanthera as source of N for vermicast gave the highest net profit to kangkong (Php 1,488.80). Kangkong applied with vermicast with mixture of azolla, trichantera and kakawate as source of N gave a net income of Php 1,382.00, while those plants fertilized with vermicast with azolla as N source gave a net profit of Php 975.20. The lowest net profit was obtained from plants applied with vermicast with N source coming from kakawate with a net profit of Php. 806.00.

Data on income further revealed that ratooning of kangkong is profitable when applied with vermicompost using different leguminous crops as N source. For those plants applied with vermicompost with azolla and trichantera, net profit increases up to the second ratooning after which there was a drop in the net profit. While for those kangkong applied with vermicompost with N source coming from kakawate and mixed (azolla, trichantera, & kakawate) profit declined after the first ratoon. Though trend on net income revealed a gradual decline in the net profit of kangkong applied with vermicompost from N source coming from the mixed leguminous crops (10.60%) compared to those applied with vermicompost with N source coming from kakawate (28.24%)

Prevalence of Pests

The total number of pest observed on kangkong plants was not affected by the application of vermicompost with different leguminous crops as N source (Appendix Table 4). The different pests observed were: Semi-looper, grasshopper, orange beetle, flies, dragon fly, green hopper, white fly, black bug and rice bug (Appendix Table 5).

Conclusions

1.The application of vermicompost with leguminous crops a nitrogen source did not influenced all the growth parameters except the width of the widest leaf and the weight and number of the marketable part.

2.Plants applied with vermicast with trichantera, azolla, and mixed leguminous crops (trichantera, azolla and kakawate) gave the widest leaf size.

3.Kangkong applied with vermicompost with trichantera and mixed leguminous crops as N source produced the heaviest marketable and most number of marketable plants.

4.The number of ratooning affected all growth and yield parameters of kangkong except width of the widest leaf, weight of marketable plant, weight of non-marketable plant, weight of roots, length of roots, and biomass.

5.Kangkong harvested in the first harvest had the tallest height, bigger stems, most number of leaves, longest marketable stem, and least number of non-marketable part.

6.Most number of marketable kangkong was obtained from the second ratoon which was also comparable to first and third ratoon.

7.The kind and quantity of pest in kangkong plants were not affected by the application of vermicompost with different leguminous crops as N source and number of ratooning.

8.Kangkong applied with trichantera as N source in vermicompost gave the highest net profit.

Recommendations

1.Use any of the leguminous crops as N source in vermicomposting.

2.Apply vermicompost using different leguminous crops as N source in growing kangkong but for higher profit use tricanthera as N source.

3.Ratoon kangkong up to second time for higher income.

4.Conduct similar studies with the following modifications: use other leafy vegetables, and use other leguminous crops as N use

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