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The Effect of Provision of Chicken Cage Fertilizer and N Fertilizer on The Growth of Pakchoy (*Brassica rapa* L.) Plants with Verticultural Paralon System

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Abstract

The research was conducted in the greenhouse of the Faculty of Agriculture, Universitas Islam Sumatera Utara. The aim of this research is to know the effectof chicken manure and N fertilizer on growth and production of mustard pakcoy plant with parallon vertikultur system. The design of this study used a Completely Randomized Design (CRD) Factorial consisting of two factors and repeated three times. The first factor is the provision of chicken coop (A) which consists of 4 levels, namely: A0 = 0 g / parallon (Control); A1 = 1000 g / parallon; A2 = 2000 g / parallon; A3 = 3000 g / parallon. The second factor is N (N) fertilizer consisting of 4 levels, namely: N0 = 0 g / parallon (Control); N1 = 1.8g / plant; N2 = 3.7g / plant; N3 = 5.6g / plant. The results showed that chicken manure gave a very significant effect on allparameters observed. The provision of chicken manure has a very significant effect on the parameters of plant height, the number of leaves, the diameter of the cob. The results showed that N fertilizer gave very significant effect on the parameters of plant height, leaf number, diameter of cob. The interaction of chicken manure and N fertilizer gave a very real effect on the diameter of the hump. However, the effect is not significant on the parameters of plant height, number of leaves.

Keywords: *Chicken Manure, N Fertilizer, Parallon Vertikultur System*

1. INTRODUCTION

Vegetables for the people of Indonesia cannot be left out in everyday life because of the many benefits of which are as a source of vitamins and protein. Pakcoy mustard is a vegetable that has been known for a long time and is one of the vegetables favored by various groups of people. Another advantage of mustard greens is that the price is relatively cheap, easy to obtain in traditional markets and supermarkets (Rahmat R., 1994).

Pakcoy is a horticultural vegetable that has a fairly high production. Judging from the average production in Indonesia, this vegetable is still quite low at 20 tons/ha, compared to countries in China 40 tons/ha, the Philippines 25 tons/ha, Taiwan 30 tons/ha. Based on data from the Central Statistics Agency (2014) the production of pakcoy vegetables in Indonesia from 2010 to 2013 was 583,770 tons, 580,969 tons, 594,934 tons and 600,961 tons. These data indicate that in 2011 there was a decline in

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the yield of pakcoy plants. One of the causes of the low productivity of this plant is the lack of high yielding varieties that are resistant to dangerous diseases such as soft rot and leaf spot, and very few varieties that are resistant to temperature. (Mulyadi, M. I. C., & M. Abror, 2021).

Furthermore, Kurniadi (2005) said that apart from being a vegetable, pakcoy mustard can also be beneficial for human health, especially those who consume it continuously. Mustard can relieve itching in the throat in cough sufferers, as a headache reliever because it contains vitamins and nutrients that are important for human health.

Pakcoy production can be increased through good cultivation, namely proper maintenance and fertilization. Fertilization using organic and inorganic fertilizers is very good for the growth of mustard greens with good quality and can increase pakcoy production (Lingga, 2003).

Several research results on the application of chicken manure always give the best plant response in the first season. This happens because chicken manure decomposes relatively quickly and has sufficient nutrient levels when compared to the same number of units as other manures (Widowati et al., 2005). Chicken manure is a solid fertilizer that contains a lot of water and mucus. Chicken manure is a cold fertilizer because the change from the material contained in the fertilizer becomes available in the soil, takes place slowly (Musnamar, 2003).

In addition to giving organic fertilizers, giving urea as a source of N nutrients is an effort that has been done a lot in increasing the productivity of vegetables, especially pakcoy, urea fertilizer as a source of N nutrients can improve plant vegetative growth, where plants that grow on sufficient N soil are greener in color. (Hardjowigeno, 2001).

2. METHOD

This research was conducted in the greenhouse of the Faculty of Agriculture, Islamic University of North Sumatra, Jl. Eka Warni, Medan Johor District, Medan City Madya. With a height of ± 25 meters above sea level with a flat topography. This research was conducted from April 2017 to June 2017. This study used a completely randomized design (CRD) with 2 factorials, namely: the first factor was Chicken Manure (A) which consisted of four levels, namely: A0: 0 g/paralon, A1: 1000 g/paralon, A2: 2000 g/paralon , A3 : 3000 g/paralon. The second factor is fertilizer N (N) which consists of four levels, namely: N0: 0 g/plant, N1: 1.8 g/plant, N2: 3.7 g/plant, N3: 5.6 g/plant. Parameters observed were plant height (cm), number of leaves (strands), hump diameter (cm).

3. RESULTS AND DISCUSSION

Results

1. Plant Height (cm)

The results of statistical analysis showed that the treatment of chicken manure and N fertilizer had a very significant effect at the age of 1, 2 and 3 mst. Meanwhile, the interaction of the two treatment factors had no significant effect at the ages of 1, 2 and 3 mst.

Table 1. Average Plant Height of Mustard Pakcoy (cm) in the Treatment of Chicken Manure and N Fertilizer at 3 WAP

Chiken Manure	N Fertilizer				Average
	N0	N1	N2	N3	
A0	5,27	5,88	7,39	8,10	6,66 A
A1	8,27	9,37	9,96	10,49	9,52 B
A2	9,60	10,22	10,49	11,27	10,39 C
A3	11,54	12,48	12,53	13,82	12,60 D
Average	8,67 A	9,49 B	10,09 C	10,92 D	

Note: Figures followed by unequal letters in the same treatment group were significantly different at the 1% levelbased on the DMRT test, while those that were not notated showed no significant difference.

In Table 1 it can be seen that the treatment of chicken manure has a very significant effect on the plant height of mustard pakcoy. The highest plants were obtained in treatment A3 (3000 g/paralon) which was 12.60 cm, which was very significantly different from treatment A2 (2000 g/paralon) which was 10.39 cm, treatment A1 (1000 g/paralon) was 9.52 cm. and treatment A0 (0 g/paralon) which is 6.66 cm. Treatment with N fertilizer had a very significant effect on the plant height of mustard pakcoy. The highest plants were obtained in the N3 treatment (5.6 g/plant) which was 10.92 cm, which was significantly different from the N2 treatment (3.7 g/plant) which was 10.09 cm, the N1 treatment (1.8 g/plant) ie 9.49 cm and treatment N0 (0 g/plant) was 8.67 cm. The interaction ofthe two treatment factors had no significant effect on the plant height of mustard pakcoy. The highest plant was obtained in the A3N3 treatment (3000 g/paralon and 5.6 g/plant) which was 13.82 cm, while the lowest plant was obtained in the A0N0 treatment (0 g/paralon and 0 g/plant) which was 5.27 cm.

2. Number of Leaves (strands)

The results of statistical analysis showed that the treatment of giving chicken manure and N fertilizer had avery significant effect at the age of 1, 2 and 3 mst. While the interaction of the two treatment factors had no significant effect at the age of 3 mst and a very significant effect at the age of 1 and 2 mst.

Table 2. Average Number of Leaves of Pakcoy Mustard Plants (strands) in the Treatment of Giving Chicken Manure and N Fertilizer at the Age of 3 WAP

Chiken Manure	N Fertilizer				Average
	N0	N1	N2	N3	
A0	6,00	6,00	6,00	7,00	6,25 A
A1	7,00	7,00	7,00	7,00	7,00 B
A2	7,33	7,00	7,33	7,67	7,33 C
A3	7,00	7,67	7,67	7,67	7,50 C
Average	6,83 A	7,00 A	7,00 A	7,33 B	

Note: Figures followed by unequal letters in the same treatment group were significantly different at the 1% levelbased on the DMRT test, while those that were not notated showed no significant difference.

In Table 2 it can be seen that the treatment of chicken manure has a very significant effect on the numberof leaves of the mustard pakcoy plant. The highest number of leaves was obtained in treatment A3 (3000 g/paralon) which was 7.50 leaves, which was not very significantly different from treatment A2 (2000 g/paralon) which was 7.33 leaves, and very significantly different from treatment A1 (1000 g/paralon). paralon) ie 7.00

strands and treatment A0 (0 g/paralon) ie 6.25 strands. The treatment of giving N fertilizer had a very significant effect on the number of leaves of the mustard pakcoy plant. The highest number of leaves was obtained in treatment N3 (5.6 g/plant) which was 7.33 strands, and very significantly different from treatment N2 (3.7 g/plant) namely 7.00 leaves, treatment N1 (1.8 g/plant). plants) was 6.92 strands and treatment N0 (0 g/plant) was 6.83 strands. The interaction of the two treatment factors had no significant effect on the number of leaves of the mustard pakcoy plant. The highest number of leaves was obtained in the A3N3 treatment (3000 g/paralon and 5.6 g/plant) which was 7.67 leaves, while the smallest number of leaves was obtained in the A0N0 treatment (0 g/paralon and 0 g/plant) which was 6.00 leaves.

3. Hump Diameter (cm)

The results of statistical analysis showed that the treatment of giving chicken manure, N fertilizer and the interaction of the two factors had a very significant effect.

Table 3. Average Diameter of the Prunes of Pakcoy Mustard Plants (cm) in the Treatment of Giving Chicken Manure and N Fertilizer at Harvest

	N Fertilizer				Average
Chiken Manure	N0	N1	N2	N3	
A0	4,38 A	4,71 A	4,63 A	6,46 B	5,04 A
A1	6,59 B	6,38 B	6,19 B	6,69 B	6,46 B
A2	6,97 B	6,43 B	6,72 B	6,94 B	6,76 C
A3	6,41 B	7,24 B	7,39 B	6,85 B	6,97 C
Average	6,08 A	6,19 A	6,23 A	6,73 B	

Note: Figures followed by unequal letters in the same treatment group were significantly different at the 1% levelbased on the DMRT test, while those that were not notated showed no significant difference.

In Table 3 it can be seen that the treatment of giving chicken manure has a very significant effect on the diameter of the tuber of the mustard pakcoy plant. The largest hump diameter was obtained in treatment A3 (3000 g/paralon) which was 6.97 cm, which was not very significantly different in treatment A2 (2000 g/paralon) which was 6.76 cm, but was very significantly different in treatment A1 (1000 g/paralon). paralon) is 6.46 cm and treatment A0 (0 g/paralon) is 5.04 cm. The treatment of giving N fertilizer had a very significant effect on the diameter of the tuber of the pakcoy mustard plant. The largest diameter of the weed was obtained in the N3 treatment (5.6 g/plant) which was 6.73 cm, which was very significantly different from the N2 treatment (3.7g/plant) which was 6.23 cm, the N1 treatment (1.8 g/plant).) was 6.19 cm and treatment N0 (0 g/plant) was 6,08 cm. The interaction of the two treatment factors significantly affected the diameter of the tuber of the mustard pakcoy plant. The largest diameter of the bulb was obtained in the A3N2 treatment (3000 g/paralon and 3.7 g/plant) which was 7.39 cm, while the lowest plant was obtained in the A0N0 treatment (0 g/paralon and 0 g/plant) which was 4.38 cm.

Discussion

1. The Effect of Chicken Manure on the Growth of Pakcoy Mustard Plants with Paralon Verticulture System

The results showed that the application of chicken manure had a very significant effect on all observed parameters.The application of chicken manure has a very significant effect on the parameters of plant height, number of leaves,wee diameter.

This study used chicken manure at a dose of 3000 g/paralon (A3), 2000 g/paralon (A2), 1000 g/paralon (A1) and 0 g/paralon (A0). Chicken manure had a positive impact on the growth of mustard pakcoy. Treatment A3 (3000 g/paralon) obtained the highest plant height, which was 12.60 cm, the highest number of leaves was 7.50 strands, and the largest hump diameter was 6.97 cm.

Provision of chicken manure has a very significant effect on the growth of mustard pakcoy plants with a verticulture system. This is because chicken manure contains complete macro and micro nutrients even in small amounts. In accordance with Retno and Susi (2013) who said that poultry manure (chicken) is useful in the mineralization process which will completely release nutrients (N, P, K, Ca, Mg, S and micro nutrients), and can increase soil nutrient content. In addition, chicken manure can also improve the physical and chemical properties of the soil, improve soil structure, make the soil lighter to cultivate, increase water resistance, improve soil permeability, and increase cation exchange capacity, so that it can bind high cations. Sukmawati, S., & Marliyana, I. (2020) added that therewas a very significant effect on plant height because chicken manure contains complete nutrients to loosen the soil. This results in optimal plant growth and chicken manure can increase water absorption so that the plant's need for water is fulfilled.

2. Effect of N Fertilizer on Pakcoy Mustard Plant Growth With Paralon Verticulture System

The results showed that the application of N fertilizer had a very significant effect on the parameters of plant height, number of leaves, wee diameter. Fertilizer treatment of N 5.6 g/plant (N3) resulted in the highest plant height of 10.92 cm, the highest number of leaves 7.33 strands, and the largest bulb diameter 6.73 cm.

The application of N fertilizer has a very significant effect on the growth of mustard pakcoy. This is because the mustard plant requires nutrients for the vegetative growth process, especially N elements. If the need for N elementsis fulfilled, it can increase plant growth. This is in line with Novizan (2002) that the element of N is very useful for plants for plant growth and development, including: 1. Making plants greener and fresher and containing lots of chlorophyll which has a role in the photosynthesis process 2. Accelerating plant growth (height, number of leaves), stem diameter and others) 3. Increase the protein content of plants.

Nitrogen is one of the essential nutrients for plants, so it is very important for their growth and development. In line with Lakitan (2008) that in plant tissue, nitrogen is an essential nutrient and a constituent element of amino acids, proteins and enzymes. In addition, nitrogen is also contained in chlorophyll, cytokinin and auxin hormones.

The N element in plants serves to increase plant growth, one of which increases the number of leaves and will become wider with a greener color which will increase protein levels in the plant body (Vimala, P., 2010).

3. The Effect of Chicken Manure and N Fertilizer on the Growth of Pakcoy Mustard Plants with Paralon Verticulture System.

The results showed that the interaction of chicken manure and N fertilizer had a very significant effect on the wee diameter parameter. But the effect is not significant on the parameter hump diameter. But the effect is notsignificant on the parameters of plant height, number of leaves.

The largest diameter of the bulb was obtained in the A3N0 treatment (3000 g/paralon and 0 g/plant) which was 7.39 cm. Meanwhile, the highest plant height and number of leaves was obtained in the A3N3 treatment (3000 g/paralon and 5.6 g/plant), each with the highest plant being 13.82 cm and the highest number of leaves being 7.67 strands.

This is in accordance with Alif, A & Amira, H. (2023) who said that the combination of chicken manure and reduction of inorganic fertilizers resulted in high N availability and constant NO3 release during the planting period, which indicated a harmony between N availability and uptake by plants. Therefore, efforts need to be made to increase the efficiency of inorganic fertilizer use through integrated fertilizer management, namely combining the right organic fertilizers and chemical fertilizers, so that the cost of using fertilizers can be reduced, but the production level remains high.

It can be seen from table 3 that the weevil diameter had a very significant effect on the A3N0 treatment (3000 g/paralon and 0 g/plant). In accordance with the previous description, the high application of chicken manure and the reduction of urea (N) led to an alignment between the availability and uptake of N by plants, resulting in an alignment between the availability and uptake of N by plants.

4. CONCLUSIONS AND SUGGESTIONS

The application of chicken manure has a very significant effect on the parameters of plant height, numberof leaves and wee diameter. The application of N fertilizer has a very significant effect on the parameters of plant height, number ofleaves and wee diameter. The interaction of chicken manure and N fertilizer has a very significant effect on the diameter of thehump. However, the parameters of plant height and number of leaves were not significant.

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