

The Growth and Yield of Organic Pakcoy Crop (*Brassica Rapa L.*) Using Treatment of Various Manures and Weeding Times

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DOI: <https://doi.org/10.51584/IJRIAS.2024.911012>

Received: 26 October 2024; Accepted: 03 November 2024; Published: 29 November 2024

ABSTRACT

Organic pakcoy crop (*Brassica rapa L.*) is commodity that has potential to be developed in Indonesia along with community awareness toward food safety and environmental sustainability. The research objective is to determine the effect of various manures and weeding times on the growth and production of pakcoy crop which are grown organically. Experimental design used in this research is Factorial Randomized Block Design which is replicated three times. Factors studied are consisted of chicken manure (K) with magnitude of 25 ton/ha (K1), goat manure with magnitude of 25 ton/ha (K2) and cow manure with magnitude of 25 ton/ha (K3), respectively. Weeding times treatment (W) are consisted of without weeding (W1), weeding time up to 15 days after planting (W2), weeding time up to 30 days after planting (W3) and then the weeds are allowed to grow until harvest. Results of research showed that treatments of various manures and weeding times had significant effect on the growth and yield of pakcoy. Pakcoy treated with chicken manure with magnitude of 25 ton/ha and weeding time up to 30 days after planting produced the best treatment effect on the growth and yield of pakcoy with the highest fresh harvest weight of 302.26 g/crop or 28.1 ton/ha.

Keywords: organic pakcoy crop, the growth and yield, manures, weeding

INTRODUCTION

Organic vegetables that have become known in Indonesia among them are leaf vegetable plants such as mustard (*Brassicaceae*) as potential commodity in organic cultivation and one of relatively known commodity is spoon mustard or Pakcoy (*Brassica rapa sub. chinesnsis*) [1]. According to [2], organic cultivation is natural cultivation system without using additional chemicals.

Vegetable cultivation using organic system has some advantages and disadvantages. Its advantages are consisted of product is free from pesticides residue, contains more nutrients content and has higher economic price compared to regular vegetables as well as healthy to consume. On the other hand, its disadvantages are troublesome to cultivate, require longer cultivation time [3].

The increase of community awareness toward food safety and environmental sustainability induce the development of organic farming system. Organic cultivation system is known as cultivation system that is environmentally friendly and capable to improve land condition continuously. However, application of organic matter types in form of compost from livestock manure has potential to affect weeds development and maintenance method (weeding and control of crop pest and disease) in organic system requires higher manpower due to manual and mechanic preventive measures [4]. Therefore, efforts that can be done in order to overcome these problems are by using proper manure doses and and proper weeding times.

According to the study result by [5], chicken manure dose of 30 ton/ha had significant effect on the growth (crop height for all ages, leaf numbers for all ages, fresh leafy part weight, dry leafy part weight) and yield (flower head diameter, flower weight per crop, flower weight per plot) of flower mustard crop. There was interaction among parameters of crop height, leaf numbers for all ages, flower weight per crop, fresh leafy part

weight. Result of the study by [6] showed that mustard crop growth by addition goat manure with magnitude of 20-30 ton/ha was capable to increase wet weight of mustard crop, whereas addition cow manure at dose of 30 ton/ha was capable to increase wet weight of mustard crop.

Weeding time had effect on crop growth and yield. Result of the study by [7] showed that the best weeding time was 0-30 days after planting in clean condition and then left to weed for mustard crop growth and yield.

The research objective is to determine the effect of various manures and weeding times on the growth and production of pakcoy crop which are grown organically.

RESEARCH METHOD

This research was done starting from March 2024 up to June 2024 at Exprimental Farming Land of Agricultural Faculty of Baturaja University, East Baturaja Subdistrict, Ogan Komering Ulu District using Factorial Randomized Block Design (RAKF) with three replications. The observed factors were manure types (K) involving 25 ton/ha (K1) chicken manure, 25 ton/ha (K2) goat manure and 25 ton/ha (K3) cow manure. Weeding times treatment (W) were without weeding (W1), weeding up to 15 days after planting (W2), weeding up to 30 days after planting (W3) and then weeds are allowed to grow until harvest.

Nursery is done at nursery bed until seeds have age of 14 days after seedling. Planting plot with size of 120 x 120 cm² subsequently is treated and mix with manure according to treatments, flattened and turned over using hoe and is formed with height of 25 cm and distance between plot is 30 cm. After seeds have 2 weeks age, they are ready to move into planting plot with planting distance of 10 x 10 cm² and total population 144 crops per plot. Weeding operation at plot is done according to treatment using manual or mechanical method. Upkeeping is done by routine watering in the morning and afternoon using soil water. Manure application is done in conjunction with soil tillage, whereas pest and disease control are done mechanically and preventively using botanical pesticides. Pakcoy crop harvest is done when crop age was 40 days after planting through uprooting crops followed by washing.

Agronomic characters observation are consisted of crop height (cm), leaf numbers (strand), leaf length (cm) and harvest fresh weight (g/m²). Data is statistically analyzed using Analysis of Variance (ANOVA) followed by Honestly Significant Difference (LSD) test at 5% significant level. All data calculation are done using program SPSS 22.0 aid and data is presented in form of tables and figures.

RESULTS AND DISCUSSION

Results

Table 1. Analysis of variance results in term of observed parameters for several manures and weeding times treatments on organic pakcoy crop.

No	The observed parameters	Manure	Weeding time	Interaction
1	Crop height (cm)	4.29*	6.41*	1.16 ns
2	Leaf numbers (strand)	37.80*	51.89*	0.58 ns
3	Leaf length (cm)	17.83*	30.85*	4.40*
4	Harvest fresh weight (g)	86.67*	58.59*	11.32*

Remarks: * = significant effect

ns = not significant effect

Results of variance analysis related to the effet of several manures and weeding times treatments on each observed parameter can be seen in Table 1. Effect of amongst treatments of several manures and weeding

times had significant effect on each observed parameter, whereas treatment interaction of several manures and weeding times had no significant effect on each observed parameter except for leaf length and harvest fresh weight.

A. Crop Height

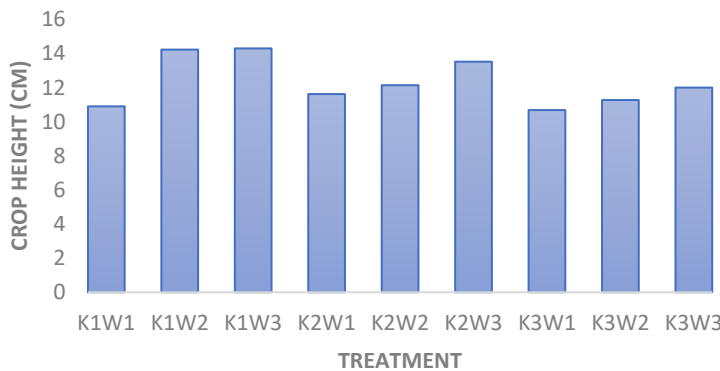


Figure 1. Crop height at several manures and weeding times treatments on organic pakcoy crop at 40 days after planting (cm). K1: chicken manure, K2: goat manure, K3: cow manure. W1: without weeding, W2: weeding up to 15 days after planting, W3: weeding up to 30 days after planting.

Manures application and weeding times had effect on crop height. Results of LSD test at 5 percent significance level showed that treatment effect of several manures and weeding times are not significantly difference on crop height (Figure 1). The highest crop height was obtained from treatment chicken manure application (K1) and weeding up to 30 days after planting (W3) with magnitude of 11.31 cm.

B. Leaf Numbers

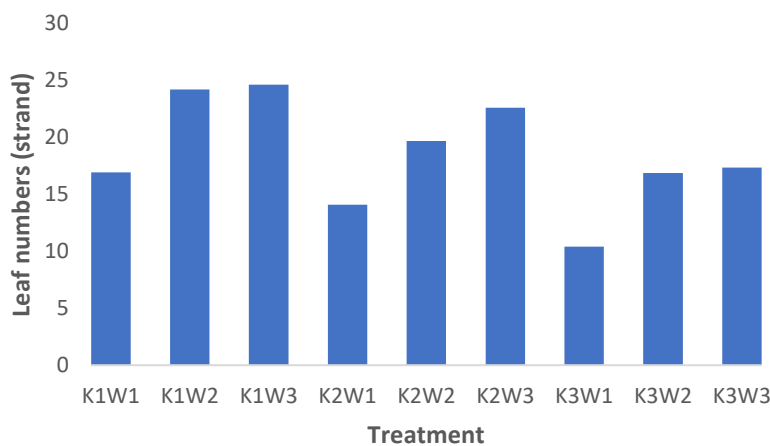


Figure 2. Leaf numbers at several manures and weeding times treatments on organic pakcoy crop at 40 days after planting (strand). K1: chicken manure, K2: goat manure, K3: cow manure. W1: without weeding, W2: weeding up to 15 days after planting, W3: weeding up to 30 days after planting.

Manures application and weeding times had effect on leaf numbers. Hasil uji LSD test at 5 percent significance level showed that treatment effect of several manures and weeding times are not significantly difference on leaf numbers of pakcoy crop The highest leaf numbers was obtained from treatment chicken manure application (K1) and weeding up to 30 days after planting (W3) with magnitude of 24.60 strands per crop.

C. Leaf Length

Manures application and weeding times had effect on leaf length. LSD test at 5 percent significance level

showed that treatment effect of several manures and weeding times are significantly difference on average leaf length numbers of pakcoy crop (Table 2). The highest average leaf length was obtained from treatment chicken manure application (K1) and weeding up to 30 days after planting (W3) with magnitude of 18.35 cm per crop.

Table 2. Average leaf length at several manures and weeding times treatments for organic pakcoy crop at age of 40 days after planting (cm)

Treatment	W1	W2	W3
K1	11.11 a	17.11 ef	18.35 f
K2	11.72 ab	14.15 cd	15.61 de
K3	10.48 a	13.35 bc	12.12 abc
HSD .05 = 2.18			

Remarks: Numbers followed by the same letter indicate not significant effect. K1: chicken manure, K2: goat manure, K3: cow manure. W1: without weeding, W2: weeding up to 15 days after planting, W3: weeding up to 30 days after planting. (HSD = Honestly Significant Difference)

D. Harvest Fresh Weight

Manures application and weeding times had effect on harvest fresh weight. LSD test at 5 percent significance level showed that treatment effect of several manures and weeding times are significantly difference on harvest fresh weight (Table 3). The highest harvest fresh weight was obtained from treatment chicken manure application (K1) and weeding up to 30 days after planting (W3) with magnitude of 302.26 g per crop.

Table 3. Harvest fresh weight at several manures and weeding times treatments for organic pakcoy crop at age of 40 days after planting (g/crop)

Treatment	W1	W2	W3
K1	76.98 bc	247.83 e	302.26 f
K2	44.12 ab	96.50 c	167.90 d
K3	22.16 a	68.58 bc	61.44 abc
HSD .05 = 45			

Remarks: Numbers followed by the same letter indicate not significant effect. K1: chicken manure, K2: goat manure, K3: cow manure. W1: without weeding, W2: weeding up to 15 days after planting, W3: weeding up to 30 days after planting. (HSD = Honestly Significant Difference)

DISCUSSION

Application of manures and weeding times had effect on the growth and yield of organic pakcoy (*Brassica rapa*. L) crop. This was indicated by several observed parameters such as crop height, leaf numbers, leaf length and harvest fresh weight. According to [8], application of manures is more effective in increasing crop growth because manures have complete nutrients content to fulfil crop nutrient requirement. Manure which is originate from animal waste contains macro nutrients such as nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulfur (S) so that it is capable to fulfil nutrients requirement of pakcoy mustard crop. Subsequently, weeding is also affect crop growth because it is capable to minimize crop losses due to competition with weeds. According to [7], competition between main crops and weeds can become critical factor for crop growth. Moreover, [9] had stated that critical period for annual plant such as vegetable is one third of the life of the plant.

Variance Analysis results in term of effect interaction chicken manure and weeding times up to 30 days after planting showed significantly different for leaf length and harvest fresh weight parameters, but not significantly different for crop height and leaf numbers parameters. It is estimated that crop height and leaf numbers are more dominated by genetic effect than that of treatments interaction effect. According to [10], crop height is more affected by variety factor than that of fertilizing.

Pakcoy crop production in form of harvest fresh weight had significantly affected by chicken manure application and weeding times up to 30 days after planting. It is estimated that manure had high nitrogen content so that nitrogen supply into crop is fulfilled. N nutrient is highly required for crop vegetative growth and this is shown by leaf length parameter that had significant effect in this treatment. This is in accordance to statement of [11] that chicken manure has N and P nutrients content that is relatively higher than that of other manures. Subsequently, [12] stated that crop growth requires sufficient nitrogen supply and in balance condition with other nutrients. In addition, available nutrients should be in appropriate condition so that they can be absorbed by crop. Moreover, proper weeding time is also affect harvest fresh weight of pakcoy crop. Weeding time up to 30 days after planting can reduce yield losses due to the presence of weeds. According to [13], one of factor that affect reduction in production is due to the presence of weeds on plants environment.

CONCLUSION

It can be concluded from this research that treatments of manures and weeding times have effect on the growth and yield of pakcoy crop. Pakcoy crop which is fertilized with chicken manure at dose 25 ton/ha and weeding times up to 30 days after planting gave good effect on the growth and yield of pakcoy that produce the highest harvest fresh weight with magnitude of 302.26 g/crop or 28.1 ton/ha.

ACKNOWLEDGEMENT

We would like to thank LPPM Baturaja University for funding this research through an Internal Grant for Lecturers at the Faculty of Agriculture, Baturaja University.

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