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Influence of Manure And Pgr Cosentration On Growth of Pakchoy (*Brassica Chinensis*)

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Abstract: The purpose of this research is to determine interaction between composition of growing medium, PGR concentration to growth, influence of composition of growing medium toward growth and harvest of pakchoy. The present study uses factorial randomized group design consisting of two factors with three replicates and 2 sample plants. Factor I is growing medium composition of 3 levels while factor II is a level 3 PGR concentration. The composition of these factors is factor I: M_1 = 3 garden soil: 1 manure, M_2 = 2 garden soil: 2 Manure, M_3 = 1 garden soil: 3 manure. Factor II consists of: K_1 = 2 ml/liter of water, K_2 = 4 ml/liter of water, K_3 = 6 ml / liter of water. Results from this study indicate that the combined treatment of manure and PGR concentration has significant effect on observation of plant length at 28 days of age. However, it does not give real interaction to variables of number of leaves, plant length, and gross at all ages of observation. The use of manure has significant effect on all observation variables. The highest average plant length, leaf number, and highest gross were obtained at the treatment of M_2 (2 garden soil: 2 manure). Treatment of PGR concentration had significant effect on all observation variables. Average length of plants, number of leaves, and highest gross were obtained at treatment of K_1 = 2 ml / ltr water.

Keywords: *Pakchoy, Manure, PGR, RAK.*

1. INTRODUCTION

In vegetable cultivation include mustard (pakchoy), tomatoes, kale, celery, etc. Vegetables are a type of plant frequently consumed by society with difficult and relatively quick cultivation. The importance of vegetables for health triggers an increase in vegetable products.

To produce fresh, healthy and high-quality vegetables, good handling needed from site, seed, and fertilization selection. Mustard is a kind of vegetables favored by Indonesian people. Of the various types of mustard, pakchoy is highly cultivated farmers today. Pakchoy can grow well in lowland and highland (Ashariandani, 2012), which become its strength. Pakchoy is originated from China and has been cultivated since after the fifth century extensively in southern China, central China and Taiwan. This vegetable is new in Japan and still in with *Chinese vegetable*. Pakchoy allegedly entered Indonesian territory in the XIX Century (Anonymous. 2010).

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From economic and business aspects, pakchoy is feasible to be developed to meet the increasingly growing consumer demand and market opportunities. Pakchoy selling price is higher than other types of mustard. Feasibility of mustard cultivation is shown by their comparative advantage of Indonesia's tropical regions conditions that is very suitable for the commodity, in addition, pakchoy needs relatively short growing period ie 40-50 days after planting with adequate profit. Pakchoy contains a lot of fiber, vitamin A, vitamin B, vitamin B2, vitamin B6, vitamin C, calcium, phosphorus, copper, magnesium, iron, and protein. Therefore, pakchoy is believed to prevent cancer, hypertension, and heart disease (Anonymous, 2011).

Several types of mustard are quite popular and widely consumed by the community, including mustard, chicory and pakchoy tau caisim. Of the three types of mustard, pakchoy is highly cultivated by farmers today. The stems and leaves are wider than the common mustard greens, making this type of pakchoy is more commonly used in the cuisine menu. This certainly provides a fairly bright business prospects for pakchoy farmers, because the demand is high (Anonymous, 2011).

The rate of growth of vegetable production in Indonesia ranges from 7,7 - 24.2%/year. Some types of vegetables, such as onion, pouch/pakchoy, and cucumber increased production is the impact of the application of cultivation technology. To meet the high market demand and to obtain the desired production, it is necessary to use planting techniques for planting pakchoy.

The success of farming is influenced by several factors, including fertilizer in terms of its type and dose. According to novizan (2010), fertilizer application is basically to add nutrients for plants to grow and develop properly.

Efforts to increase productivity of pakchoy include the provision of fertilizer, both organic and inorganic fertilizers. Provision of organic fertilizers can improve soil properties such as physical, chemistry and soil biology properties. Provision of organic fertilizers can increase the solubility of P, K, Ca, Mg, increase C-organic, cation exchange capacity, soil holding capacity and decrease saturation of AI (Aidi et al., 1996).

In addition to giving organic fertilizer (manure), urea fertilizer as a source of nutrients N (nitrogen) is anothereffort in increasing vegetable productivity, especially pakcoy vegetables,

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urea fertilizer as a source of N (nitrogen) can improve vegetative growth of plants, sufficient Nitrogen on soil can make leaves become greener (Aninymous, 2012).

Given the important role of organic fertilizer, especially manure and PGR, the current study observe composition of growing media and concentration of PGR on growth and yield of pakchoy.

2. MATERIALS AND METHODS

The method used is factorial experiment arranged in a randomized block design (RAK), consists of two factors: Treatment of growing media composition with three dose levels and treatment with 3 levels PGR. Each combination treatment was repeated three times and every combination treatment comprises two plants and materials. The research tools used are poly bag size 35 x 35 cm, sprayer, seed of pakchoy, planting medium composed of garden soil, manure and measuring tool.

3. RESULT AND DISCUSSION

3.1. Plants Length

Analysis of variance indicates that there was no interaction between manure application and PGR concentration on all age of observation. Separately, treatment of manure significantly affects the length of the plant at the age of 28 days and 35 days after planting. Treatment of PGR concentration showed a significant effect on the age of 28 days after planting.

The average of plant length after treatment with manure application and concentration of PGR is listed in Table 1. In Table 1 the highest value in the treatment of M2 media (soil: fertilizer = 2: 2) is 23.6 cm while the average with treatment of PGR concentration is achieved by treatment of K1 (2ml / ltr water) by 21.50 cm.

Table 1. Average of pakchoy length from Various Observations on Treatment with Manure and concentration of PGR

Treatment	Average Length of Plants (cm)			
	14	21	28	35
M_1	8.78	13.83	16.33 a	19.39 a
M_2	9.56	15.72	20.11 b	23.61 b
M_3	8.17	13.72	18,61 ab	19.56 a

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BNT 5%	tn	tn	2.40	3.03
K_1	9.06	15.56	20.33 b	21.50
K_2	8.89	14.44	17.67 a	20.67
K_3	8.56	13.28	17.06 a	20.39
BNT 5%	tn	tn	2.40	tn

Description: The numbers followed by the same letter in the same column are not significantly different at BNT tst of 5%

3.2. Leaf Amount

The result of the analysis shows that there was no interaction between manure and PGR concentration on growth and yield of pakchoy plants. Separately, treatment of manure significantly affected the number of leaves at 28 days and 35 days after planting. In addition, the application of PGR showed no significant effect on the number of leaves at all ages of observation.

The average number of leaf of pakchoy at observations on growing media by using PGR concentration is indicated in Table 2. In Table 2, the highest average number of leaves is obtained with manure application on P2 (garden soil: fertilizer = 2: 2) by 20.72 leaves. In the treatment of PGR concentration the highest average of leaf number was achieved by treatment of K1 (2ml / ltr water) by 19.33 leaves compared to other treatments.

Table 2. Average Number of pakchoy Plants Leaves on Various Observations with Treatment of Growing Media Composition and concentration of PGR

Treatment	Average Leaf Amount			
	14	21	28	35
M_1	4.22	5.56	9.67 a	16.11 a
M_2	4.72	6.17	12.39 b	20.72 b
M_3	4.50	5.56	10.44 ab	17.83 a
BNT 5%	tn	tn	1.97	2.12
K_1	4.61	6.06	10.72	19.33
K_2	4.44	5.78	11.06	17.67
K_3	4.39	5.44	10.72	17.67
BNT 5%	tn	tn	tn	tn

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Description: The numbers followed by the same letter in the same column are not significantly different at BTN test of 5%.

3.3. Gross weight per Plant

Results of analysis of variance showed the lack of interaction between manure application and PGR concentration on gross weight per plant. Separately, treatment of manure significantly affected gross weight per plant. Meanwhile PGR concentration treatment showed no significant effect on gross weight per plant at the end of observation.

The average gross weight at the end of observation (35 HST) in the treatment of manure application and concentration of PGR can is shown Table 3. In Table 3 with manure, the average gross weight reaches the highest with M2 (garden soil: manure = 2: 2) by 245,39 gram which is not significantly different with M3 treatment. Meanwhile for PGR concentration treatment, the average highest gross weight is achieved by K1 (2ml / ltr water) by 245, 99 grams.

Table 3. Average gross Weight per Plant In Final Observations (35 Days After planting) in Treatment with Manure and concentration of PGR.

Treatment	Average Gross Weight per Plant
M_1	128.80 a
M_2	245.39 b
M_3	232.99 b
BNT 5%	79.99
K_1	243.77
K_2	186.69
K_3	176,72
BNT 5%	tn

Description: The numbers followed by the same letter in the same column are not significantly different at LSD 5%

3.4. Discussion

Combination of treatment of manure and PGR concentration did not significantly affect plant length, number of leaves and plant gross weight variables at all ages of

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observations. Separately, treatment of M2 (2 Land: 2 manure) gave the best results on the variables studied: plant length, leaf number and gross weight per plant. Treatment with PGR concentration shows that K1 (2 ml/ltr water) provided the best result on the variable length of the plant, the number of leaves and the gross weight per plant. It is presumed that application of manure can increase the fertility of the plant; adequate concentration of PGR can increase vegetative growth of the plant. This is in accordance with Sumarsono (2010) statement that manure and other organic sources are used to improve soil fertility and soil organic matter content.

The provision of micro nutrients and improving soil structure can also increase the growth of microbes and rotation of nutrients in the soil. Provision of organic material in addition to manure can also increase the availability of other nutrients in the soil (Anonymaus,2010).

There are several advantages of organic fertilizer including micro element which is more complete than inorganic fertilizer. Organic fertilizer will also give life of soil microorganism which has become good friend of farmer. Organic fertilizer helps keep soil moisture and reduce pressure or soil structure stress on the roots of plants. It also plays an important role in maintaining the level of soil fertility that is in excessive fertilization with inorganic/chemical fertilizers in the soil. Quality of soil containing organic fertilizer is better compared with chemical fertilizers that the plant is not susceptible to disease and healthier plants (Anonymous 2012).

Growth regulator affects plant growth and development. The effects of PGR depend on plant species, PGR action sites in plants, plant growth stage and PGR concentration. PGR does not work alone in influencing plant growth and development. In general, concentration of PGR will control the growth and development of plants: Auxin: Affects the length of stem, growth, differentiation and branching roots; fruit development; apical dominance; phototropism and geotropism. Cytokinins: Affects the growth and differentiation of roots; encourages cell division and growth in general, promoting germination; and delay aging. Giberelin: Encourages development of seed, bud, stem elongation and leaf growth; encourage flowering and fruit development; affect root growth and differentiation. Abscisic acid (ABA): Inhibits growth; stimulates stomata closure at water shortage, maintains dormancy. Etilenn: Encourages maturation; provides the opposite effect with some auxin effects; encourage or inhibit the

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growth and development of roots, leaves, stems and flowers. Apical meristem leaf tips of young shoots, the embryo in seeds (Anonymaus, 2010).

4. CONCLUSION

Treatment with manure gives a real effect on the observation of plant length of 28, 35 HST and the number of leaves and gross weight per plan on 28 HST. Significant influence on the number of leaves is indicated the age of 35 days. The highest average length of plant in M2 is 23,61 cm, the average of highest number of leaves is also on M2 by 20,72 while the average of highest gross weight is at M2 by 245,39 cm. Treatment on the concentration of PGR gave a real effect on the observation of plant lenght on 28 day. The highest average length of plant is in K1 = 21, 50 cm, the highest average number of leaves is achieved at K1 = 19.33, while the highest average of gross weight is at K1 by 245,77 gr. Treatment of combination of manure and PGR concentration did not give significant interaction to leaf number, plant length and gross weight at all age of observation.

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