

Pengaruh Dosis Pupuk Organik Kompos dan Phonska Terhadap Pertumbuhan dan Produksi Tanaman Mentimun (*Cucumis sativus* L.)

*Effect of Organic Fertilizer Doses Compost and Phonska on The Growth and Production of Cucumber Plants (*Cucumis sativus* L.)*

Lody Bintang Extrada^{1*}, Supriyono¹, dan Samudi¹

¹ Program Studi Agroteknologi, Fakultas Pertanian, Universitas Islam Kadiri

*email korespondensi: extradabintang@gmail.com

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Abstract

The study was conducted from January to March 2022 at Green House located in Ngadiluwih District, Kediri Regency. The soil here is sandy loam. This study used a 2-factor design. Point 1: There are 3 steps to using fertilizer. That is, K1 = 5 tons/Ha, K2 = 10 tons/Ha, K3 = 15 tons/Ha, Factor 2: The amount of Ponska NPK fertilizer has three levels. For example: P1 = 100gr/Ha, P2 = 200 gr Ha and P3 = 300gr/Ha. Data were analyzed using an F-test at the 5% level. The results showed that the amount of fertilizer in the treatment had no effect on the observed changes. However, at a dose of 180 gr/plant, the K1 treatment became the best treatment for lack of leaf stem diameter, fruit weight, and fruit length. However, at a rate of 360gr/tree at different fruit heights and numbers, K2 gave the best results. The second important factor in the treatment of NPK phonska fertilizer dosage does not affect the growth and yield of cucumber plants. However, in the treatment of diseases such as the dose of phonska P2, phonska P2 with a dose of 7.2 gr per plant is the optimal treatment in this study on plant growth not as a function of plant length, the number of leaves and the diameter of the stem.

Keyword:

Cucumber, dosage, compost, NPK Fertilizer

Abstrak

Penelitian dilakukan pada bulan Januari hingga Maret 2022 di Green House yang terletak di Kecamatan Ngadiluwih Kabupaten Kediri. Tanah di sini adalah lempung berpasir. Penelitian ini menggunakan desain 2 faktor. Butir 1: Ada 3 langkah penggunaan pupuk. Yaitu K1 = 5 ton/Ha, K2 = 10 ton/Ha, K3 = 15 ton/Ha, Faktor 2: Jumlah pupuk NPK Ponska ada tiga taraf. Misal: P1 = 100 gr/Ha, P2 = 200 gr Ha dan P3 = 300gr/Ha. Data dianalisis menggunakan uji-F pada taraf 5%. Hasil penelitian menunjukkan bahwa jumlah pupuk pada perlakuan tidak berpengaruh terhadap perubahan yang diamati. Pada takaran 360 gr/pohon pada tinggi dan jumlah buah yang berbeda, K2 memberikan hasil terbaik. Faktor penting kedua pada perlakuan dosis pupuk NPK phonska tidak mempengaruhi pertumbuhan dan hasil tanaman mentimun. Namun pada tanaman berpenyakit dosis phonska P2, phonska P2 dengan dosis 7,2 g per tanaman merupakan perlakuan yang optimal.

Kata Kunci:

Mentimun, dosis, kompos, pupuk NPK

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is a type of vegetable from the pumpkin family (Cucurbitaceae) that is popular all over the world. According to history, the cucumber plant came from the Asian continent. Some sources mention the origin of cucumber plants in North Asia (Rukmana, 2010).

Cucumbers include fruit vegetables such as chayote, paria, oyong, beligo, and watermelon. People love cucumber because it tastes good, fresh, and cold. The nutritional content per 100 g of cucumber consists of 15 calories, 0.8 g protein, 3 g carbohydrates, 30 mg phosphorus, 0.5 mg iron, 0.02 theanine, 0.01 mg riboflavin, 14 mg acid, 0.3 mg vitamin A, 0.3 mg vitamin B1, 0.02 mg vitamin B2 and 8.0 mg vitamin C. Cucumber in Indonesia is a very popular vegetable and is loved by all people. However, most cucumber farming is still considered a side business, so the average national cucumber yield is still low namely 3.5 – 4.8 tons/hectare. The prospect of developing cucumber cultivation commercially and managed on an agribusiness scale is getting brighter, because the marketing of the results is not only done domestically, but also abroad such as in Malaysia, Singapore, Taiwan, Hong Kong, Pakistan, France, England, Japan, the Netherlands, and Thailand. Currently, the potential target for the cucumber export market is Japan (Wijoyo, 2012).

Organic fertilizers are good for long-term use because they loosen the soil and increase the soil's ability to store water so that soil fertility is maintained (Pairunan, 2013). the use of compost in cucumber cultivation will improve the biological life of soil microorganisms, retain soil moisture, thereby reducing plant stress during the dry season, and also chemically increase soil fertility. This compost is also easy to obtain and processing is also not so difficult because the ingredients are made from animal waste, from plants that undergo a process of decay in the presence of decomposing microorganisms. The use of this compost on cucumber plants is 10-20 tons/ha (Rukmana, 2010).

The use of inorganic fertilizers such as Phonska NPK fertilizer is also recommended for cucumber plant cultivation as long as it is in accordance with the recommended dosage because in addition to having many advantages, there are also many disadvantages compared to using organic fertilizers (Lingga and Marsono, 2013).

METHODOLOGY

The study was conducted from January to March 2022 at Green House located in Ngadiluwih District, Kediri Regency. The type of soil in this place is sandy loam. The tools used are polybag, dipper, hoe, name flyer, lanjaran, stationery, camera, rope, water-pot, clamp and ruler. The materials used were soil, seeds, cucumber varieties Hercules f1, compost, and Phonska fertilizer. This study used a completely randomized design (CRD) with 2 factors. The first factor is the effect of the dose of compost from 3 levels and the second factor is the effect of the dose of phonska fertilizer from 3 levels so that 27 combinations of treatments and replications are obtained. The first factor is the nutrient concentration of ABMIX 5 ml/liter 3 brand variants. The second factor is Kale Plant Varieties. The second factor is Kale Plant Varieties. The following is the experimental design. In the first factor, the dose of compost used is (K1) 5 tons/Ha; (K2) 10 tons/Ha; and (K3) 15 tons/Ha. The second factor is Phonska fertilizer dose: (P1) 100 kg/Ha; (P2) 200 kg/Ha; and (P3) 300 kg/Ha.

Observation parameters include plant height, number of leaves, fresh weight, and plant root length. The parameters of plant height, number of leaves, and stem diameter were calculated between 15.22 and 29 days after planting, while the number of fruits, fruit weight, and fruit length were calculated at harvest. Observational data obtained were analyzed using analysis of variance (F test) at the 5% level. If there is a significant effect ($F_{count} > F_{table 5\%}$), followed by Duncan's

test (DMRT) 5% by comparing the average value of the treatment combinations to find out which values are significantly different. If there is no interaction and it is significant for a single factor, then only the 5% BNT test is carried out and there is no further test.

RESULT AND DISCUSSION

Plant Height

The effect of various doses of compost fertilizer and various doses of NPK phonska fertilizer on cucumber plant height after statistical analysis can be seen in Table 1. The results of statistical analysis show that there is an interaction between these two factors.

Table 1. Average Cucumber Plant Height in Treatment of Various Doses of Compost Fertilizer and Types of Phonska Fertilizer Doses

Treatment	Average Plant Height Age 22 DAP
K1P1	129,00 abc
K1P2	153,11 c
K1P3	120,22 abc
K2P1	130,33 abc
K2P2	102,22 a
K2P3	135,33 abc
K3P1	112,11 ab
K3P2	142,33 abc
K3P3	135,11 abc

Note: Numbers followed by the same letter in the same column are not significantly different at the 5% Duncan Multiple Range Test level (DMRT Test 0.05)

Based on the results of Table 1, the results of the Duncan Multiple Range Test 5% (DMRT 0.05 test) showed the numbers followed by the letter c were able to increase plant height growth which was significantly different from the other combinations. The K1P2 treatment (a dose of 180 g of compost fertilizer/plant and a dose of NPK phonska fertilizer of 7.2 g/plant of 153.11 cm) was the most optimal treatment for cucumber plant height, so it was effective as a fertilizer recommendation for cucumber cultivation.

The results of the research that has been carried out show that the height of the cucumber plant has an interaction. One of the factors that play an important role in plant height growth is the presence of nutrients contained in the growing media. This is in accordance with the statement of Lawalata (2011), which revealed that the provision of nutrients can increase plant growth in an amount according to plant needs. The difference in the length of growth of cucumber plants can be caused by the type of plant and the nutrient content contained in the compost used during the cultivation process. The macronutrient NPK contained in compost has an effect on the vegetative growth of cucumber plants, the N nutrients needed by cucumber plants for the process of plant height growth. In addition, the organic matter contained in compost can help the process of water absorption so that the soil will become fertile (Masriyana, 2020).

Number of Leaves

The effect of various doses of compost fertilizer and various doses of NPK phonska fertilizer on the number of leaves on cucumber plants after statistical analysis can be seen in Table 2. The results of statistical analysis showed that there was no effect on all single treatments of compost and NPK phonska fertilizers.

Table 2. Average Number of Leaves of Cucumber Plants on Treatment with Various Doses of Compost Fertilizer and Types of Phonska Fertilizer Doses

Treatment	Average Number of Leaves (strands)		
	15 DAP	22 DAP	29 DAP
K1	7,74 a	15,81 a	28,15 a
K2	6,93 a	15,44 a	24,07 a
K3	7,59 a	14,41 a	25,44 a
BNT 5%	tn	tn	tn
P1	6,89 a	14,15 a	25,67 a
P2	7,63 a	15,59 a	27,72 a
P3	7,74 a	15,93 a	24,48 a
BNT 5%	tn	tn	tn

Note: Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (BNT Test 0.05)

The results of the Smallest Significant Difference test of 5% (BNT 0.05) in table 2. indicate that the average value of the treatment of various doses of compost (K) has no effect on the variable number of leaves at the age of 15 to 29 days after planting. Cucumber plant growth in K1 treatment (180 g/plant) was the best treatment. The NPK phonska fertilizer treatment showed that there was no effect on the number of leaves at the age of 15 to 29 days after planting. Cucumber plant growth variable number of leaves in the treatment with various doses of NPK phonska fertilizer (P), P2 (7.2 g/plant) was the best treatment. Plants during the vegetative phase need nitrogen as the main element in the formation of organs, especially leaves. Nitrogen itself is a nutrient that forms amino acids and protein as the basic material for plants to make leaves. According to Sarido (2017), the number of leaves and leaf width are influenced by the availability of nitrogen nutrients (N). The availability of nitrogen also plays a role in the formation of chlorophyll which is important for the photosynthesis process or as the formation of proteins and organic compounds in plants. In addition to N elements, plants also absorb P and K elements which function for cell division and the formation of enzymes in plants (Marningsih et al, 2018).

Stem Diameter

The effect of various doses of compost fertilizer and various doses of NPK phonska fertilizer on the stem diameter of cucumber plants after statistical analysis can be seen in Table 3. The results of statistical analysis showed that there was no effect on all single treatments of compost fertilizer doses and phonska NPK fertilizer doses.

Table 3. Average Stem Diameter of Cucumber Plants in Treatment Types of Compost Fertilizer Doses and Phonska Fertilizer Doses

Treatment	Average of Stem Diameter (cm)		
	15 DAP	22 DAP	29 DAP
K1	5,47 a	6,57 a	7,93 a
K2	5,39 a	6,48 a	7,79 a
K3	5,50 a	6,59 a	7,59 a
BNT 5%	tn	tn	tn
P1	5,37 a	6,60 a	7,80 a
P2	5,44 a	6,49 a	7,91 a
P3	5,54 a	6,55 a	7,59 a
BNT 5%	tn	tn	tn

Note: Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (BNT Test 0.05)

The results of the 5% Least Significant Difference (BNT 0.05) in Table 3. showed that the different doses of compost (K) had no effect on the stem diameter variable at 29 DAP. K1 treatment of 180 g/plant was the best treatment. In the treatment of various doses of NPK phonska fertilizer, there was no effect on the stem diameter variable at 29 DAP age growth. The P2 treatment at a dose of 7.2 g/plant became the optimal point for observing the stem diameter of cucumber plants. The diameter of the stem did not increase due to the absence of cell division due to lateral meristem activity and the lack of phosphorus, nitrogen, and potassium nutrients that were absorbed by plants. Phosphorus is a nutrient found in nucleotides which are the building blocks of nucleic acids. Nitrogen and calcium have an effect on shaping the growth of plant stem diameter. Nitrogen is part of proteins, protoplasm, enzymes, and biological catalysts that accelerate metabolic processes. While potassium plays a role in forming protein, hardens plant stems. Nutrient absorption by plants is not directly absorbed at the same time for the growth of stem diameter, at the beginning of planting nutrients will be focused on plant height growth and when approaching the end of vegetative The results of the 5% Least Significant Difference (BNT 0.05) in table 3. showed that the different doses of compost (K) had no effect on the stem diameter variable at 29 DAP. K1 treatment of 180 g/plant was the best treatment. In the treatment of various doses of NPK phonska fertilizer, there was no effect on the stem diameter variable at 29 DAP age growth. The P2 treatment at a dose of 7.2 g/plant became the optimal point for observing the stem diameter of cucumber plants. The diameter of the stem did not increase due to the absence of cell division due to lateral meristem activity and the lack of phosphorus, nitrogen, and potassium nutrients that were absorbed by plants. Cell division can increase the size of the diameter of the organ. Phosphorus is a nutrient found in nucleotides which are the building blocks of nucleic acids. Nitrogen and calcium have an effect in shaping the growth of plant stem diameter. Nitrogen is part of proteins, protoplasm, enzymes, and biological catalysts that accelerate metabolic processes. While potassium plays a role in forming protein, hardens plant stems. Nutrient absorption by plants is not directly absorbed at the same time for the growth of stem diameter, at the beginning of planting nutrients will be focused on plant height growth and when approaching the end of vegetative nutrients will be absorbed by stem diameter (Puspadewi et al., 2016). ve nutrients will be absorbed by stem diameter (Puspadewi et al., 2016).

Number of Fruits

The effect of various doses of compost fertilizer and various doses of NPK phonska fertilizer on the number of cucumber plants after statistical analysis can be seen in table 4. The results of statistical analysis show that there is an interaction between these two factors.

Table 4. Average number of cucumber plants fruits on treatment with various doses of compost fertilizer and types of phonska fertilizer doses

Treatment	Average Number of Fruits
K1P1	1,00 abc
K1P2	1,67 c
K1P3	1,22 abc
K2P1	1,56 abc
K2P2	0,67 a
K2P3	1,67 c
K3P1	0,89 ab
K3P2	1,33 abc
K3P3	1,22 abc

Note: Numbers followed by the same letter in the same column are not significantly different at the 5% Duncan Multiple Range Test level (DMRT Test 0.05)

Based on the results of Table 4, the results of the Duncan Multiple Range Test 5% (DMRT 0.05 test) showed the numbers followed by the letter c were able to increase the number of fruits produced on cucumber plants which were significantly different from other combinations. K1P2 and K2P3 treatments were the most optimal treatment for the number of cucumber plants, so they were effective as fertilizer recommendations for cucumber cultivation.

The number of fruits in plants is strongly influenced by the availability of nutrients needed by plants to produce flowers into fruit. If the availability of nutrients when the plant enters the generative phase is reduced, the plant will not produce flowers optimally. The same thing was expressed by Hertos, (2015) stating that the use of compost can affect plant production due to the presence of nutrients such as N, P, and K. The role of nitrogen is to form chlorophyll, protein, and fat. Nitrogen is also a constituent of enzymes contained in cells, thus affecting the growth of carbohydrates in plant growth. In addition, the presence of NPK in compost also contains other elements such as calcium (Ca), magnesium (Mg), and sulfur (S), so it is able to meet the nutrient needs of cucumber plants, especially in the fruit formation phase (Kusuma et al., 2017).

Fruit Weight

The effect of various doses of compost fertilizer and various doses of NPK phonska fertilizer on the fruit weight of cucumber plants after statistical analysis can be seen in Table 5. The results of statistical analysis showed that there was an interaction between these two factors.

Table 5. Average fruit weight of cucumber plants on treatment types of compost fertilizer doses and phonska fertilizer doses the average weight of cucumber plant fruits on treatment types of compost fertilizer doses and types of phonska fertilizer doses.

Treatment	Average Fruits Weight (gr)	
K1P1	283,78	abc
K1P2	489,67	c
K1P3	307,22	abc
K2P1	380,78	abc
K2P2	192,78	a
K2P3	435,44	bc
K3P1	234,67	ab
K3P2	346,33	abc
K3P3	343,78	abc

Note: Numbers followed by the same letter in the same column are not significantly different at the 5% Duncan Multiple Range Test level (DMRT Test 0.05)

Based on the results of Table 5. the results of the Duncan Multiple Range Test 5% (DMRT 0.05 test) showed the numbers followed by the letter c were able to increase the fruit weight produced by cucumber plants which were significantly different from other combinations. K1P2 treatment is the most optimal treatment for the number of cucumber plants, so it is effective as a fertilizer recommendation for cucumber cultivation.

Fruit weight in plants shows that metabolic processes in plants can occur effectively. Plants that have the right number and weight according to the type of plant, it shows that the plant is healthy and able to produce optimally. This is in line with the statement of Aisyah et al. (2011), which states that fruit weight and the number of fruit in plants can indicate plant metabolic activity is influenced by tissue water content, nutrients, and metabolic products. Phosphate-rich liquid organic fertilizer can improve soil fertility and has a high nutrient content so that physical

properties such as permeability, porosity, structure and water binding capacity will be better (Roidah, 2013).

Fruit Length

The effect of various doses of compost fertilizer and various doses of NPK phonska fertilizer on fruit length on cucumber plants after statistical analysis can be seen in table 6. The results of statistical analysis showed that there was no effect on all single treatments of compost fertilizer doses and phonska NPK fertilizer doses.

Table 6. Average fruit length of cucumber plants on treatment types of compost fertilizer doses and phonska fertilizer doses average length of cucumber plant fruit on treatment types of compost fertilizer doses and types of phonska fertilizer doses

Treatment	Average Fruit Length (cm)
K1	27,26 a
K2	24,96 a
K3	23,96 a
BNT 5%	tn
P1	23,52 a
P2	25,89 a
P3	26,78 a
BNT 5%	tn

Note: Numbers followed by the same letter in the same column are not significantly different at the Least Significant Difference level at the 5% level (BNT Test 0.05)

The results of the 5% Least Significant Difference (BNT 0.05) in Table 6. indicate that the treatment with different doses of compost (K) has no effect on the variable length of fruit on cucumber plants. K1 treatment of 180 g/plant was the best treatment. In the treatment of various doses of NPK phonska fertilizer, there was no effect on the variable length of fruit on cucumber plants. The P2 treatment at a dose of 7.2 g/plant became the optimal point for observing the length of cucumber fruit.

The fruit length of the cucumber plant is closely related to the weight of the fruit produced. If the resulting fruit has a length that is less than optimal then the weight of the fruit produced will be less than optimal so that the productivity of the plant will be reduced. The addition of fruit length is closely related to fruit growth. According to Puspitasari and Aini (2014) which states that fruit growth requires a lot of nutrients so mobilization and transport occur from the vegetative part to fruit and seed development. Therefore, the nutrient needs of cucumber plants during the fruit growth phase are fulfilled, which will produce large fruit (Bahri, 2011).

CONCLUSION

Based on the results of research that has been carried out regarding the effect of various doses of compost fertilizer and kinds of doses of NPK phonska fertilizer, it can be concluded that (1) there is an interaction between kinds of doof compost fertilizers and kinds of doses of NPK phonska fertilizer on the variables of plant height, number of fruits and fruit weight with different treatments. optimal, namely K1P2 (the dose of compost is 180 g/plant and the dose of NPK Phonska fertilizer is 7.2 g/plant); (2) there was no effect on the single treatment of compost fertilizer dosage on the growth and yield of cucumber plants. However, the K1 treatment with a dose of 180 g/plant became the optimal treatment on the variables of leaf number, stem diameter, fruit weight, and fruit length. However, on the variable length of the plant and the number of fruit

the best treatment was at K2 with a dose of 360 g/plant; (3) there is no effect on the single treatment of compost fertilizer dosage on the growth and yield of cucumber plants. However, in a single treatment, the dose of NPK phoska dose of P2 with a dose of 7.2 g/plant became the optimal treatment in this study on plant growth variables which included plant length, number of leaves, and stem diameter. Meanwhile, the yield variables which included the number of fruit, fruit weight, and fruit length were the best treatment with NPK phonska P3 at a dose of 10.8gr/plant.

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