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PRODUCTION RESPONSE OF CUCUMBER (CUCUMIS SATIVUS L.) PLANTS DUE TO APPLICATION OF Sp-36 AND MANURE

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Abstract: The cucumber plant (Cucumis sativus L.) is a vegetable plant that can be consumed in fresh or processed form. Cucumber production data from 2019-2022 continues to decline. One of the factors causing the decline in cucumber production is cultivation techniques that have not been carried out properly. To increase cucumber production, it is necessary to pay attention to the availability of nutrients. The fertilizer used is SP 36 fertilizer and organic fertilizer. The aim of the research is: To determine the interaction of SP36 fertilizer and manure on the growth and production of the best cucumber plants. The research was carried out in July - August 2023. The design used was a factorial Randomized Block Design (RAK). First factor: SP-36 fertilizer dose consisting of; P1: Control, P2: 150 kg ha-1 equivalent to 60 gpetak-1, P3: 250 kg ha-1 equivalent to 100 gpetak-1, Factor II: manure consisting of: N1: Control, N2: Cow manure 10 tonha-1 is equivalent to 4 kgpetak-1, N3: 10 tonha-1 chicken manure is equivalent to 4 kgpetak-1, Based on the results obtained: The interaction of SP-36 fertilizer and manure has a very real influence on the number of leaves, fruit length, plant height, fruit diameter and fruit weight
Keywords: Production, Cucumis sativus L, SP-36, Cow manure

INTRODUCTION

The cucumber plant (Cucumis sativus L.) is a vegetable plant that can be consumed in fresh or processed form (De Condole, 1882). The nutritional content per 100 g of cucumber consists of 15 calories, 0.8 g protein, 0.1 g starch, 3 g carbohydrates, 30 mg phosphorus, 0.5 mg iron, 0.02 thianine, 0.01 riboflavin, 14 mg acid, 0.45 vitamin A, 0.3 vitamin B1, and 0.2 vitamin B2 (Sumpena, 2001).

Cucumber production data from 2019-2022 continues to decline. One of the factors causing the decline in cucumber production is cultivation techniques that have not been carried out properly. To increase cucumber production, it is necessary to pay attention to the availability of nutrients as the main support for plant growth in the planting medium. One of the inorganic fertilizers that can be used is SP 36 fertilizer.

SP36 fertilizer is a single fertilizer with a fairly high phosphorus (P) content in the form of P205, believed to be 36% and in the form of blackish gray granules. The phosphorus (P) content in SP36 fertilizer is almost completely soluble in water so it is easily absorbed by plants and is very suitable for use as basic fertilizer for annual plants. Phosphate is useful for plants to accelerate the growth of seedling roots and strengthen the roots of young plants. Apart from that, phosphate can function to formation of certain proteins, helps assimilation and respiration, accelerates flowering and ripening of fruit or seeds and increases seed production. To increase fruit production, the P element does not work alone, but will combine with other elements (Lingga and Marsono, 2003 in lay Y. Y , 2007).

Prasetyo, et al (2006) explained that the use of 200 – 300 kgha-1 phosphate fertilizer will increase tomato production 2 to 3 times higher than without phosphate application.The weaknesses of inorganic fertilizer are: 1) the selling price is relatively expensive due to limited production, 2) damage to the environment (land), 3) reduces the value of product quality in terms of the health of people who consume corn, etc. Therefore, to reduce the impact, organic fertilizer is needed.

Organic fertilizer has an important function for the soil, namely to loosen the surface soil layer, increase the population of soil microorganisms, increase the absorption and retention capacity of water which overall will increase soil fertility. One of the organic fertilizers is livestock manure (cow, chicken). Manure can increase soil fertility both physically, chemically and biologically, can improve soil structure in the root area, increase soil aeration and prevent loss of main nutrients such as nitrogen and phosphorus from the soil (Williams et al, 1993).

Mulyati et al. (2007) stated that the application of manure at a dose of 10 tons ha-1 had a significant effect on the N uptake of tomato plants, and also had a significant effect on the dry fruit weight of tomato plants. Problem: Does SP36 fertilizer and manure have an effect on the growth and production of cucumber plants, what dose of SP36 and manure provides the best growth and production of cucumber plants and is there an interaction between SP36 and manure on the growth and production of cucumber plants. The aims of the research are: To determine the effect of SP36 fertilizer and manure on the growth and production of cucumber plants, to obtain one treatment dose of SP36 and manure on the best growth and production of cucumber plants and to find out the interaction of SP36 fertilizer and manure on the growth and production of cucumber plants best.

RESEARCH METHOD

This research was carried out at the experimental field of the Faculty of Agriculture, UPG 1945, NTT, which is located in Air Sago, Batuplat Village, Kota Raja District, in July - August 2023.

The materials used in this research were Belona variety cucumber seeds, cow manure, chicken manure and SP36 fertilizer.

The tools used in this research were hoes, machetes, measuring tapes, scales, wood, ropes, rulers, buckets, opaque paper, polybags, writing utensils and cameras.

The design used in this research was a factorial Randomized Group Design (RAK). The treatment attempted consisted of two factors:

This research was carried out in July - August 2023. The design used in this research was a factorial Randomized Group Design (RAK). First factor: SP-36 fertilizer dose consisting of; P1: Control, P2: 150 kg ha-1 equivalent to 60 gpetak-1, P3: 250 kg ha-1 equivalent to 100 gpetak-1, Factor II: manure consisting of: N1: Control, N2: Cow manure 10 tonha-1 is equivalent to 4 kgpetak-1, N3: 10 tonha-1 chicken manure is equivalent to 4 kg petak1

Observations were made on sample plants. The variables observed included:

1. Plant Height (cm)
   Plant height is measured from the base of the stem to the highest part of the plant, measurements are made once, namely at the end of the vegetative period.
2. Number of fruit crops (fruit)
   The number of fruit per plant is calculated as all the fruit produced on the sample plants.
3. Fruit Length (cm)
   The length of the fruit per plant was calculated by measuring the length of the cucumber fruit after harvest on the sample plants using a tape measure.
4. Fruit diameter (cm)
   Plant fruit diameter was calculated by measuring the diameter of cucumber fruit after harvest on sample plants using a caliper.
5. Weight of fruit planted (g)
   Plant fruit weight was calculated by weighing the weight of cucumber fruit after harvest on the sample plants.

The mathematical model of the factorial Randomized Group Design (RAK) according to Sastrosupadi (2000) is:

$$Yijk = \mu + \alpha i + \beta j + (AB)ij + \varepsilon ijk$$

The research production data obtained were analyzed using analysis of variance (ANOVA) to determine the effect of the treatment given. If there is an effect of the treatment, the Duncan test (5%) will be continued to see the differences between the treatments given.

RESULT AND DISCUSSION

General Observations

This research used cucumber seeds of the Herkules variety. Cucumber seeds begin to grow and appear on the soil surface at the age of 4 days after planting and begin to grow evenly at the age of 7 after planting. Harvesting was carried out 3 times with a harvest interval of 3 days at 36, 39 and 42 days after

planting (DAP) with the characteristics of the fruit being pithy and bright in color. During the research, cucumber plants were not attacked by pests and diseases.

Plant Height (cm)

The results of the ANOVA test analysis (appendix 3) show that the use of SP-36 fertilizer and manure has a very significant effect on the length of cucumber plants. Below we will show the average length of cucumber plants.

Table 1 Average Cucumber Plant Height Due to Application of SP-36 and Manure.

Factor P	Factor N		
	N1	N2	N3
P1	214 a	224 b	226 b
P2	229 c	230 cd	231 cde
P3	232 de	233 e	236 f
Jumlah	675	687	693
Rata-rata	56.250	57.250	57.750

Note: Numbers followed by the same letter in the same column and row are not significantly different at the Duncan test level of 5%

The results of the Duncan test at the 5% level in table 4.1 show the average length of the best cucumber plants in the treatment (P3N3) of SP-36 fertilizer 250 kg ha^{-1} equivalent to 100 g $plot^{-1}$ and chicken manure 10 tons ha^{-1} equivalent to 4 kg $plot^{-1}$ was significantly different from other treatments. This is thought to be because in this treatment SP36 and chicken manure were able to interact well to provide nutrients for the plant's needs.

Chicken manure contains 29% organic material which plays a role in improving the physical and biological properties of the soil so that plants become loose as a result of which nutrients can be absorbed by plants, which has an impact on increasing plant length growth, while SP36 contains Phosphate which functions to store and transfer internal energy. forms ADP and ATP. Energy is obtained from photosynthesis and metabolism of carbohydrates in a phosphate mixture for use in growth processes such as plant height (Liferdi, 2009). Phosphate fertilization can stimulate the initial growth of plant seeds, the formation of flowers, fruit and seeds (Wiryanta, 2004).

The lowest plant length in the P1N1 treatment was significantly different from the other treatments. This is thought to be because in this treatment the plant's need for nutrients is insufficient, thereby disrupting plant growth in length. According to Setyati (1988), the availability of nutrients in fairly balanced quantities for the process of plant growth, cell division, photosynthesis and cell elongation will occur quickly, resulting in rapid plant growth, especially in the vegetative phase..

Number of Fruits

The results of the ANOVA test analysis (attachment 4) show that the use of SP-36 fertilizer and manure has a very significant effect on the number of cucumbers. Below we will show the average length of cucumber plants resulting from the application of SP-36 and Manure.

Table 2. Average Number of Cucumbers Due to Application of SP-36 and Manure.

Factor P	Factor N		
	N1	N2	N3
P1	26 a	29 b	31 c
P2	31 c	32 c	33 d
P3	35 e	38 f	45 g
Jumlah	92	99	109
Rata-rata	7.667	8.250	9.083

Note: Numbers followed by the same letter in the same column and row are not significantly different at the Duncan test level of 5%

The results of the Duncan test at the 5% level in table 4.4 show that the highest average number of cucumbers in the treatment (P2K2) of SP-36 fertilizer 250 kg ha^{-1} is equivalent to 100 g of $plot^{-1}$ and 10 tons of chicken manure-1 is equivalent to 4 kg $plot^{-1}$ and was very significantly different from other treatments. This is thought to be because in this treatment the available nutrients are able to meet the plant's needs. Apart from that, the chicken manure given can increase the activity of microorganisms so that they can release P bonds so that they can be absorbed by plants.

Lakitan (1995), stated that the process of fruit formation is greatly influenced by the amount of nutrients available around the plant. The fruit formation process will run perfectly if the P nutrient is in sufficient quantities and is available (Dariatsu, 1990). Phosphorus is a macro element that makes up the components of every living cell. Phosphorus in plants really helps the formation of proteins and minerals which are very important for plants, stimulates the formation of flowers, fruit and seeds. P functions to circulate energy throughout the plant, stimulating root growth and development.

The lowest number of fruit was seen in the P1K1 treatment and was significantly different from the other treatments. This is thought to be because cucumber plants lack nutrients so that the plant's physiological and metabolic processes do not run normally, thus the plant roots are unable to absorb nutrients properly, thus affecting the number of fruit.

Fruit Weight (g)

The results of the ANOVA test analysis (attachment 5) show that the use of SP-36 fertilizer and chicken manure has a very significant effect on the weight of cucumber fruit. Below we will show the weight of cucumber plants resulting from the application of SP-36 and Manure.

Table 3. Average weight of cucumber fruit due to application of SP-36 and Manure.

Factor 1	Factor K		
	K0	K1	K2
P0	683,5 a	697,5 c	776,5 d
P1	824 a	831 c	834 e
P2	864 b	939,5 c	969 f
Jumlah	2371,5	2468	2579,5
Rata-rata	197,625	205,667	214,958

Note: Numbers followed by the same letter in the same column and row are not significantly different at the Duncan test level of 5%

The results of the Duncan test at the 5% level in table 4.4 show the average weight of the best cucumber fruit in the treatment (P2K2) of SP-36 fertilizer 250 kg ha-1 equivalent to 100 g plot-1 and chicken manure 10 tons ha^{-1} equivalent to 4 kg $plot^{-1}$ and was significantly different from other treatments. This is thought to be because the nutrients needed by the plants are sufficient. Apart from that, chicken manure is an organic fertilizer that affects soil fertility because the process of weathering and breaking down organic material can increase the number and activity of soil microorganisms so that the soil becomes loose and fertile and P functions to circulate energy throughout the plant, stimulating root growth and development.

Sarief (1985), stated that the nutrient P is the main nutrient for plant growth, because it is a constituent of all proteins and nucleic acids and is also a constituent of the protoplasm as a whole for plants. So with sufficient availability of P nutrients for cucumber plants, all cell tissue activities in cucumber plants will run normally, such as speeding up the flowering process, fruit and seed formation.

The lowest fruit weight was in the K0 treatment and was significantly different from the other treatments. This is thought to be caused by insufficient nutrients in the soil, thereby inhibiting the fruit formation process. Wijaya (2008), stated that nutrient deficiencies can cause cell growth to be hampered, thereby causing the fruit filling process to be hampered.

Fruit Length (g)

The results of the ANOVA test analysis (attachment 5) show that the use of SP-36 fertilizer and manure has a very significant effect on the length of cucumber fruit. Below we will show the weight of cucumber plants resulting from the application of SP-36 and Manure.

Table 4. Average length of cucumber fruit due to application of SP-36 and Manure.

Factor P	Factor K		
	K0	K1	K2
P0	64,0 a	64 b	65 e
P1	66 a	72 c	74 e
P2	76 ab	77 d	79 f
Jumlah	206	213	218
Rata-rata	17,167	17,750	18,167

Note: Numbers followed by the same letter in the same column and row are not significantly different at the Duncan test level of 5%

The results of the Duncan test at the 5% level in table 4.4 show the average weight of the best cucumber fruit in the treatment (P2K2) of SP-36 fertilizer 250 kg ha^{-1} equivalent to 100 g $plot^{-1}$ and chicken manure 10 tons ha^{-1} equivalent to 4 kg $plot^{-1}$ was very significantly different from other treatments. This is thought to be because the interaction of providing chicken manure and SP-36 is able to synergize well to provide sufficient nutrients for plant growth, especially macro and micro nutrients to stimulate vegetative and generative growth for plants. Furthermore, chicken manure contains organic materials which function to increase the soil's absorption capacity for water and nutrients.

The P nutrient in SP36 that is absorbed by plants can function to transport energy resulting from metabolism in plants, stimulate cell division and enlarge cell tissue as a result of which the length of cucumber fruit will increase.

The provision of P nutrients in SP36 fertilizer and K in chicken manure will improve fruit quality, this is in accordance with the function of chicken manure, namely optimizing the availability and balance of nutrients through nitrogen fixation and absorption of nutrients which are really needed by plants in optimal quantities for formation. amino acids, amides, nucleotides and nucleuproteins, as well as the essence for cell enlargement and division (Primantoro, 2001).

Furthermore, the fruit length of cucumber plants was the lowest in the P1K1 treatment interaction and was significantly different from other treatments because the plants lacked nutrients which caused low photosynthate which had an impact on fruit development. Wibawa (1998), explains that good plant growth will be achieved if the required nutrients are available in optimum doses.

Fruit Diameter (g)

The results of the ANOVA test analysis (attachment 5) show that the use of SP-36 fertilizer and chicken manure has a very significant effect on the diameter of cucumber fruit. Below we will show the fruit diameter of cucumber plants resulting from the application of SP-36 and Manure.

Tabel 5. Average diameter of cucumber fruit due to application of SP-36 and Manure.

Factor P	Factor N		
	N1	N2	N3
P1	668 a	670 a	700 b
P2	729 c	786 d	818 e
P3	931 f	1067 g	1158 h
Jumlah	2328	2523	2676
Rata-rata	194.000	210.250	223.000

Note: Numbers followed by the same letter in the same column and row are notsignificantly different at the Duncan test level of 5%

The results of the Duncan test at the 5% level in table 4.4 show the average weight of the best cucumber fruit in the treatment (P3N3) of SP-36 fertilizer 250 kg ha^{-1} equivalent to 100 g $plot^{-1}$ and 10 ton ha^{-1} chicken manure equivalent to 4 kg $plot^{-1}$ was very significantly different from other treatments. This is thought to be because chicken manure contains organic materials which function to increase the activity of microorganisms which are able to release p bonds so that they can be absorbed by plants. This is in

accordance with the opinion of Agustina (1990), stating that the addition of chicken manure will increase the activity of microorganisms in the soil which produce various growth hormones. Growth hormones can stimulate the synthesis of proteins and carbohydrates so that the cell division process runs well in cucumber plants.

Hakim et al, (1986) said that manure added to the soil can affect the availability of P. The added SP-36 will be decomposed by organic matter and produce organic acids and C02 so that it can reduce the binding of P so that it can be absorbed by plants. This has an impact in the process of filling cucumbers.

Furthermore, the tuber diameter was lowest in the P1K1 treatment interaction because the plants lacked nutrients which caused low photosynthate which had an impact on fruit development. Wijaya (2008), stated that nutrient deficiencies can cause cell growth to be hampered, thereby causing the fruit filling process to be hampered.

CONCLUSION

1. Production response of cucumber plants (cucumis sativusl.) due to the application of SP-36 and manure showed a significant effect on plant height, number of fruit per plant (fruit), fruit length (cm), fruit diameter, and fruit weight.
2. Treatment (P2K2) SP-36 fertilizer 250 kg ha-1 equivalent to 100 g plot-1 and chicken manure 10 tons ha-1 equivalent to 4 kg plot-1 gave the highest results at plant height (236,000) cm, Total fruit per crop (45,000), fruit length (79,000) cm, fruit diameter (1158,000) and fruit weight (969,000).
3. The interaction of SP-36 fertilizer and manure has a very real influence on the number of leaves, fruit length, plant height, fruit diameter and fruit weight.

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