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Growth Response of the Tomato plant (*Solanum lycopersicum* L.) on giving variation of the organic fertilizers

Respon Pertumbuhan Tanaman Tomat (*Solanum lycopersicum* L.) Terhadap Pemberian Berbagai Variasi Pupuk Organik

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ABSTRACT

Tomato plant (Solanum lycopersicum L.) is one of the horticultural commodities that has the potential to be developed because it has quite high economic value. One of the efforts made to increase the growth of tomato plants is by using organic fertilizers. Organic fertilizer is the best and natural soil repairer than artificial / synthetic. This study aims to determine the response of tomato plant growth to organic fertilizer by observing plant height, number of leaves and stem diameter. This study used an experimental method with a randomized block design consisting of 4 treatments, namely compost, manure, and green manure. The results of the observations were analyzed using Analysis of Variance (ANOVA) and statistical data processing was performed using the F test at the level of α = 5%. The results showed that the growth of tomato plants for the highest plant measurement, the highest average number of leaves and stem diameter was found in the compost (PK) treatment.

***Keywords**: Tomato (Solanumlycopersicum L.), Compost, Manure, Green Manure, Growth*

ABSTRAK

Tanaman tomat (*Solanum lycopersicum* L.) merupakan salah satu komoditas hortikultura yang sangat potensial untuk dikembangkan karena mempunyai nilai ekonomis cukup tinggi.Salah satu upaya yang dilakukan untuk meningkatkan pertumbuhan tanaman tomat adalah dengan menggunakan pupuk organik. Pupuk organik merupakan bahan pembenah tanah yang paling baik dan alami dari pada bahan pembenah buatan/sintesis.Penelitian ini bertujuan untuk mengetahui respon pertumbuhan tanaman tomatterhadap pemberian pupuk organik dengan mengamati tinggi tanaman, jumlah daun dan diameter batang.Penelitian ini menggunakan metode eksperimental denganRancangan Acak Kelompok yang terdiri dari 4perlakuanyaitu Pupuk Kompos, Pupuk Kandang, Pupuk Hijau.Hasil pengamatan dianalisis dengan *Analysis of Variance* (ANOVA) dan pengolahan data secara statistik dilakukan dengan menggunakan uji F pada taraf α = 5%. Hasil penelitian menunjukkan pertumbuhan tanaman tomat untuk pengukuran tanaman tertinggi, jumlah daun dan diameter batang rerata tertinggi terdapat pada perlakuan Pupuk Kompos (PK).

Kata Kunci: Tomat (*Solanumlycopersicum* L.), Pupuk Kompos, Pupuk Kandang, Pupuk Hijau

INTRODUCTION

Tomato plant (Solanum lycopersicum L.) is one of the horticultural commodities that have the potential to be developed because it has a high economic value (Prastyo *et al.*, 2014).

The fruit is a source of vitamins and minerals, the content contained in 100 grams of tomatoes includes vitamin C 40 mg, vitamin A 1500 SI, vitamin B 60 mg, calories 30, protein 1 g, fat 0.3 g, carbohydrates 4.2 g, iron 0.5 mg, and calcium 5 mg (Rahmawati *et al.*, 2011).

The cultivation of tomatoes by farmers generally uses chemical-based fertilizers. Chemical fertilizers can increase soil productivity in a short time but in the long term, it can reduce the productivity of the resulting plant and make the soil structure hard (Sutanto, 2002).

Efforts made to increase the productivity of agricultural land, especially for the cultivation of tomatoes, are no different from other crops, namely by applying fertilization. Effect of Giving Solid (Empty Fruit Bunches of Palm Oil) and Rice Husk Charcoal on Tomato Production. (Fadhillah and Harahap, 2020), Fertilizers provided can be in the form of organic fertilizers and inorganic fertilizers (Muryanto and Rahmi, 2015).

Organic matter is an important component of soil as a source and binder of nutrients for soil microbes. The results of the mineralization of organic matter can increase the availability of soil nutrients and the cation exchange rate. Several types of organic fertilizers are manure and compost (Mariani *et al.*, 2017). Harahap *et al.*, (2020), Supply Liquid Organic Fertilizer NASA and Rice Husk Ash To The Chemical Properties Of The Soil On The Tomato Plant Compost, manure, and green manure, these fertilizers can play a role in improving the physical, chemical, and biological properties of the soil (Suriadikarta *et al.*, 2002).

This research is expected to be able to study the right type of organic fertilizer so that it can get better tomato yields.The purpose of this research was to study and determine the effect of various types of organic fertilizers consisting of compost, manure, and green manure on the growth and production of tomato plants.

MATERIALS AND METHODS

Time and place of research

This research was conducted in May-September 2020 on the plantation area of Indah Lestari Village, Padangsidimpuan.

Tools and Materials

The materials used are tomato seeds, compost, manure, green manure, NPK, insecticides, and fungicides

The tools used were a hoe, stake, rope, hand sprayer, tape measure, bucket, watering can, polybags, scales, and stationery.

Data analysis

Data from observations were analyzed using a completely randomized design (RBD) with 4 treatment variables, namely: Control, Compost, Manure, and Green Fertilizer.

Research procedure

1. Preparation of planting media, grown tomato seeds by seedling for ± 1 month, and prepare a dose of compost, manure, and green manure with a dose of 1: 1 each.
2. Planting is done by placing the tomato seeds from the seedlings into a polybag filled with treatment and then pouring enough water. Polybag layout based on research design.
3. The maintenance carried out includes watering, pengajiran, and controlling pests and diseases. Watering is done every day in the morning or evening to keep the planting medium moist. Pengajiran using bamboo is done when the plants are 8 weeks old after planting (MST) while controlling pests and diseases is carried out chemically.

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4. Observations were made when tomatoes were 15 DAS, 30 DAS, 45 DAS, and 60 DAS which included plant height, number of leaves, and stem diameter.

5. Harvesting is done after physiologically ripe tomatoes are characterized by a color change from green to yellow and finally red.

RESULTS AND DISCUSSION

Plant height

Based on Table 1, it is known that the results of plant height measurements from the age of 15 DAS - 60 DAS show a significant difference between control and treatment (PK, PKA, PH). The highest average value on plant height was shown in the PK treatment from the age of 15 DAS - 60 DAS. This proved that the untreated plants had a lower growth rate. Following the opinion of Aisyana (2009), plant height can be influenced by the availability of nutrients by the environment, for example, the supply of nutrients from fertilizers into the soil which can be absorbed through the roots. Widyanto (2007) states that apart from being a source of nutrients, organic fertilizers can stimulate root growth, improve plant health and reduce the use of pesticides, make plants grow better, and increase the absorption and binding capacity of the soil to water so that water availability for plants is adequate.

Based on Table 2, it is known that organic fertilizers have no significant effect on the age of 15 DAS. The number of leaves at the age of 30 DAS - 60 DAS there was a significant difference between control and treatment. This is presumably because the nitrogen element available to plants is sufficient to stimulate the formation of shoots and leaves, increase protein content and increase the amount of chlorophyll, this is in line with what Wijaya (2008) said that nitrogen affects the formation of leaves with wider strands. and higher chlorophyll content, to produce

Table 1. Average Effect of Treatment on Tomato Plant Height 15-60 DAS (Days After Planting)

Treatment	HST			
	15	30	45	60
Control	13,33a	33,67a	50,83a	65,83a
PK	21,67b	44,17b	72,00c	87,83c
PKA	18,67b	41,00b	72,00c	87,00c
PH	19,83b	41,47b	67,17bc	82,67c

Note: The numbers followed by the same letter on the line show no significant difference between treatments (ANOVA with DMRT test at $\alpha = 0.05$)
PK = Compost Fertilizer, PKA = Manure, PH = Green Fertilizer

1. Number of leaves

Table 2.Average Effect of Treatment on Number of Tomato Leaves 15-60 Days After Planting)

Treatment	HST			
	15	30	45	60
Control	10,67a	29,83a	48,67a	91,00a
PK	14,33a	51,83b	101,50b	148,17b
PKA	12,50a	47,83b	91,17b	138,00b
PH	12,00a	48,17b	89,83b	137,33b

Note: The numbers followed by the same letter on the line show no significant difference between treatments (ANOVA with DMRT test at $\alpha = 0.05$)
PK = Compost Fertilizer, PKA = Manure, PH = Green Fertilizer

Table 3.Average Effect of Treatment on Tomato Stem Diameter 15-60 DAS (Days After Planting)

Treatment	HST			
	15	30	45	60
Control	0,35a	0,65ab	0,85a	1,05a
PK	0,55bc	0,73b	1,00b	1,25b
PKA	0,45ab	0,67ab	0,88a	1,06a
PH	0,51b	0,67ab	0,95ab	1,18b

Note: The numbers followed by the same letter on the line show no significant difference between treatments (ANOVA with DMRT test at $\alpha = 0.05$)
PK = Compost Fertilizer, PKA = Manure, PH = Green Fertilizer

a lot of carbohydrates for plant vegetative growth. Nitrogen in plants functions in expanding the leaf area so that it can increase photosynthesis (Chaturvedi, 2005). The highest average was found in the compost treatment from each observation because compost can generally make plants greener and soil looser due to organic acids that are not found in other fertilizers, namely humic acid, fulfic acid, hormones, and enzymes (Hery, 2011). Effect of Application of Oil Palm Empty Bunches and Rice Husk Charcoal on Several Soil Chemical Properties of Tomatoes (Harahap *et al.*, 2020). The presence of enzymes in compost allows the compost to work more.

Stem diamter

Based on Table 3, it is known that the mean stem diameter results at the age of 15 DAS between the control and the treatment of compost and green manure were significantly different. According to Hardjowigeno (2003), the addition of organic matter to the soil will increase the supply of macronutrients even in small amounts. The observations for stem diameter that showed a significant difference were compost, this can be seen from the average stem diameter.

CONCLUSION

Based on the research above, it can be concluded that the provision of compost has a significant effect on plant height, leaf number, and stem diameter. Compost gives the best results for each observation parameter.

REFERENCES

Aisyana,P. 2009. Respontanaman tomat (*Lycopersicumesculentum* Mill.) terhadap pemberian berbagai konsentrasi pupuk organik cair.Universitas Jambi.

Chaturvedi I. 2005.Effect of nitrogen fertilizer on growth, yield, and quality of hybrid rice (*Oryza sativa* L.).*J Eur Agric* 6 (4): 611-618.

Fadhillah, W. and Harahap, F.S., 2020. Pengaruh Pemberian Solid (Tandan Kosong Kelapa Sawit) Dan Arang Sekam Padi Terhadap Produksi Tanaman Tomat. *Jurnal Tanah dan Sumberdaya Lahan*, *7*(2), pp.299-304.

Harahap, F.S., Roswita, O. and Iman, A., 2020. Supply Liquid Organic Fertilizer NASA and Rice Husk Ash To The Chemical Properties Of The Soil On The Tomato Plant. *International Journal of Science, Technology & Management*, *1*(3), pp.185-189.

Harahap, F.S., Walida, H., Rahmaniah, R., Rauf, A., Hasibuan, R. and Nasution, A.P., 2020. Pengaruh Aplikasi Tandan Kosong Kelapa Sawit dan Arang Sekam Padi terhadap beberapa Sifat Kimia Tanah pada Tomat. *Agrotechnology Research Journal*, *4*(1), pp.1-5.

Hardjowigeno, S. 2003. Ilmu Tanah. Jakarta: Akademi Pressindo.274-289hal. Hery Soeryoko. 2011. *Kiat Pintar Memproduksi Kompos*. Yogyakarta : Lily Publisher.

Mariani, S., D. Koesriharti, D.&Barunawati, N. 2017.Respon pertumbuhan dan hasil tanaman tomat (*Lycopersicum esculentum* Mill.) varietas permata terhadap dosis pupuk kotoran ayam dan KCl. *J. ProduksiTanaman*, 5(9), 1505 - 1511.

Maryanto dan Rahmi, A. 2015.Pengaruh Jenis dan Dosis Pupuk Organik terhadap Pertumbuhan dan Hasil Tanaman Tomat.*Agrifor*.XIV (1), 87 - 94

Prasetyo, W., Santoso, M., dan Wardiyati, T. 2014.Pengaruh Beberapa Macam Kombinasi Pupuk Organik dan Anorganik terhadap Pertumbuhan dan Hasil Tanaman Jagung Manis (*Zea mays saccharata* Sturt).*Jurnal Produksi Tanaman*, 1 (3) : 79-86.

Rahmawati, H., E.Sulistyaningsih, dan E.T.S.Putra. 2011. Pengaruh KadarNaCl terhadap Hasil dan Mutu Buah Tomat (Lycopersicum esculentumMill).Vegetalika(1) 4:44-54.

Suriadikarta D., A. Prihatini, T. DSetyorini, D., dan Hartatik, W. 2002. Teknologi Pengelolaan Bahan Organik Tanah, Pusat Penelitian dan Pengembangan Tanah dan Agroklimat, Badan Litbang Pertanian, Departemen Pertanian.183-238.

Sutanto, R. 2002. *Dasar Dasar Ilmu Tanah*. Kanisius.Yogyakarta.

Widyanto. 2007. Petunjuk Pemupukan. Agromedia Pustaka. Jakarta

Wijaya, K. A. 2008.*Nutrisi tanaman*. Prestasi Pustaka. Jakarta