

Effect of Giving Organic Fertilizer from Coffee Skin Waste With Soil and Bokashi on the Growth of Red Chilli

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ABSTRACT

Organic fertilizer is natural fertilizer that can be obtained directly from nature, for example natural phosphate, manure, green manure and compost. Organic fertilizer can be said to be natural fertilizer because it is the result of the decomposition process of living material, such as plant, animal or other by-products. This research aims to determine the effect of using organic fertilizer, mixed with coffee skin waste, on the growth of chili stems and also the number of leaves on chili plants. The research method used in this research is quantitative descriptive research using the RAL (Completely Randomized Design) method on the growth of red chili plants. The results of this research show that there are significant changes in chili plants that use organic fertilizer mixed with coffee skin waste, and in chili plants without fertilizer. The results of variance testing showed F_{hit} 15 and 20 in plant height growth, while for number of leaves F_{hit} was 560992 and 63438 in a period of 10 days.

Keywords: Chili, organic fertilizer, coffee skin waste, influence

INTRODUCTION

Humans have known organic farming for a long time, since the science of farming was applied by our ancestors. At that time everything was done in the traditional way and using natural ingredients. So it is very important to carry out research on the use of organic materials that can be used to produce nutrients in plants. Indonesia has very large basic capital to develop organic agriculture, because the sales value that will be achieved is based on existing data, so it requires the development of a theoretical review of phenomena that are developing quite rapidly in the world of agriculture, animal husbandry, food and others. Fertilizer is a material that contains one or more nutrients or nutrients for plants which function to support the growth and development of plants. The nutrients needed by plants are C, H, O (listed as abundant in nature), N, P, K, Ca, Mg, S (macro nutrients), and Fe, Mn, Cu, Zn, Cl, Mo, B (micro amount of nutrients), (Ariska & Putra, 2020).

Organic fertilizer is natural fertilizer that can be obtained directly from nature, for example natural phosphate, manure, green manure and compost. Organic fertilizer can be said to be natural fertilizer because it is the result of the decomposition process of living material, such as plant, animal or other by-products. In general, organic materials have a high C/N ratio so that when used directly on agricultural land it affects plant growth because the fermentation process occurs in the soil and it is important to know that organic fertilizers contain more complete microelements than inorganic fertilizers, organic fertilizers will provide viable soil microorganisms. So far, it has been a good friend of farmers, organic fertilizer is able to play a role in mobilizing or bridging nutrients that are already in the soil so that it can form ion particles that are easily absorbed by plant roots, and there are still many advantages of organic fertilizer. (Mau, et al 2019) Coffee has become one of the main commodities in the plantation sub-sector to date. Coffee has an important role in the Indonesian economy. Coffee also has an important role in international trade, currently Indonesia is ranked fourth in the world in coffee exports after Brazil, Vietnam and Colombia. Indonesia was able to export 279.96 thousand tons of coffee in 2018. (Rikza, 2021)

Currently, processing coffee husk waste is not very popular among farmers, they mostly use

coffee husk waste as animal feed or simply throw it away without any prior processing. This could happen due to several factors, the first is due to the lack of public awareness of maintaining environmental cleanliness, from coffee worker waste pollution. The second factor is low public awareness of the knowledge to manage coffee husk waste as compost which has quite high economic value. (Novita, et al 2018) Coffee waste skin has a multitude of benefits for plants. According to Dzung et al. (2013), coffee fruit horn skin contains nitrogen (N) of 1.27%, phosphorus (P) 0.06% and potassium (K) 2.46%. According to Bressani (1979:21) in (Novita, et al. 2018), outer skin waste (pulp) has an N content of 1.94%, P 0.28%, and K 3.61%. Based on the nutrient content of coffee skin waste, there have been several previous studies that used coffee skins to be used as a compost material. One alternative for optimizing coffee skin waste is to make compost. Previous reports show that coffee skin waste contains Nitrogen, Phosphorus, Potassium and Carbon (Novita et al., 2018) so it can be used as fertilizer for plants. Compost fertilizer generally has advantages over synthetic fertilizer. Some of the advantages are that the soil texture becomes better, the pH of the soil increases, macro and micro elements increase, microorganisms in the soil increase and in general it does not cause environmental pollution. (Putra dkk, 2022).

In general, the principle of processing organic waste using composting techniques is the decomposition of organic materials that occur naturally. This decomposition stage can be optimized so that the composting process takes place more quickly and efficiently. One way to optimize composting is to use composting bacteria (Zairinayati & garmini2021). Wonosalam Jombang District is an active and productive coffee farmer. The main problem in coffee fruit processing is the proper handling of solid coffee fruit skin waste. Therefore, innovative bioconversion processing technology is needed so that coffee husk waste becomes high quality and can provide added economic value. One innovation is processing coffee fruit skins into compost, which is environmentally friendly with a multitude of benefits. With the chemical element content of coffee husk waste being quite high, it is very important for the author to carry out this research to make research into a theoretical contribution that is needed in social circles and hopefully it will be useful for society in the future, by utilizing organic fertilizer from coffee husk waste to increase productivity. curly red chilies (*Capsicum annum L.*). Based on these problems, researchers conducted research entitled, The effect of giving organic fertilizer from coffee skin waste and without fertilizer there is growth of red chilies (*Capsicum annum L.*).

METHOD

This research is a quantitative descriptive study with a Completely Randomized Design (CRD) and an experimental approach, using curly red chili plants (*Capsicum annum L.*) as subjects. The procedure includes preparing planting media with two treatments (organic fertilizer from coffee skin waste and no fertilizer), planting seeds, and monitoring periodic growth. The independent variable is the type of fertilization, while the dependent variable includes plant height and number of leaves. Data collection was carried out through direct measurements using a ruler, documentation and interviews if necessary, using a simple random sampling method. Data analysis used ANOVA according to the RAL design to compare growth between treatments. Measurement instruments, specific procedures, and grids (if any) are attached to facilitate research replication.

RESULT AND DISCUSSION

Result

This research shows that it is a gift Organic fertilizer accompanied by coffee skin waste is very effective for the growth of chili plants, which includes tree height, and also the number of leaves on the chili. There are 2 trials to find out What is the difference before and after using organic fertilizer? which is mixed with coffee skin waste and also plants without any fertilizer mixed at all.

Table 1. Organic plant height

| P | u1 | u2 | u3 | u4 | u5 | Total |
|----|------|------|------|------|------|-------|
| o1 | 10 | 10 | 10 | 10 | 10 | 50 |
| o2 | 11 | 11 | 11 | 11 | 11 | 55 |
| o3 | 11,5 | 11,5 | 11,5 | 11,5 | 11,5 | 57,5 |
| o4 | 12 | 12 | 12 | 12 | 12 | 60 |
| o5 | 12,6 | 12,6 | 12,6 | 12,7 | 12,7 | 63,2 |

| | | | | | | |
|---------|-------|-------|-------|------|-------|-------|
| o6 | 13 | 13 | 13,5 | 13 | 13,5 | 66 |
| o7 | 14 | 14 | 14 | 14 | 14 | 70 |
| o8 | 14,5 | 14,8 | 15 | 15 | 15 | 74,3 |
| o9 | 15 | 15 | 15,6 | 15,8 | 15 | 76,4 |
| o10 | 16 | 16 | 16 | 16 | 16,5 | 80,5 |
| Amount | 129,6 | 129,9 | 131,2 | 131 | 131,2 | 652,9 |
| Average | 12,96 | 12,99 | 13,12 | 13,1 | 13,12 | 65,29 |

Source: 2024 Data

Measurement of the height of cayenne pepper plants is carried out at replications 1 to 5. Plant height was measured using ruler in centimeters (cm). The height of the cayenne pepper is measured starting from the base of the stem to the highest point on the stem. This 1st chili treatment uses fertilizer plant media organic mixed with coffee skin waste. The comparison is 3:2, namely 3 kg of drum fertilizer and 2 kg of waste coffee skins mixed evenly. Table 1 shows the average growth in tree height until the 5th repetition is 13.058 cm. This shows that means giving organic fertilizer mixed with Coffee skin waste is quite effective for growing tree height chilli. Apart from that, it also shows that the average is high chili plants without fertilizer with fertilizer a difference of 2cm, which This means that fertilizer is very effective.

Table 2. Plant height without fertilizer

| P | u1 | u2 | u3 | u4 | u5 | Total |
|------|------|------|------|------|------|-------|
| TP1 | 10 | 10 | 10 | 10 | 10 | 50 |
| TP2 | 10,5 | 10,5 | 10,5 | 10,5 | 10,5 | 52,5 |
| TP3 | 12 | 12 | 12 | 10,5 | 12 | 48 |
| TP4 | 12 | 12 | 12 | 11,6 | 12,6 | 60,2 |
| TP5 | 12,7 | 12,7 | 12,7 | 12,5 | 12,6 | 63,2 |
| TP6 | 12,7 | 12,7 | 12,7 | 12,5 | 12,6 | 63,2 |
| TP7 | 13 | 13 | 13 | 13,2 | 13,2 | 65,4 |
| TP8 | 13,5 | 13,5 | 13 | 13,5 | 13,2 | 66,7 |
| TP9 | 13,7 | 13,6 | 13,6 | 13,5 | 13,5 | 67,9 |
| TP10 | 14 | 14 | 14 | 13,7 | 13,7 | 69,4 |
| P | u1 | u2 | u3 | u4 | u5 | Total |
| TP1 | 10 | 10 | 10 | 10 | 10 | 50 |

Source: 2024 data

Measurement of the number of cayenne pepper leaves was carried out at Transfer the cayenne pepper to a polybag until repetition 5. Method Counting the number of leaves on a plant is by counting the number of fully opened leaves. The following is an observation table number of cayenne pepper leaves per treatment.

Table 3. Number of Leaves without fertilizer

| P | u1 | u2 | u3 | u4 | u5 | Total |
|--------|----|----|----|----|----|-------|
| TP1 | 3 | 3 | 3 | 3 | 3 | 15 |
| TP2 | 3 | 3 | 3 | 3 | 3 | 15 |
| TP3 | 3 | 3 | 3 | 3 | 3 | 15 |
| TP4 | 4 | 4 | 4 | 4 | 4 | 20 |
| TP5 | 4 | 4 | 4 | 4 | 4 | 20 |
| TP6 | 4 | 4 | 4 | 4 | 4 | 20 |
| TP7 | 5 | 5 | 5 | 5 | 5 | 25 |
| TP8 | 5 | 5 | 5 | 5 | 5 | 25 |
| TP9 | 5 | 5 | 5 | 5 | 5 | 25 |
| TP10 | 6 | 6 | 6 | 6 | 6 | 30 |
| Amount | 46 | 46 | 46 | 46 | 46 | 230 |

| | | | | | | |
|---------|-----|-----|-----|-----|-----|----|
| Average | 4,6 | 4,6 | 4,6 | 4,6 | 4,6 | 23 |
|---------|-----|-----|-----|-----|-----|----|

Source: 2024 data

Observations on the number of chili leaves were carried out on day 1 of planting chilies in polybags, until the 10th day. Based on the table above, it shows that the number of chili leaves did not increase much, they increased on the 4th day, 7th day and 10th day. And based on the table above, it also shows that the average number of chili leaves over 10 days has increased by 4 pieces.

Table 4. Jumlah Daun organik

| P | u1 | u2 | u3 | u4 | u5 | Total |
|-----------|-----|-----|-----|-----|-----|-------|
| o1 | 3 | 3 | 3 | 3 | 3 | 15 |
| o2 | 3 | 3 | 3 | 3 | 3 | 15 |
| o3 | 3 | 3 | 3 | 3 | 3 | 15 |
| o4 | 4 | 4 | 4 | 4 | 4 | 20 |
| o5 | 4 | 4 | 4 | 4 | 4 | 20 |
| o6 | 5 | 5 | 5 | 5 | 5 | 25 |
| o7 | 5 | 5 | 5 | 5 | 5 | 25 |
| o8 | 6 | 6 | 6 | 6 | 6 | 30 |
| o9 | 6 | 6 | 6 | 6 | 6 | 30 |
| o10 | 7 | 7 | 7 | 7 | 7 | 35 |
| Jumlah | 46 | 46 | 46 | 46 | 46 | 230 |
| Rata-rata | 4,6 | 4,6 | 4,6 | 4,6 | 4,6 | 23 |

Source: 2024 data

The second treatment showed quite significant changes, the use of 3:2 organic fertilizer with a mixture of coffee skin waste, showed changes in the number of chili leaves on the 5th day, 1 day faster than in Table 3. Then, the average number of additional leaves on chili plants was also greater, for 10 days it showed an average of 7 additional leaves.

Discussion

The most important thing studied by researchers is plant height. Plant height plays a very important role in the growth of chilies. As stated by Lakitan (2000), increasing plant height is a physiological process in which cells divide. If the plant height is not normal/not good, then one of the reasons is the application of fertilizer.

Table 5. Sidik ragam Tinggi tanaman

| Sk | db | Jk | kt | Fhit | f5% | f1% | Notasi |
|---------|----|----------|--------|----------|------|------|--------|
| n(o,tp) | 1 | 22 | 22 | 15 | 3.96 | 6.96 | ** |
| W | 9 | 270 | 30 | 20 | 2.00 | 2.64 | ** |
| Nw | 9 | 16 | 2 | 1,236776 | 2.00 | 2.64 | |
| Galat | 80 | 117,484 | 1,4686 | | | | |
| Total | 99 | 425,5564 | | | | | |

Description: ** (very significant difference), * (significant difference), Tn (not significant)

The results of the analysis of variance in the table above show that the application of coffee husk compost to the planting medium at a dose of 90 g has a significant effect on the growth of chilies as evidenced by the results in the table above that Fhit 15 is greater than F table 3.96/6.96 (5 %/1%). This is because the addition of coffee husk compost also provides maximum growth and development for chilies, so it will affect the fresh weight of the plant. Treatment of organic compost mixed with coffee skins provides plant height and number of leaves, although the ratio of the two is not too far off. Coffee skin compost contains N 2.443%, P 0.286% and K 2.9% (Afrizon, 2015). The nitrogen content in coffee husk compost functions as a protein-forming material, while calcium and phosphorus play a role in stimulating the growth of leaves and roots and encouraging the division of meristem tissue (Ayub, 2010). According to Purnomo., cit Polta and Subagiyono (2018), the availability of sufficient nutrients and a porous soil structure can stimulate overall growth, especially stem growth, which affects plant height. Apart from that, Hartati, et al (2019) also explained that nutrients have a very important role in the energy formation process in glycolysis and photosynthesis which is used to increase plant growth. Providing doses of organic fertilizer and coffee skin waste is able to grow plants to the maximum, this is in accordance with research by Berlian et al., (2015).

The main photosynthetic organs for plants are leaves, which are not important for plant height. This is because the number of leaves is related to the height of the plant, because the taller the plant, the more leaves it forms. Dede et al (2015).

Table 6. Check the variety of leaf numbers

| Sk | db | Jk | Kt | Fhit | f5% | f1% | Notasi |
|---------|----|--------|-------|---------|------|------|--------|
| n(o,tp) | 1 | 14025 | 14025 | 560992 | 3.96 | 6.96 | ** |
| W | 9 | 14273 | 1586 | 63438 | 2.00 | 2.64 | ** |
| Nw | 9 | -28167 | -3130 | -125186 | 2.00 | 2.64 | |
| Galat | 80 | 2 | 0,025 | | | | |
| Total | 99 | 133,39 | | | | | |

Description: ** (very significant difference), * (significant difference), Tn (not significant)

The results of the analysis of variance in the table above show that the application of organic fertilizer with coffee husk compost in the planting medium has a significant influence on the number of chili leaves as proven by Fhit 560992 greater than F table 3.96/6.96 (5%/1 %). This is because coffee husk compost is able to provide the nutrients that plants need to grow, so that the dry weight of the plants increases. Jumin (2002) stated that the production of plant dry weight, which is the result of the accumulation of assimilate through the processes of photosynthesis, respiration and accumulation of organic compounds, is greatly influenced by the availability of nutrients. The availability of P content in coffee husk compost which is absorbed by red chili plants can stimulate the emergence of flowers more quickly. According to Lingga and Marsono (2007) stated that to speed up the flowering process, sufficient and balanced nutritional availability is needed, especially phosphorus (P), which can stimulate the flowering process.

CONCLUSIONS

According to research that has been carried out by researchers, it can be concluded that organic fertilizer from coffee skin waste has a very significant effect on the growth of chilies and Best treatment using variance data from plant height and number of leaves. The best treatment with variance results showed that the effect was very significant on the growth of red chilies (*Capsicum annum L.*)

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