Haumeni Journal of Education
Volume 3, No. 2, Desember 2023, Hal. 44-55 (e-ISSN 2798-1991)
Available online at https://ejurnal.undana.ac.id/haumeni/

The Effect of Using Liquid Organic Fertilizer Based on Organic Waste on the Growth and Production of Chili Plants (Capsicum frutescens)

Mario Justinianus Santrum[1]*, Moses Kopong Tokan[2], Viviana Ningsi Mella[3]
[1,2,3]Department of Biological Education, Nusa Cendana University, Indonesia

*E-mail: mariosantrum59@gmail.com

ARTICLE INFO

Article history
Received: July 27, 2023
Accepted: Dec 20, 2023

Keywords
Chili plants, Growth, POC

ABSTRACT

Penelitian ini bertujuan untuk mengetahui perbedaan pengaruh dari penggunaan pupuk organik cair berbahan dasar limbah organik dengan konsentrasi yang berbeda terhadap pertumbuhan dan produksi tanaman cabai dan signifikansi perbedaan pengaruh di antara rata-rata perlakuan. Penelitian ini merupakan penelitian eksperimen, menggunakan rancangan acak lengkap yang terdiri dari 5 perlakuan dan 4 ulangan pada setiap perlakuan, sehingga keseluruhannya ada 20 satuan percobaan. Perlakuan terdiri dari konsentrasi pupuk organik cair 0 ml, 50, 100, 150, dan 200 ml. Parameter pertumbuhan dan produksi tanaman cabai yang diukur meliputi tinggi batang, jumlah daun, jumlah buah, dan berat basah buah. Data hasil pengukuran dianalisis menggunakan ANOVA dan jika ada perbedaan pengaruh, maka dilanjutkan dengan uji BNJ pada α 5 % untuk mengetahui signifikansi perbedaan pengaruh di antara rata-rata perlakuan. Hasil uji ANOVA menunjukan bahwa Fhitung dari semua parameter pengukuran > Ftabel pada α 5 %. Hal ini menunjukan bahwa hipotesis alternatif diterima, yang berarti, ada perbedaan pengaruh dari pemberian pupuk organik cair dengan konsentrasi yang berbeda terhadap pertumbuhan dan produksi tanaman cabai. Hasil uji lanjut dengan menggunakan uji BNJ memperlihatkan bahwa perbedaan konsentrasi pupuk organik cair berbahan dasar limbah organik belum cukup berbeda untuk memberikan perbedaan pengaruh yang nyata terhadap pertumbuhan dan produksi tanaman cabai.

This study aims to determine the differences in effect of using liquid organic fertilizer based on organic waste with different concentrations on the growth and production of chili plants and the significance of the differences in effect between the treatment means. This study is an experimental study, using a completely randomized design consisting of 5 treatments and 4 replications for each treatment, so that there were 20 experimental units. The treatments consisted of liquid organic fertilizer concentrations of 0 ml, 50, 100, 150 and 200 ml. Parameters of growth and production of chili plants that were measured included stem height, number of leaves, number of fruit, and fruit fresh weight. The data were analyzed using ANOVA and then continued with the BNJ test at a 5% to determine the significance of the differences in effect between the treatment means. The results of the ANOVA test showed that Fcount of all measurement parameters > Ftable at a 5%. These show that the alternative hypothesis are accepted, which means that there are different effects of liquid organic fertilizer with different concentrations on the growth and production of chili plants. The results of the BNJ test showed that the differences in concentrations of liquid organic fertilizer made from organic waste were not different enough to have a significant effect on the growth and production of chili plants.

How to Cite: Santrum, M. J, Tokan M. K., Mella V. N. (2023). The effect of using liquid organic fertilizer based on organic waste on the growth and production of chili plants (Capsicum frutescens). *Haumeni Journal of Education*, 3(2), 44-55.

PENDAHULUAN

Based on a report from the Central Statistics Agency (BPS), the Indonesian economy in the third quarter of 2020 on November 5 2020, out of 17 existing business fields, 7 sectors are still growing positively despite slowing down, including information and communication, agriculture, government administration, education services, real estate, health services, water supply, and waste management. This is good news because waste management is one of the business sectors that has been resilient during the COVID-19 pandemic. National waste care day is celebrated every February 21 to remind the Indonesian people that the waste problem must be a major concern that involves all components of society in its management. National waste care day 2021 is used as a platform to strengthen the position of the waste management sector as a driver of Indonesia's economic growth as well as an embodiment of one of the principles of sustainable waste management and waste as a source of energy (Menteri Lingkungan Hidup dan Kehutanan, 2021). On the other hand, waste if not handled immediately will cause environmental pollution and interfere with human health. Waste are all non-consumable materials originating from human activities, be it from households, the economy, and development. This waste can be in the form of inorganic or organic materials and can be in solid or liquid form. Most of the organic waste in solid form comes from household and development activities such as leftovers from food and building materials. Leftovers from food ingredients, both raw and processed, and building materials can be used as basic ingredients in the process of making liquid organic fertilizer.

Liquid organic fertilizer (POC) is a type of fertilizer in the form of a solution obtained from the decay (fermentation) of organic materials (Widyabudiningsih, et.al, 2021). Liquid organic fertilizer contains nutrients that are used by plants for growth and production. Fermentation is a process of chemical change in an organic substrate through the activity of enzymes produced by microorganisms. The material that is a source of microorganisms is EM4 (effective microorganisms 4). EM4 is a solution resulting from natural selection of fermented and synthetic microorganisms in the soil, containing fermented microorganisms from the genera Lactobacillus and Saccharomyces, besides that it also contains nitrogen fixing bacteria (N), phosphorus dissolving bacteria (P), phytohormone producing bacteria, and organic matter containing cellulose and lignin decomposing bacteria (Sulistyorini, 2005). EM4 is able to increase soil fertility and plant productivity. Therefore, EM4 is very suitable to be used as a mixture in the process of making liquid organic fertilizer. The activity of microorganisms (bacteria and fungi) contained in EM4 will change complex compounds from the basic organic ingredients for making fertilizers into simpler organic elements or molecules that are ready or easy for plants to absorb. The use of liquid organic fertilizer, in addition to increasing soil fertility and crop productivity, also requires a relatively low cost.

According to the Study Center of Domestic Trade (2021), the price of cayenne pepper on the domestic market in December 2021 has increased by 117.13% or Rp. 81,565/kg when compared to November 2021 of Rp. 37,608/kg. This price also increased by 51.12% from the previous price in

November 2020. In general, prices for basic necessities at the beginning of December were relatively stable. However, there were three commodities that experienced significant price increases when compared to November. The commodities are chili, cooking oil, and eggs. According to the Minister of Agriculture, the current increase in the prices of a number of food commodities is not related to a shortage of stocks because the availability of staple foods such as chilies, shallots and eggs is in a safe condition. Price spikes are caused more by big events such as Christmas and New Year and the dynamics are the same as during Ramadan and Idul Fitri. According to the Director General of Horticulture, Ministry of Agriculture, several reasons for the increase in the price of various chilies include extreme rainfall which has continued to occur since early November resulting in reduced yields for farmers. In other words, production is not optimal resulting in a decrease in inventory. In addition, the increase in chili consumption was also due to the improved handling of Covid 19 in all regions and the tourism sector and public entertainment venues had started (Pusat Pengkajian Perdagangan Dalam Negeri, 2021).

Apart from the dynamics of chili prices in the trade market, it is better for the public to know how to make liquid organic fertilizer which is relatively cheap and its effect on plant growth and soil fertility. With the community's knowledge and skills in making liquid organic fertilizer, the community helps reduce the problem of household organic waste by turning it into energy for plant growth and soil fertility as well as being able to overcome the problem of increasing chili or vegetable prices in the market related to the family economy. The results of this study are expected to provide information to the public about differences in plant growth between plants that were not given liquid organic fertilizer and plants that were given liquid organic fertilizer. For that purpose, this research was carried out.

METODE

Organic waste is a type of waste that comes from parts of plants and animals or even whole bodies of plants and animals that are no longer used. This means that fallen leaves and branches, fallen trees, tree fellings, animal skins, animal fur or hair, animal manure, and dead animals constitute organic waste. Almost all living things have bodies whose main framework is carbon chains. Therefore, waste that comes from living things is said to be organic waste because it contains this carbon skeleton. The household organic waste used in this study is the remains of organic matter that is still in its raw form originating from household activities in the food manufacturing process, such as waste mustard greens, banana peels and egg shells.

The liquid organic fertilizer (POC) made in this experiment is a liquid organic fertilizer made from waste mustard greens, banana peels and egg shells. The process of making solid and liquid organic fertilizers from household organic waste using a composter according to Mardwita et al. (2019) are as follows: mustard vegetable waste and banana peels are cut into small pieces, while egg shells are crushed using a blender. Pieces of mustard greens and banana peels as well as crushed egg

shells are put into the composter. The waste in the composter is then sprayed with diluted EM4 activator using a sprayer. The composter is then tightly closed. Spraying with EM4 activator was carried out again when the new waste that had been cut into pieces was put back into the composter. This activity is repeated until the composter is full. After the composter is tightly closed, let it stand or store it for approximately 21 days for the fermentation process by the EM4 activator. After 21 days, the black solid waste is removed and dried. This waste can be used as solid organic fertilizer. The leachate produced from the fermentation process is removed from the composter by opening the composter tap. This leachate is used as liquid organic fertilizer (POC). The nutrients that can be found in POC include macro nutrients such as nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), carbon (C), and sulfur (S) and micro nutrients such as chlorine (Cl), iron (Fe), manganese (Mn), iodine (I), zinc (Zn), selenium (Se), and copper (Cu) (Hadisuwito, 2012).

This research was conducted in a private house, Sukun Street 1, Oepura Village, Maulafa District, Kupang City, from August 2021 to February 2022. This research was an experimental study (experimental) using a completely randomized design (CRD) consisting of 5 treatments and 4 repetitions for each treatment, so that in total there were 20 experimental units. The treatment consisted of liquid organic fertilizer concentrations of 0 ml (control), 50 ml, 100 ml, 150 ml and 200 ml. Parameters of growth and production of chili plants that were measured included stem height, number of leaves, number of fruits, and fruit fresh weight. The measured data were analyzed statistically using analysis of variance (ANOVA) to determine whether there were differences in effect between the average treatments (Gaspersz, 1991), and if there were differences in effect, the analysis was continued with honestly significant difference (HSD) test at the level of confidence 95% (5% error) to find out how far the difference in effect is between the average treatments (Gaspersz, 1991).

HASIL DAN PEMBAHASAN

Height of Chili Plant Stems (Capsicum frutescens)

The results of measuring the height of the chili plant stems can be seen in table 1 below.

Table 1. Data on the height of chili plant stems in each treatment.

Treatment	Repetition				Average
	1	2	3	4	
P0 (control)	73	69	67	69,3	69,575
P1 (50 ml)	74	83,3	79	70	76,575
P2 (100 ml)	72	97	80	87,3	84,075
P3 (150 ml)	79	93,3	81	84	84,325
P4 (200 ml)	87,5	92	99,3	88	91,7

Based on table 1 above, it is known that the treatment with the lowest average height of the chili plant stems was the P0 treatment of 69.575 and the highest was the P4 treatment of 91.7. From table 1, it can also be seen that the higher the concentration of POC used, the higher the average height of the chili plant stems produced.

The results of the analysis of variance on the average height of the chili plant stems from the five

treatments above can be seen in table 2 below.

Table 2. Results of the analysis of variance on the average height of the chili plant stems

Source of Diversity	Degrees of Freedom	Sum of Squares	Middle Square	F_{count}	F_{table} 5%	F_{table} 1%
Treatment	4	1139.2	284.8	6.387**	3.09	4.89
Error	15	668.85	44.59			
Total	19	1808.05				

Based on table 2 above, it is known that $F_{count} > F_{table}$, both for the error level (α) of 5% and 1%. This shows that the alternative hypothesis is accepted, which means that there are differences in the effect of POC treatments with different concentrations (P0, P1, P2, P3, P4) on the average height of the chili plant stems produced, both for α 5% and α 1%.

The results of further test by the honestly significant difference (HSD) to seek the extent of these differences in effect exist between treatments on the average height of the chili plant stems can be seen in table 3 below.

Table 3. Results of the HSD test on the height of the chili plant stems

Treatment	Average	HSD	Symbol
P0 (control)	69,575		a
P1 (POC 50 ml)	76,575		ab
P2 (POC 100 ml)	84,075	13,622	bc
P3 (POC 150 ml)	84,325		bc
P4 (POC 200 ml)	91,7		c

Note: numbers followed by the same letter do not show a significant difference at α 5%

Based on table 3 above, it is known that P0 treatment was not significantly different from P1 treatment but significantly different from P2, P3, and P4 treatments. Meanwhile, P1 treatment was not significantly different from P2 and P3 treatments but significantly different from P4 treatment. Meanwhile, the P4 treatment was not significantly different from the P3 and P2 treatments. So in general, it can be concluded that there are no significant differences in the effect that existed between all treatments on the average height of the chili plant stems.

Number of Chili Plant Leaves (*Capsicum frutescens*)

The results of calculating the number of chili plant leaves can be seen in table 4 below.

Table 4. Data on the number of chili plant leaves in each treatment

Treatment	Replication				Average
	1	2	3	4	
P0 (control)	41	43	32	43	39,75
P1 (50 ml)	48	49	49	44	47,5
P2 (100 ml)	53	48	61	49	52,75
P3 (150 ml)	60	63	55	59	59,25
P4 (200 ml)	66	61	55	62	61

Based on table 4 above, it is known that the treatment with the lowest average number of chili plant leaves was the P0 treatment of 39.75 and the highest was the P4 treatment of 61. From this table 1, it can also be seen that the higher the concentration of POC used, the more the average height of the

number of chili plant leaves produced.

The results of the analysis of variance on the average number of the chili plant leaves produced from the five treatments above can be seen in table 5 below.

Table 5. Results of the analysis of variance on the average number of chili plant leaves

Source of Diversity	Deegre of Freedom	Sum of Squares	Middle Square	F_{count}	F_{table} 5%	F_{table} 1%
Treatment	4	1217.7	304.25	15.259**	3.09	4.89
Error	15	299.25	19.95			
Total	19	1516.95				

Note: ** = Very significant effect ($F_{count} > F_{table}$)

Based on table 5 above, it is known that $F_{count} > F_{table}$, both for the error level (α) of 5% and 1%. This shows that the alternative hypothesis is accepted, which means that there are differences in the effect of POC treatments with different concentrations (P0, P1, P2, P3, P4) on the average number of chili plant leaves produced, both for α 5% or α 1%.

The results of further test by the honestly significant difference (HSD) to seek the extent of these differences in effect exist between treatments on the average number of the chili plant leaves can be seen in table 6 below.

Table 6. Results of the HSD test on the number of the chili plant leaves

Treatment	Average	HSD	Symbol
P0 (control)	39,75		a
P1 (POC 50 ml)	47,5		ab
P2 (POC 100 ml)	52,75	9,11	bc
P3 (POC 150 ml)	59,25		bc
P4 (POC 200 ml)	61		c

Note: numbers followed by the same letter do not show a significant difference at α 5%

Based on table 6 above, it is known that P0 treatment was not significantly different from P1 treatment but significantly different from P2, P3, and P4 treatments. Meanwhile, treatment P1 was not significantly different from P2 and P3 treatments but significantly different from P4 treatment. Meanwhile, the treatment P4 was not significantly different from the P3 and P2 treatments. So in general, it can be concluded that there are no significant differences in the effect that exists between all treatments on the average number of the chili plant leaves produced

Number of Chili Plant Fruits (Capsicum frutescens)

The results of calculating the fruit number of chili plant can be seen in table 7 below.

Table 7. Data on the number of chili plant fruits in each treatment

Treatment	Replication				Average
	1	2	3	4	
P0 (control)	34	31	23	19	26,75
P1 (50 ml)	67	50	45	32	48,5
P2 (100 ml)	41	35	55	66	49,25
P3 (150 ml)	56	47	53	63	54,75
P4 (200 ml)	68	75	42	58	60,75

Based on table 7 above, it is known that the treatment with the lowest average number of chili plant

leaves was the P0 treatment of 26,75 and the highest was the P4 treatment of 60,75. From this table 7, it can also be seen that the higher the concentration of POC used, the more the average height of the number of chili plant leaves produced.

The results of the analysis of variance on the average number of the chili plant fruits produced from the five treatments above can be seen in table 8 below.

Table 8. Results of the analysis of variance on the number of the chili plant fruits

Source of Diversity	Degree of Freedom	Sum of Squares	Middle Square	F_{count}	F_{table} 5%	F_{table} 1%
Treatment	4	2646	661.5	4.712**	3.09	4.89
Error	15	2106	140,4			
Total	19	4752				

Note: ** = Very significant effect ($F_{count} > F_{table}$)

Based on table 8 above, it is known that $F_{count} > F_{table}$ for error level (α) of 5%, but $F_{count} < F_{table}$ for error level (α) of 1%. This shows that the alternative hypothesis is accepted for α 5%, which means that there is a difference in the effect of POC treatments with different concentrations (P0, P1, P2, P3, P4) on the average number of chili plant fruits produced. However, for α 1%, there was no difference in effect between treatments.

The results of further test by the honestly significant difference (HSD) to seek the extent of these differences in effect exist between treatments on the average number of the chili plant fruits can be seen in table 9 below.

Table 9. Results of the HSD test on the number of the chili plant fruits

Treatment	Average	HSD	Symbol
P0 (kontrol)	26,75		a
P1 (POC 50 ml)	48,5		ab
P2 (POC 100 ml)	49,25	24,17	ab
P3 (POC 150 ml)	54,75		bc
P4 (POC 200 ml)	60,75		c

Note: numbers followed by the same letter do not show a significant difference at α 5%

Based on table 9 above, it is known that P0 treatment was not significantly different from P1 and P2 treatments but significantly different from P3 and P4 treatments. Meanwhile, treatment P1 was not significantly different from P2 and P3 treatments but significantly different from P4 treatment. Meanwhile, the treatment P4 was not significantly different from the P3 treatments. So, in general, it can be concluded that there are no significant differences in the effect that exists between all treatments on the average number of the chili plant leaves produced.

Fresh Weight of Chili Plant Fruits

The results of measuring the wet weight of chili fruit can be seen in table 10 below.

Table 10. Data on the fresh weight of chili plant fruits in each treatment

Treatment	Replication				Average
	1	2	3	4	
P0 (control)	23	27	19	19	22
P1 (50 ml)	51	28	28	15	30,5

Treatment	Replication				Average
	1	2	3	4	
P2 (100 ml)	33	26	34	37	32,5
P3 (150 ml)	49	26	39	44	39,5
P4 (200 ml)	53	67	33	49	50,5

Based on table 10 above, it is known that the treatment with the lowest average number of chili plant fruits was the P0 treatment of 22 and the highest was the P4 treatment of 50,5. From this table 10, it can also be seen that the higher the concentration of POC used, the more the average height of the fresh weight of the chili plant fruits produced.

The results of the analysis of variance on the average fresh weight of the chili plant fruits produced from the five treatments above can be seen in table 11 below.

Table 11. Results of the analysis of variance on the fresh weight of the chili plant fruits

Source of Diversity	Degree of Freedom	Sum of Squares	Middle Square	F_{count}	F_{table} 5%	F_{table} 1%
Treatment	4	1824	456	4.116**	3.09	4.89
Error	15	1662	110,8			
Total	19	3486				

Note: ** = Very significant effect ($F_{count} > F_{table}$)

Based on table 11 above, it is known that $F_{count} > F_{table}$ for the error level (α) of 5%, but $F_{count} < F_{table}$ for the error level (α) of 1%. This shows that the alternative hypothesis is accepted for α 5%, which means that there is a difference in the effect of POC treatments with different concentrations (P0, P1, P2, P3, P4) on the average fresh weight of the chili plant fruits produced. However, for α 1%, there was no difference in effect between treatments.

The results of further test by the honest significant difference (HSD) to seek the extent of these differences in effect exist between treatments on the average fresh weight of the chili plant fruits can be seen in table 12 below.

Table 12. The results of the HSD test on the fresh weight of the chili plant fruits

Treatment	Average	HSD	Symbol
P0 (control)	22		a
P1 (POC 50 ml)	30,5		ab
P2 (POC 100 ml)	32,5	21,47	ab
P3 (POC 150 ml)	39,5		ab
P4 (POC 200 ml)	50,5		b

Based on table 12 above, it is known that the P0 treatment was not significantly different from the P1, P2, and P3 treatments but was significantly different from the P4 treatment. Meanwhile, the P4 treatment was not significantly different from the P1, P2, and P3 treatments. So, in general it can be concluded that there are no significant differences in the effect of using POC with different concentrations on the average fresh weight of the chili plant fruits produced.

To simplify the discussion, it is necessary to display a diagram of the average measurement results such as below.

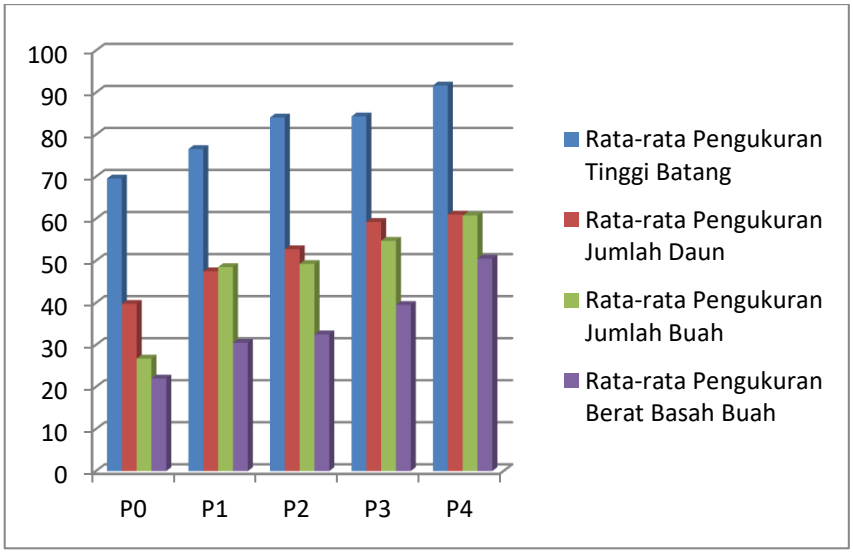

Figure 1. Diagram of the average measurement results for all measurement parameters

If seen from the diagram above, it can be seen that there are differences in the average of measurement results between all treatments (P0, P1, P2, P3, and P4) in all measurement parameters. Also from this diagram, it can be seen that the higher the concentration of liquid organic fertilizer (POC) used, the higher the average measurement results from one treatment to another for all measurement parameters. From the results of these measurements, it can be concluded that there is an effect of using liquid organic fertilizer based on organic waste with different concentrations on the growth and production of chili plants (*Capsicum frutescens*).

To strengthen this temporary conclusion, a statistical test of analysis of variance (ANOVA) was carried out through the use of the SPSS program to see if there were differences in the effect of using liquid organic fertilizer with different concentrations (P0, P1, P2, P3, P4) on the growth and production of chili plants (*Capsicum frutescens*). The results of the analysis of variance with an error level (α) of 5% show that $F_{count} > F_{table}$ for all measurement parameters (see Tables 2, 5, 8, 11), which means that null hypothesis is rejected and alternative hypothesis are accepted. If alternative hypothesis is accepted, then the treatments of liquid organic fertilizer made from organic waste with different concentrations have different effects on the growth and production of chili plants (through parameters measuring, stem height, number of leaves, number of fruits, and fruit fresh weight). The results of this ANOVA test can only see whether there is a difference in effect between treatments and in fact there are differences in effect.

However, to see the extent to which the significance of the differences in effect exists between treatments for each measurement parameter, it is necessary to carry out further tests (in this case the HSD) with an error level (α) of 5%. Further test results showed that, in general, there were no significant differences in effect between all treatments (P0, P1, P2, P3, P4) on all measurement parameters, both stem height, number of leaves, number of fruits and fruit fresh weight of chili plants (*Capsicum frutescens*) (see table 3, 6, 9, 12). Based on the results of the ANOVA test, it was generally

concluded that there were differences in effect between the treatments on the growth and production of chili plants but based on the results of the HSD test, the differences in effect were not significant. So in conclusion, there were no significant differences in the effect between treatments (different concentrations of POC) on the growth and production of chili plants (*Capsicum frutescens*). In other words, the different concentrations of liquid organic fertilizer made from organic waste did not have significantly different effect on the growth and production of chili plants.

One of the factors causing this phenomenon to occur is the difference in the concentration of the liquid organic fertilizer used is not large enough to have a significantly different effect on the growth and production of chili plants. This conjecture is based on the measurement results that there are differences in the average measurement results between treatments on all parameters of plant growth and production that are measured (see tables 1, 4, 7, 10). One way to overcome this problem is to increase the difference in the concentration of liquid organic fertilizer between one treatment and another. For example, from control (P0) with a POC concentration of 0 ml to treatment 1 (P1) with a POC concentration of 100 ml, from P1 to treatment 2 (P2) with a POC concentration of 200 ml, from P2 to treatment 3 (P3) with a POC concentration of 400 ml, then from P3 to treatment 4 (P4) with a POC concentration of 800 ml. So, the following treatment is multiplied from the previous treatment. By doubling the difference in concentration of POC solution between treatments, it will increase the difference in nutrient content in POC between treatments, so it is expected that the difference in the effect of different POC concentrations on the growth and production of chili plants (*Capsicum frutescens*) will become significant (significant).

Another possible causal factor is the length of time the organic waste is fermented by microorganisms-fermentation (EM4). The possible time of 21 days for the fermentation of organic waste by microorganisms-fermentation in this study is not long enough to produce maximum nutrients to be used in the photosynthesis process for the growth and production of chili plants. Rosmawati, Mustakin, and Fajarfika (2021) in their research on the effect of the concentration and duration of fermentation of kirinyuh leaf liquid organic fertilizer (*Chromolaena odorata* L) on the growth and production of cucumber plants (*Cucumis sativus* L) found that the treatment combinations that had a better (significant) difference in effect on the growth and production of cucumber plants when compared to other treatment combinations were a3n3 (7,2), a3n4 (7,2), a4n3 (7,2), and a4n4 (7,2). 2) for the parameter of the number of leaves; a3n4 (6) and a4n4 (6.05) for the number of fruit parameters; a3n3 (160.06), a3n4 (231.63), a4n3 (154.37), and a4n4 (259.18) for fruit weight parameters; a3n4 (2.25) and a4n4 (4.02) for fruit diameter parameters, where a3 and a4 are 30% and 40% POC concentrations of kirinyuh leaves, while n3 and n4 are 30 days and 40 days of fermentation (Rosmawati, Mustakin, and Fajarfika, 2021). These findings indicate that the longer the organic waste fermentation time and the higher the POC concentration, the better the plant growth and production. However, keep in mind that the longer the fermentation time of organic waste will not continue to increase the concentration or amount of nutrients contained in POC if it reaches a certain threshold. A

certain time threshold is intended as a certain time when the energy source for decomposing microorganisms to work is dwindling or even depleted and the increasing abundance of individual decomposing microorganisms due to the reproduction of decomposer microorganisms will become a limiting factor for decomposers microorganisms to work in the process of decomposing organic waste into nutrient elements (Meriatna, Suryati, dan Fahri, 2018). So that the nutrient content produced at and after a certain time threshold tends to be stable or even decreases. In addition, excess nutrient content or POC concentrations that are too concentrated will inhibit the absorption of the nutrients themselves and water which is needed in the process of photosynthesis, so that the growth of the plant itself will be disrupted (Rahmah, Izzati, & Parman, 2014).

From the results of this study, it is suggested to other researchers who wish to see the different effects of different POC concentrations on plant growth and production to double the differences in POC concentrations between treatments. So, it is expected that the results of the analysis of the average measurement results from the treatments given will show a significantly (significant) different in effect.

SIMPULAN

From the results of this study, it can be concluded that the differences in the concentration of liquid organic fertilizer made from organic waste used in this study are not different enough to have a significantly different effect on the growth and production of chili plants (Capsicum frutescens).

DAFTAR PUSTAKA

Menteri Lingkungan Hidup Dan Kehutanan. (2021). *Surat Edaran Tentang Hari Peduli Sampah Nasional 2021*. Kementerian Lingkungan Hidup Dan Kehutanan Republik Indonesia. Jakarta.

Widyabudiningsih, D., et.al. (2021). Pembuatan Dan Pengujian Pupuk Organik Cair Dari Limbah Kulit Buah-buahan Dengan Penambahan Bioaktivator EM4 Dan Variasi Waktu Fermentasi. *Indonesian Journal Of Chemical Analysis*, 4(1), 30-39.

Sulistyorini, L. (2005). Pengelolaan Sampah Dengan Cara Menjadikannya Kompos. *Jurnal Kesehatan Lingkungan Unair*, 2 (1), 3951.

Pusat Pengkajian Perdagangan Dalam Negeri. (2021). *Analisis Perkembangan Harga Bahan Pangan Pokok Di Pasar Domestik Dan Internasional*. Kementerian Perdagangan Republik Indonesia. Jakarta.

Mardwita, et. al. (2019). Pembuatan Kompos Dari Sampah Organik Menjadi Pupuk Cair dan Pupuk Padat Menggunakan Komposter. *Jurnal Ilmiah Pengabdian Kepada Masyarakat*, 1 (2), 80-83.

Hadisuwito, S. (2012). *Membuat Pupuk Cair*. PT. Agromedia Pustaka.

Gaspersz, V. (1991). *Metode Perancangan Percobaan Untuk Ilmu-ilmu Pertanian, Ilmu-ilmu Teknik, Dan Biologi*. CV. Armico. Bandung.

Rosmawati, S., Mutakin, J., dan Fajarfika, R. (2021). Pengaruh Konsentrasi Dan Lama Fermentasi Pupuk Organik Cair Daun Kirinyuh (Chromolaena Odorata L.) Terhadap Pertumbuhan Dan Produksi Tanaman Mentimun (Cucumis sativus L.). *Jurnal Agroteknologi Dan Sains*. Fakultas Pertanian. Universitas Garut.

Meriatna, Suryati, dan Fahri, A. (2018). Pengaruh Waktu Fermentasi Dan Volume Bio Aktivator EM_4 (Effective Microorganisme) Pada Pembuatan Pupuk Organik Cair (POC) Dari Limbah Buah-buahan. *Jurnal Teknologi Kimia Unimal*, 7(11), 13-29.

Rahmah, A., Izzati, M., dan Parman, S. (2014). Pengaruh Pupuk Organik Cair Berbahan Dasar Limbah Sawi Putih (Brassica chinensis L.) Terhadap Pertumbuhan Tanaman Jagung Manis (Zea mays L. var. Saccharata). *Buletin Anatomi Dan Fisiologi*. Jurusan Biologi. Fakultas Sains Dan Matematika. Universitas Diponegoro.