Agricultural Revolution Journal
https://ejournal.cibnusantara.org/agrivolution
E- ISSN: 3108-9062

Increased Growth and Production of Chilli (*Capsicum Frutescens* L.) with The Addition of Biological Organic Fertilizer

Yenisbar [1*], Asmah Yani [1], Hasni Ruslan [2], Arief Wicaksono [1]

[1] Program Study of Agrotechnology, National University, South Jakarta, Indonesia
[2] Program Study of Biology, National University, South Jakarta, Indonesia

* Correspondence e-mail: yenisbar.chaniago@gmail.com

Article history:
Received : August 4th, 2025
Accepted : October 18th, 2025
Published : November 10th, 2025

DOI : https://doi.org/10.64570/agrivolution.v1i2.29

Cayenne pepper (*Capsicum frutescens* L.) is a high-value horticultural crop, yet its productivity in Indonesia remains below potential despite increasing demand. Biofertilizers provide a sustainable approach to enhancing chili growth and yield, while reducing reliance on chemical fertilizers and preserving soil health. The purpose of this study was to determine the optimal dose and fertilization frequency of Beyonic StarT-mik organic biological fertilizer in enhancing the growth and production of chili (*Capsicum frutescens* L.). The experiment was conducted from April to December 2020 at the Greenhouse, Faculty of Agriculture, Universitas Nasional, Bambu Kuning, Pasar Minggu, South Jakarta. A factorial Completely Randomized Design (CRD) was employed with two treatment factors, namely fertilizer dose (D0 = control, D1 = 10 ppm, D2 = 20 ppm, D3 = 30 ppm, and D4 = 40 ppm) and fertilizer application frequency (F1 = once a week and F2 = once every two weeks). Observed variables included plant height, stem diameter, dichotomous height, fruit length, fruit diameter, fruit weight per plant, and fruit number per plant. Data were analyzed using analysis of variance (ANOVA) followed by Duncan's Multiple Range Test (DMRT) at a 5% significance level. The results showed that the highest plant height was obtained at a dose of 30 ppm, while the greatest stem diameter and dichotomous height were achieved at 40 ppm with weekly application. Optimal fruit length, diameter, and fruit weight per plant were recorded at a dose of 40 ppm, whereas the highest fruit number and overall yield were observed at 30 ppm, indicating that moderate fertilizer doses are more effective in optimizing chili productivity. This study is essential to establish scientifically sound fertilization strategies, as improper dosage and application frequency of bio-organic fertilizers can reduce yields and hinder sustainable chili production.

Keywords: Beyonic StarT-mik; biological organic fertilizer; frequency; fruit weight.

1. INTRODUCTION

Cayenne pepper (*Capsicum frutescens* L.) is a horticultural crop belonging to the Solanaceae family, recognized for its high economic value and wide utilization due to its brightly colored fruits, distinctive aroma, and rich nutritional content. Chili fruits contain a variety of bioactive compounds, including capsaicinoids, carotenoids, flavonoids, and vitamin C (Alonso-Villegas *et al.*, 2023). The concentration of these nutritional and bioactive components not only determines the organoleptic properties (such as flavor and color) but also underpins the use of chili in food, pharmaceutical, and functional product industries (Guilherme, 2020). The levels of these compounds vary depending on the species, variety, ripening stage, and cultivation practices. In general, bird's eye chili contains nutrients such as fat, protein, carbohydrates, calcium, phosphorus, and iron, along with vitamins A, B1, B2, and C. It also comprises alkaloid compounds, including capsaicin, oleoresin, flavonoids, and essential oils (Sujitno & Dianawati, 2015).

Chili peppers serve more than only as vegetables. Chili peppers are valued as ingredients in the culinary, beverage, and pharmaceutical industries due to their numerous benefits. In reality, chili, with its high vitamin A content, is not only good for eye health but also quite helpful at treating sore throats because of its fiery taste (it includes capsicol, a high-concentration essential oil). Chili can replace rubbing oil in treating pains, rheumatism, shortness of breath, and itching. Chili's pungent fragrance is also used to treat cold-related sore throats and polio. According to Narang (2017), capsaicin has been shown to exert anti-obesity, antidiabetic, and antioxidant effects, as well as potential benefits in preventing metabolic disorders by enhancing energy expenditure and reducing fat accumulation. These findings provide a scientific basis for the use of chili peppers in supporting weight management and preventing degenerative diseases.

According to the Central Bureau of Statistics (2016), Indonesia's chili harvest area in 2015 was 120,847 ha, with an output of 1,045,182 tons and a yield of 8.649 tons per hectare. This productivity remains much below the potential productivity of chili produced in many studies. The Central Bureau of Statistics (2016), the harvest area of chili in Indonesia in 2011, 2012, 2013, 2014, and 2015 was 121,063; 120,275; 124,110; 128,734; 120,847 ha, with production of 888,852; 954,310; 1,012,879; 1,074,602; 1,045,182 tons and productivity of 7.34; 7.93; 8.16; 8.35; 8.649 tons/ha. The figures reveal a very slight rise in production from year to year. Despite annual increases in productivity, the price of chili peppers continues to rise.

Research conducted by Kalay *et al*. (2015) demonstrated that the application of biofertilizers significantly enhanced the growth and yield of mustard (Brassica juncea L.). Furthermore, the study by Setiawati et al. (2018) revealed that the use of biofertilizers had a significant effect on increasing the yield of edamame soybean (*Glycine max* L.), while the research by Suwandi *et al*. (2017) reported similar effectiveness in improving the growth and yield of shallots. In general, biofertilizers contain several essential components, including: (1) consortia of beneficial microbes that have been proven effective, (2) microorganisms capable of supporting plant growth through the production of phytohormones such as cytokinins, auxins, and gibberellins, and (3) microbes that contribute to improving soil structure through the production of exopolysaccharides (Setiawati *et al*., 2018). According to Kalay (2015), emphasized that biofertilizers play an important role in enhancing the availability of essential macronutrients such as N, P, and K, while also producing phytohormones that stimulate plant growth. In addition, the use of biofertilizers can reduce the application of chemical NPK fertilizers by up to 30% and contribute to improving both the quantity and quality of horticultural crop yields.

Especially for chili cultivation, optimizing nutrient management is crucial to achieving high yields and superior fruit quality. Excessive use of chemical fertilizers often leads to nutrient imbalances, decreased soil fertility, and environmental pollution, as reported in a study in Batu Merah, Lampihong, which showed that the continued use of inorganic fertilizers deteriorates the chemical and biological properties of the soil (Maulana & Mulyawan, 2024). Conversely, inadequate fertilization can result in suboptimal plant growth and yield losses. Therefore, integrating biofertilizers into chili production systems offers a balanced and sustainable strategy. Research in Ketapang showed that organic fertilizer enriched with phosphate-solubilizing and nitrogen-fixing bacteria significantly improved soil conditions and plant productivity (Marlina *et al.*, 2024). Microorganisms in biofertilizers not only increase nutrient availability but also the physiological function of chili plants, leading to better vegetative and reproductive growth as evidenced in research with biofertilizers and biogas sludge, which increased the growth rate and capsaicin levels in curly red chilies (Siswanti & Lestari, 2019).

In Indonesia, where chili is both a staple spice and a key economic crop, the adoption of sustainable fertilization practices holds significant importance. With rising consumer demand for safe, high-quality, and environmentally friendly agricultural products, biofertilizers offer an alternative that aligns with the principles of sustainable agriculture. They not only ensure the long-term health of agroecosystems but also support national food security by stabilizing chili production and reducing dependency on imported chemical fertilizers. Based on this background, the present study evaluates the effectiveness of Beyonic StarT-mik, an organic biological fertilizer, in supporting chili growth and production. Specifically, the study investigates the interaction between fertilizer dosage and application frequency under controlled greenhouse conditions. By identifying the optimal combination of these factors, this research seeks to provide practical recommendations for chili farmers to maximize productivity while minimizing costs and environmental impacts. Furthermore, the study contributes to the broader discourse on sustainable agriculture in Indonesia, where the adoption of biofertilizers can play a transformative role in balancing economic productivity with ecological stewardship.

2. METHOD

Time and Place

This research was conducted from April to December 2020 at the Green House of the Faculty of Agriculture, National University of Bambu Kuning, Pasar Minggu, South Jakarta.

Materials and Tools

The materials used in this study were cayenne pepper, polybags, organic fertilizer Beyonic StarT-mik@lob, furadan, basamid, insecticide, Ripcord, Prima Trubus, labels, stakes, and raffia rope. The tools used in this research are scissors, scales, paddles, hoes, and stationery.

Research Methods

The experimental design used was a factorial completely randomized design (CRD), with 2 treatment factors. The first factor is the dose of organic fertilizer (D), D0 = control, D1 = 10 ppm, D2 = 20 ppm, D3 = 30 ppm, D4 = 40 ppm of organic fertilizer Beyonic StarT-mik@lob per Liter) and the second factor is the frequency of fertilizer application (F), F1 = fertilizer application once a week, F2 = fertilizer application every 2 weeks. Each treatment was repeated 3 times.

Marker

a. **Preparation of Planting Media**
   Soil and manure in a 1:1 ratio that had been sterilized in stages were put into polybags as much as 4 kg/polybag.
b. **Seed Preparation**
   Chili seeds to be planted were prepared and soaked in fungicide solution (1 g/L) for 10 minutes. Selection of good chili seeds is by soaking the seeds in water and taking chili seeds

that sink. Watering 1 time a day by watering the soil to the field capacity of the soil. Chili plants are treated with organic fertilizer according to the dose and frequency of administration. Furthermore, maintenance and observation are carried out.

c. Plant Maintenance

Maintenance of chili plants is carried out by watering chili plants every morning and evening at 07 - 08 for the morning and afternoon at 16.00, depending on the weather. The plant fertilizer used is manure with the addition of Biological Organic Fertilizer. Plant maintenance aims to get optimal growth. Caring for plants is a very important activity in chili cultivation in order to obtain high productivity. Plant care activities generally include staking, replanting, removing water buds (pewiwilan), supplementary fertilization, irrigation, and controlling plant-disrupting organisms (OPT).

Observation Variables

The variables observed in this study were: plant height (cm), stem diameter (cm), dichotomous height (cm), fruit diameter, fruit length (cm), weight per fruit, number of seeds per fruit, harvest weight, and number of harvest fruits.

Data Analysis

The data obtained were analyzed with an ANOVA test using the SPSS program. ANOVA test results that were significantly different were followed by Duncan's test (DMRT) at the 5% real level.

3. RESULT AND DISCUSSION

General Conditions

The research was conducted at the National University Faculty of Agriculture Experimental Farm on Jalan Bambu Kuning, Jati Padang Village, Pasar Minggu District, South Jakarta (26.2 m above sea level). The average rainfall was 13.9 mm/day, 81% air humidity, with 52% sunshine intensity. Temperatures ranged from 24.3-32.2°C.

Plant Height

Table 1. Effect of interaction of organic fertilizer dosage and application frequency on plant height

Treatments	Plant Height (cm)				
	3 WAP	5 WAP	7 WAP	9 WAP	11 WAP
D4F1	54,63	60,93	64,90	67,73	70,67
D4F2	52,47	53,50	54,67	55,80	56,23
D3F1	50,87	58,97	64,83	77,67	94,17
D3F2	32,83	36,23	37,00	38,00	39,33
D2F1	42,07	43,53	44,17	44,73	49,33
D2F2	39,37	41,50	42,13	42,83	43,63
D1F1	40,73	45,73	46,57	46,90	50,00
D1F2	31,17	34,17	34,63	35,33	38,20
D0F1	35,73	37,73	38,93	42,83	42,90
D0F2	32,73	34,03	35,33	36,37	40,07

The results of plant height observations at 3, 5, 7, 9, and 11 weeks after planting (WAP) can be seen in Table 1. It can be seen that the height of cayenne pepper plants at the age of 11 weeks after planting is highest in D3F1 treatment (94.17 cm), followed by D4F1 treatment (70.67 cm) and D1F1 treatment (50.00 cm). After ANOVA test on plant height, the interaction of organic fertilizer dose and frequency of fertilizer application, the dose of organic fertilizer was not significantly different, but the frequency of fertilizer application was significantly different at 11 WAP. Figure 1 shows that the dose of organic fertilizer D3 (30 cc Star T-mik organic fertilizer) outperformed the doses of 40, 20, 10, and 0 ppm. This is consistent with the findings of Juhaeti *et al.*, (2016), who discovered that a dose of 25-30 cc of Beyonic StarT-mik@lob organic fertilizer mixed with 1 liter of water produced better results.

Table 2. Effect of frequency of organic fertilizer application on plant height

Treatments	Plant Height (cm)				
	3 WAP	5 WAP	7 WAP	9 WAP	11 WAP
F1	44,81 a	49,38 a	51,88 a	55,97 a	61,41 a
F2	37,71 a	39,89 a	40,72 a	41,66 a	43,49 b

Remarks: *The numbers in the same column and followed by the same letter are not significantly different at the 5% DMRT level.

The frequency of organic fertilizer application once a week (F1) showed that the best plant height was at 11 weeks (Table 2). This is presumably because the nutrient content in the treatment is sufficient in the application of fertilizer once a week, compared to once every two weeks. The application of biological organic fertilizers (POH) has been shown to not only promote plant growth but also improve soil structure by improving soil physical, chemical, and biological qualities. Some research findings on the use of LIPI POH indicate that the fertilizer is appropriate for enhancing vegetable output (Lingga & Marsono, 2006; Juhaeti *et al.*, 2016). Cayenne pepper plants' increased height development is influenced by the presence of nitrogen (N). Nitrogen is an essential macronutrient that supports plant vegetative growth, including increasing plant height (Karim *et al.*, 2019). Plant growth and development will accelerate as a result of the abundance of nutrients available for absorption. It is also recognized that plants require nitrogen for the creation of carbohydrates, proteins, lipids, and other organic components, but phosphorus is essential for the formation of the plant's generative section. In some cases, increasing the fertilizer dose will result in increased vegetative and generative growth of plants (Zainullah, 2018), which is consistent with Rahma *et al.*, (2018) opinion that nutrients, particularly N, P, and K, are required for vegetative and generative growth of plants. According to Taisa *et al.* (2021), fertilizer application is closely related to plant growth because it impacts nutrient availability during the vegetative and generative phases. Nitrogen is crucial for plant growth, particularly in the creation of organs such as stems and leaves.

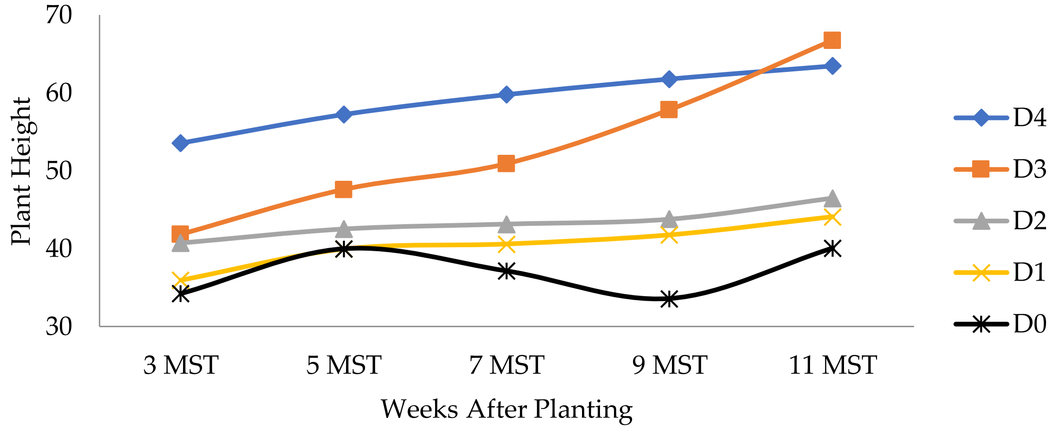

Figure 1. The effect of starmic organic fertilizer doses on the height of cayenne pepper plants.

Stem Diameter

Stem diameter as an indicator of plant growth, in this study, it was seen that at the age of 11 weeks after planting, the D3F1 treatment gave the best results of 0.64 cm, followed by the D4F1 treatment (0.57 cm) and the D1F1 treatment (0.55). The average observation of the stem diameter of chili plants can be seen in Table 3. The results of the variance of stem diameter of both the interaction between fertilizer doses and fertilizers are shown in Table 3. The frequency of application and the treatment of fertilizer dose and frequency were not significantly different. In Figure 2, it can be seen that the 40ppm fertilizer dose (0.55 cm) is the best dose and followed by the treatment with a dose of 30 ppm (0.51 cm). The increase in the dose of biological organic fertilizer was followed by an increase in stem diameter.

Table 3. Effect of interaction of doses of organic fertilizer and frequency of giving on the diameter of the stem of cayenne pepper plants.

Treatments	Stem Diameter (cm)			
	5 WAP	7 WAP	9 WAP	11 WAP
D4F1	0,43	0,51	0,53	0,57
D4F2	0,42	0,46	0,48	0,53
D3F1	0,48	0,54	0,57	0,64
D3F2	0,35	0,35	0,37	0,38
D2F1	0,38	0,45	0,45	0,49
D2F2	0,38	0,39	0,45	0,47
D1F1	0,46	0,47	0,48	0,55
D1F2	0,31	0,31	0,31	0,34
D0F1	0,31	0,42	0,42	0,44
D0F2	0,37	0,49	0,49	0,51

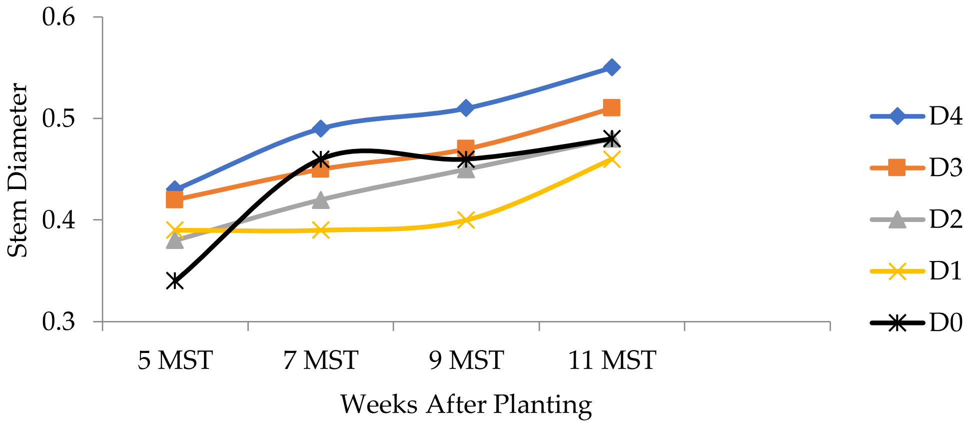

Figure 2. Average stem diameter of chili pepper plants in dosage treatment of organic fertilizer

Plant parts via the phloem network, including roots, stems, and reproductive organs. During this distribution process, the stem serves as the primary channel, causing the diameter of the stem to grow to facilitate the smooth transit of photosynthates and nutrients. Phosphorus (P) is a nutrient that helps plants produce tissues, particularly those in the stem. Adding phosphorus can expand the diameter of plant stems. According to Sasmita, (2020), extra phosphorus will improve stem growth more than without it. This is related to phosphorus's involvement in facilitating cell division. Similarly, the use of manure on hot chili pepper plants has been shown to increase various growth parameters, including stem diameter, particularly at higher doses compared to lower doses. These results strengthen the evidence that organic fertilizers, including biofertilizers, contribute to stem enlargement by improving nutrient availability and improving soil physical properties (Khaitov *et al*., 2019). Overall, the findings confirm that integrating organic biological fertilizers with the appropriate fertilization frequency is essential to sustainably maximize chili growth and productivity, enhance nutrient efficiency, and maintain long-term soil fertility and microbial balance in cultivation systems.

Dichotomous Height

The dichotomous height of cayenne pepper plants at 5 weeks after planting can be seen in Table 4. It can be seen that the dichotomous height of the plants is highest in D3F1 treatment (41.83 cm), followed by D4F1 treatment (40.33 cm) and D1F1 treatment (36.00 cm). After the ANOVA test on the dichotomous height of the plant, the interaction of the dose of organic fertilizer and the frequency of fertilizer application, the dose of organic fertilizer and the frequency of fertilizer application was not significantly different. Dichotomous height shows the first branch of each plant and indicates the number of branches; the smaller the dichotomous height, the greater the number of branches.

Table 4. Effect of interaction of doses of organic fertilizer and frequency of giving on the dichotomous height of cayenne pepper plants.

No	Treatments	Dichotomous Height (cm)
1	D4F1	40,33
2	D4F2	29,00
3	D3F1	41,83
4	D3F2	18,87
5	D2F1	25,33
6	D2F2	28,50
7	D1F1	36,00
8	D1F2	12,00
9	D0F1	23,40
10	D0F2	24,33

Dichotomous height growth in cayenne pepper plants is influenced by a number of factors, such as the growing environment, the use of biological agents, the type of variety, and the composition of the growing medium. Although the term "dichotomous height" is rarely mentioned explicitly in various studies, measuring plant height up to the first branching is often used as a reference in assessing vegetative growth. Understanding these factors is very important to support the increase in yield and quality of cayenne pepper plants.

Production Components

The observation results of the average dose of organic fertilizer and frequency of application on fruit diameter, fruit length, fruit weight, number of harvested fruits, harvested fruit weight, and number of seeds per fruit can be seen in Table 5. Fruit diameter, fruit length, and fruit weight were highest in D4F1 treatment (0.57 cm, 4.08 cm, and 1.20 grams). The number of harvested fruits, harvested fruit weight, and number of seeds per fruit were highest in D3F1 treatment (49.27 grams, 60.0 grams, and 63.30 seeds). After ANOVA test on fruit diameter, fruit length, fruit weight, number of harvested fruits, harvested fruit weight and number of seeds per fruit that the interaction of organic fertilizer dose and frequency of fertilizer application is not significantly different, but the frequency of fertilizer application is significantly different on fruit weight, number of harvested fruits, harvested fruit weight and number of seeds per fruit. Juhaeti & Lestari (2016), found that combining ½ dose of NPK with Star T-mik organic fertilizer yielded good results. Fruit output was generally robust until the third harvest of finger eggplant and the fourth harvest of index eggplant, after which it dropped. The total quantity of fruits/plants produced was comparable to the application of NPK combined with Commercial PO, but higher than NPK combined with Megarhizo. Plants' responses to megarhizo treatment are also unstable, therefore there is little data to draw conclusions.

The efficiency of megarhizo fertilizer in reducing future NPK fertilizer applications. When summed across six harvests, NPK fertilizer performed best, followed by NPK combined with Commercial PO and NPK combined with Startmik. According to Ananty's (2008) research, fertilizing with a combination of 50% inorganic fertilizer and organic biological fertilizer (POH) greatly enhanced plant height and caisin leaf count. Starting three weeks after planting (3 HST), plants treated with 100% NPK and biological organic fertilizers (Fertismart, Biost, and Ponti treatments paired with 50% NPK) grew substantially quicker than the control and DOP + 50% N treatments.

Table 5. Effect of interaction of organic fertilizer dosage and application frequency on fruit diameter, fruit length, fruit weight, number of seeds, number of harvested fruits, harvested fruit weight.

Treatment	Fruit diameter (cm)	Fruit length (cm)	Fruit weight	Number of seeds	Number of fruit harvest	Harvest fruit weight.
D4F1	0,57	4,08	1,20	42,04	56,67	71,47
D4F2	0,53	3,32	0,96	30,03	11,00	10,57
D3F1	0,54	3,51	1,06	49,27	60,00	63,30
D3F2	0,56	2,94	0,65	27,27	33,33	22,87
D2F1	0,53	3,37	0,94	31,6	46,67	51,17
D2F2	0,45	3,26	0,84	28,33	21,67	18,17
D1F1	0,48	3,19	0,96	32,93	31,67	32,93
D1F2	0,49	3,30	0,87	28,67	8,67	17,80
D0F1	0,49	3,36	1,01	37,27	40,33	39,40
D0F2	0,46	2,57	0,90	26,83	10,33	13,00

Table 7 shows the effect of biological organic fertilizer doses on fruit diameter, fruit length, fruit weight, number of harvested fruits, harvested fruit weight, and number of seeds per fruit. The D4 treatment had the largest fruit diameter, length, and weight (0.55 cm, 3.70 cm, and 1.08 grams, respectively). Treatment D3 had the most seeds per fruit, harvested fruits, and harvested fruit weight (43.09 seeds, 38.27 grams, and 46.67 grams, respectively). Average observation of the frequency of giving in terms of fruit diameter, length, weight, number of harvested fruits, weight of harvested fruits, and seed count.

Per fruit can be seen in Table 7. Fruit diameter and fruit length did not show any difference between the frequency of once a week and twice a week, but were significantly different in fruit weight, number of harvested fruits, harvested fruit weight, and number of seeds per fruit. The frequency of once a week was higher for all components of cayenne pepper yields. Nitrogen remains a critical macronutrient for plants, playing essential roles in protein synthesis, chlorophyll formation, and numerous metabolic processes. In a study by Gojon (2017), improvements in nitrogen nutrition were shown to significantly enhance crop productivity through better nitrate uptake and signalling pathways. Phosphorus (P) plays a crucial part in practically all metabolic activities in the plant body. One of its tasks is to aid in the absorption and conversion of sunlight into biological energy. Phosphorus is also found in the construction of cell membranes, enzymes, and nucleotides, which are components of nucleic acids. Furthermore, phosphorus is involved in protein synthesis, particularly in green plant tissues, carbohydrate production, and the flowering process (Herlina *et al*., 2017). The treatment's nutrient content enables plant roots to absorb nutrients from the soil more effectively, potentially increasing the number of fresh fruit produced by cayenne pepper plants.

Table 6. Effect of organic fertilizer dosage on fruit diameter, fruit length, fruit weight per plant, harvested fruit weight, number of harvested fruit and number of seeds per fruit.

Treatment	Fruit diameter (cm)	Fruit length (cm)	Fruit weight	Number of seeds	Number of fruit harvest	Harvest fruit weight.
D4	0,55	3,70	1,08	36,04	33,84	41,02
D3	0,55	3,23	0,86	38,27	46,67	43,09
D2	0,49	3,32	0,89	29,97	34,17	34,67
D1	0,54	3,25	0,92	30,80	20,17	25,37
D0	0,48	2,97	0,96	32,05	25,33	26,20

Table 7. Effect of frequency of organic fertilizer application on fruit diameter, fruit length, fruit weight per plant, harvested fruit weight, number of harvested fruits and number of seeds per fruit

Treatment	Fruit diameter (cm)	Fruit length (cm)	Fruit weight	Number of seeds	Number of fruit harvest	Harvest fruit weight.
F1	0,54 a	3,50 a	1,03 a	38,62 a	47,07 a	51,65 a
F2	0,50 a	3,08 a	0,84 b	28,23 b	17,00 b	16,48 b

Phosphorus (P) is essential in the conversion of carbohydrates, such as starch, into sugar. This alteration leads to the development of fruit size and weight. If the soil is phosphorus-rich, crop yields can be increased in size and weight. Biological organic fertilizers have the ability to improve crop output while also providing important nutrients like nitrogen (N) and phosphorus (P). Sadiah's (2022), research found that the availability of N and P components in the soil has a vital role in the process of fruit formation, which can lead to an increase in cayenne pepper yield. Aside from nutrition, water availability is a crucial factor in determining the fruit weight of cayenne pepper. Sufficient water allows plants to grow and develop optimally, as well as facilitates the movement of key nutrients required for the production of quality fruits. In contrast, a shortage of water can impair nutrient transfer, reducing fruit development and weight. According to Sari (2020), the amount of water in the fruit impacts its weight because water promotes plant metabolism, which raises the need for nutrients and water. Lack of water inhibits plant growth and development, resulting in lower crop yields.

4. CONCLUSIONS

Chili growth and yield showed differential responses to fertilizer doses. The highest plant height was recorded at 30 ppm, reaching 94.17 cm, whereas the largest stem diameter (0.64 cm) and the highest dichotomous height (41.83 cm) were obtained at 40 ppm with weekly fertilization. Fertilizer application once a week resulted in better vegetative growth compared to biweekly application. For reproductive traits, the maximum fruit diameter (0.57 cm), fruit length (4.08 cm), and individual fruit weight (1.20 g) were observed at 40 ppm. However, the highest number of seeds per fruit (42.04 seeds), number of harvested fruits per plant (56.67 fruits), and total harvest fruit weight (71.47 g per plant) were achieved at 30 ppm, indicating that moderate fertilizer doses more effectively support overall chili yield.

REFERENCES

Alonso-Villegas, R., González-Amaro, R. M., Figueroa-Hernández, C. Y., & Rodríguez-Buenfil, I. M. (2023). The genus capsicum: a review of bioactive properties of its polyphenolic and capsaicinoid composition. *Molecules*, *28*(10), 4239. https://doi.org/10.3390/molecules28104239

Badan Pusat Statistik. (2016). *Luas Panen, Produksi dan Produktivitas Cabai2010*.http://www.bps.go.id (12 January 2017).

Guilherme, R., Reboredo, F., Guerra, M., Ressurreição, S., & Alvarenga, N. (2020). Elemental composition and some nutritional parameters of sweet pepper from organic and conventional agriculture. *Plants, 9*(7), 863. https://doi.org/10.3390/plants9070863

Gojon, A. (2017). Nitrogen nutrition in plants: rapid progress and new challenges. *Journal of Experimental Botany*, *68*(10), 2457–2462. https://doi.org/10.1093/jxb/erx171

Herlina, B., Sutejo, S., & Laksono, J. (2017). Peranan inokulasi fungi mikoriza arbuskular (FMA) dan Pupuk fosfat terhadap produktivitas dan kandungan nutrisi Indigofera zollingeriana. *Jurnal Sain Peternakan Indonesia*, *12*(2), 184-190. https://doi.org/10.31186/jspi.id.12.2.184-190

Juhaeti, T. & Lestari, P. (2016). Pertumbuhan, Produksi dan Potensi Gizi Terong Asal Enggano pada Berbagai Kombinasi Perlakuan Pemupukan. *Berita Biologi*, *15*(3), 325 – 336. https://doi.org/10.14203/beritabiologi.v15i3.2246

Karim, H., Suryani, A. I., Yusuf, Y., & Khaer, F. N. A. (2019). Pertumbuhan tanaman cabai rawit (Capsicum frutescens L.) Terhadap pemberian pupuk organik cair limbah pisang kepok. *Indonesian Journal of Fundamental Sciences*, *5*(2), 89-101. https://doi.org/10.26858/ijfs.v5i2.11110

Kalay, A. M., Hindersah, R., Talahaturuson, A., Uluputty, M. R., & Langoi, F. (2015). Pertumbuhan dan Hasil Tanaman Sawi (*Brassica Juncea* L) Setelah Aplikasi Pupuk Hayati Tunggal dan dan Konsorsium. *Agrologia*, *4*(1), 15–20. . https://doi.org/10.30598/a.v4i1.219

Khaitov, B., Yun, H. J., Lee, Y., Ruziev, F., Le, T. H., Umurzokov, M., & Park, K. W. (2019). Impact of organic manure on growth, nutrient content and yield of chilli pepper under various temperature environments. *International journal of environmental research and public health*, *16*(17), 3031. https://doi.org/10.3390/ijerph16173031

Marlina, N., Rosmiah, R., Khotimah, K., Helmizuryani, H., Palmasari, B., Amir, N., ... & Meidelima, D. (2024). The Use of Organic Fertilizer Enriched with Bacteria to Improve the Fertility of the Soil. *Altifani Journal: International Journal of Community Engagement*, *4*(2), 148-152. https://doi.org/10.32502/altifani.v4i2.7868

Maulana, A., & Mulyawan, R. (2024). Soil Fertility Due to The Use of Inorganic Fertilizer In Batu Merah Village, Lampihong District. *SEAS (Sustainable Environment Agricultural Science)*, *8*(1), 60-68. https://doi.org/10.22225/seas.8.1.9409.60-68

Narang, N., Jiraungkoorskul, W., & Jamrus, P. (2017). Current understanding of antiobesity property of capsaicin. *Pharmacognosy reviews*, *11*(21), 23 – 26. https://doi.org/10.4103/phrev.phrev_48_16

Sadiah, K. I. (2022). *Respon Pemberian Beberapa Pupuk Organik Cair Terhadap Pertumbuhan Dan Hasil Tanaman Terung Ungu (Solanum melongena L.)* (Doctoral dissertation). Uin Sultan Syarif Kasim Riau.

Sasmita, M. W. S., Nurhatika, S, & Muhibuddin, A. (2020). Pengaruh dosis mikoriza arbuskular pada media AMB-P0K terhadap pertumbuhan tanaman tembakau (*Nicotiana tabacum* var. Somporis). Jurnal Sains dan Seni ITS, *8*(2), 43–48. https://doi.org/10.12962/j23373520.v8i2.49374

Sari, W. P. (2020). Analisis Tingkat Keberhasilan Penyerbukan Bunga dari Tanaman Tomat (*Solanum lycopersicum* L.) dan Pemanfaatannya sebagai Bahan Ajar. *Journal of Biology Science and Education*, *8*(2), 623–629. https://doi.org/10.22487/jbse.v8i2.1170

Setiawati, M. R., Sofyan, E. T., Nurbaity, A., Suryatmana, P., & Marihot, G. P. (2018). Pengaruh Aplikasi Pupuk Hayati, Vermikompos Dan Pupuk Anorganik Terhadap Kandungan N, Populasi Azotobacter sp. Dan Hasil Kedelai Edamame (*Glycine max* (L.) Merill) Pada Inceptisols Jatinangor. *Agrologia*, *6*(1), 1-10. https://doi.org/10.30598/a.v6i1.174

Siswanti, D. U., & Lestari, M. F. (2019). Growth rate and capsaicin level of curly red chili (Capsicum annum L.) on biofertilizer and biogas sludge application. *Jurnal Biodjati*, *4*(1), 126-137. https://doi.org/10.15575/biodjati.v4i1.4216

Suwandi, N., Sopha, G. A., Lukman, L., & Yufdy, M. P. (2017). Efektivitas Pupuk Hayati Unggulan Nasional Terhadap Pertumbuhan dan Hasil Bawang Merah. *J. Hortik*, *27*(1), 23-34. https://doi.org/10.21082/jhort.v27n1.2017.p23-34

Sujitno, E., & Dianawati, M. (2015). Produksi panen berbagai varietas unggul baru cabai rawit (Capsicum frutescens) di lahan kering Kabupaten Garut, Jawa Barat. *Pros. Sem. Nas. Masy. Biodiv. Indon*, *1*(4), 874-877. https://doi.org/10.13057/psnmbi/m010438

Taisa, R., Purba, T., Sakiah, S., Herawati, J., Junaedi, A. S., Hasibuan, H. S., Junairiah, J., & Firgiyanto, R. (2021). *Ilmu Kesuburan Tanah dan Pemupukan*. Yayasan Kita Menulis.

Zainullah, A. H. (2018). *Komparasi Tingkat Produksi Benih Kacang Panjang (Vigna Sinensis L) pada Aplikasi Berbagai Jenis Mulsa dan Pupuk Majemuk*. (Doctoral dissertation). Universitas Muhammadiyah Jember.