Eksakta : Berkala Ilmiah Bidang MIPA
VOLUME 22 NO 04 2021, pp 248-258
ISSN : Print 1411-3724 — Online 2549-7464
DOI : https://doi.org/10.24036//eksakta/vol22-iss4/283

Eksakta
Berkala Ilmiah Bidang MIPA
http://www.eksakta.ppj.unp.ac.id/index.php/eksakta

Article

Effect of Bokashi Fertilizer and Monosodium Glutamate on Growth and Yield of Cayenne Pepper (*capsicum frutescens l.)*

Article Info

Article history :

Received August 08, 2021
Revised September 1, 2021
Accepted September 14, 2021
Published December 30, 2021

Keywords :

Chili Rawit, bokashi, MSG

Zahanis*, Fatimah, Utria Nurval Utami

Agrotechnology Study Program, Faculty of Agriculture, Universitas Tamansiswa, Padang, Indonesia

Abstract. This study aims to determine The purpose of this experiment was to determine the interaction of bokashi fertilizer and monosodium glutamate on the growth and yield of cayenne pepper (Capsium frutescens L.). This experiment used a completely randomized design (CRD) factorial. The first factor is the dose of rice straw bokashi which consists of 4 levels, namely: 0 g / polybag, 50 g / polybag, 100 g / polybag, 150 g / polybag. The second factor is the dose of MSG which consists of 3 levels, namely: 0 ml / 1 water, 4 ml / 1 water, 8 ml / 1 water. Based on the results of the study, it was found that the application of bokashi fertilizer and monosodium glutamate interacted with the growth and yield of cayenne pepper (Capsicum frutescens L.), namely producing the weight of the fruit plants by giving 150 g / polybag of bokashi fertilizer and 8 ml / 1 of MSG water, namely 60.67 g of weight. fruit

Corresponding Author :
Zahanis
Agrotechnology Study Program, Faculty of Agriculture, Universitas Tamansiswa, Padang, Indonesia
Email : zahanis@gmail.com

1. Introduction

The cayenne pepper plant (Capsicum frutescens L.) is a plant originating from the tropics and subtropics of the Americas, to be precise in Colombia, South America, and continues to spread to Latin America. Chili plants were spread by Spanish and Portuguese traders throughout the world, including to Asian countries, especially Indonesia. There are 20 species of chili that develop on the American continent, however, Indonesians only recognize a few types, namely large chilies, curly chilies, cayenne pepper, and paprika [1,2,3,4,5]

Cayenne pepper (Capsicum frutescens L.) is one of the horticultural plants of the Solanaceae family which not only has high economic value, but also has fruit with a combination of colors, flavors, complete nutritional value, and potential to be developed[6,7,8,9,10,11,12,13,14]. According

to [15] cayenne pepper contains nutrients such as fat, protein, carbohydrates, calcium, phosphorus, iron, vitamins A, B1, B2, C, and alkaloid compounds such as capsaicin, oleoresin, flavonoids, and essential oils. Ikpeme [16] reported that cayenne pepper has the highest protein content, and anthraquinone is the highest, with many nutritional content and uses, cayenne pepper continues to be cultivated and at the same time increased production to meet market demand. Chili is an important commodity for the economy. National cayenne pepper production in 2015 was 869,937 tons with a harvest area of 134,869 ha, productivity reached 6.45 tons ha-1, in 2016 there was an increase in production of 915,988 tons with a harvest area of 136,818 ha, productivity reaching 6.69 tons ha-1, increased production due to additional harvested area, in 2017 there was a decrease in production reaching 857,045 tons[17,18,19,20,21].

Efforts can be made to accelerate growth and increase production of cayenne pepper by applying the right fertilizer [22,23,24,25]. According to [26] fertilization is carried out as an effort to meet the needs of plants so that growth and production goals can be achieved. However, if the use of fertilizers is not appropriate or excess, it can cause problems for cultivated plants, such as poisoning to plants, susceptibility to pests and diseases, reducing production quality, and high production costs.

Fertilizer has an important role in the success of plant cultivation. According to [27] giving organic fertilizers can increase nutrient reserves in the soil, improve soil structure and increase soil organic matter content. One of the organic fertilizers that can be used is bokhasi fertilizer [28,29,30,31].

Bokashi comes from a Japanese term which means fermented organic material. Bokashi is a compost fertilizer that is produced from the fermentation process or fermentation of organic matter with EM4 technology (4 types of Effective Microorganisms). The advantage of using EM4 technology is that organic fertilizers can be produced in a relatively short time compared to conventional methods. According to [32] bokashi has a good prospect to be used as organic fertilizer because it has a high nutrient content and contains organic matter which is rich in biological sources. Bokashi fertilizer comes from the fermentation of organic materials obtained from agricultural waste such as: grass, husks, sawdust, bran, straw, manure, and EM4.

Apart from using bokhasi, Monosodium Glutamate can also accelerate growth and increase the yield of cayenne pepper. Monosodium Glutamate is generally known as MSG. Monosodium Glutamate is an additive commonly used in food flavoring [33]. Apart from adding flavor to dishes, MSG is also beneficial for plants. When viewed from the content, it turns out that MSG consists of nutrients that can fertilize plants, namely compounds C, H, O, N, and Na. The purpose of using MSG is so that the plant can grow faster. Monosodium Glutamate can be used as fertilizer for plants, because it contains substances needed for plant growth, which contain a lot of N which is a macro requirement in plants.

The purpose of this study was to determine the interaction of bokashi fertilizer and monosodium glutamate on the growth and yield of cayenne pepper (Capsicum frutescens L.).

2. Method

Materials used in this experiment are local varieties of cayenne pepper seeds, MSG, topsoil soil at a depth of 0-20 cm, polybags measuring 40 cm x 50 cm, materials for making bokashi: cow manure, rice straw, EM4, water. Meanwhile, the tools used are knives, hoes, buckets, sprays, plastic ropes, pins, gauges, analytical scales, label boards and stationery.

The experimental design used was factorial completely randomized design. The first factor is the dose of rice straw bokashi which consists of 4 levels, namely: 0 g/ polybag, 50 g/ polybag, 100 g/ polybag, 150 g / polybag. The second factor was the MSG dose which consisted of 3 levels, namely: 0 ml/ l water, 4 ml / l water, 8 ml / l water, so there were 12 treatment combinations, each of which was repeated 3 times. The data obtained were analyzed by means of variance (F test) at the 5% real

level, if F is large than F Table 5%, followed by the Duncan's Multiple Range Test (DMRT) at the 5% or 1% level.

3. Results and Discussion

Plant height

Check the height variety of cayenne pepper plants showed that the application of bokashi fertilizer and monosodium glutamate had significant interactions. The results of further tests on the height of the cayenne pepper are shown in Table 1.

Table 1. Height of cayenne pepper on the application of bokashi and monosodium glutamate fertilizers 2 weeks after planting (MST).

Bokashi fertilizer (g/polybag)	Monosodium glutamate (ml/L water)		
	0	4	8
	(cm)		
Bokashi 0	47.39 Bb	50.19 Ab	47.91 Bb
Bokashi 50	51.29 Bab	54.35 Ab	55.72 Aab
Bokashi 100	56.40 Ba	58.63 Aa	58.80 Aa
Bokashi 150	58.67 Aa	59.04 Aa	59.25 Aa

KK = 2.01 %

Column numbers followed by lowercase and inline letters followed by uppercase letters are not significantly different according to DNMRT 5%.

Table 1 shows that applying bokashi fertilizer with a dosage of bokashi fertilizer of 150g / polybag and MSG of 8 ml / l of water resulted in a plant height of 59.25 cm. The administration of bokashi fertilizer doses and different MSG doses with significantly different interactions on plant height obtained the highest plant height, namely the treatment of bokashi fertilizer at a dose of 150 g / polybag with MSG at a dose of 8 ml / l of water resulting in plant height of 59.25 cm. This is because the addition of bokashi to the soil can increase soil nutrient content. Because more and more doses of bokashi are given, the N contained in the bokashi fertilizer is more and more absorbed by plants [34]. As well as the addition of MSG which contains substances needed for plant growth such as high nitrogen and sodium so that it can affect fertility levels and accelerate plant growth

Number of Branches

The analysis of the variety of the number of cayenne pepper branches showed that the application of bokashi and monosodium glutamate fertilizers had no significant interaction, single use of bokashi fertilizer had a very significant effect, while the administration of monosodium glutamate had no significant effect. The results of further tests on the number of cayenne pepper branches are shown in Table 2.

Table 2. Number of branches of cayenne pepper in the administration of bokashi and monosodium glutamate fertilizers.

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)			Average
	0	4	8	
		(branch)		
Bokashi 0	4.00	3.67	6.33	4.66 b
Bokashi 50	6.67	5.33	5.67	5.89 b
Bokashi 100	7.33	6.67	6.67	6.89 ab
Bokashi 150	9.00	9.67	9.00	9.22 a
Average	6.75	6.33	6.91	

KK = 29.37 %

The number of columns followed by lowercase letters is not significantly different according to DNMRT 5%.

Table 2 shows that the application of bokashi fertilizer has a very significant effect on the number of cayenne pepper branches, namely by giving 150 g / polybag the number of branches is 9.22. The addition of the dosage of bokashi fertilizer 150 g / polybag can increase the number of cayenne pepper branches, because the more dosage of bokashi fertilizer that is given, it can increase nutrient reserves in the soil, which functions to improve soil structure, increase growth and the number of cayenne pepper branches.

Flowering Age

The analysis the various flowering ages of cayenne pepper showed that the application of bokashi fertilizer and monosodium glutamate had significant interactions. The results of the aging of cayenne pepper are shown in Table 3. Table 3 shows that the application of bokashi fertilizer at a dose of 100 g / polybag of bokashi fertilizer and 8 ml / L of MSG of water resulted in the fastest flowering at 30.33 DAS.

Table 3. Flowering age of cayenne pepper on the application of bokashi and monosodium glutamate fertilizers

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)		
	0	4	8
		(HST)	
Bokashi 0	35.00 Aa	34.00 Aba	33.00 Ba
Bokashi 50	34.67 Aa	32.67 Abb	30.67 Bb
Bokashi 100	31.67 Abb	32.33 Ab	30.33 Bb
Bokashi 150	34.67 Aab	31.33 Bb	30.67 Bb
KK 2.80 %			

Column numbers followed by lowercase and inline letters followed by uppercase letters are not significantly different according to DNMRT 5%.

The administration of bokashi fertilizer doses and different MSG doses with significantly different interactions with flowering age obtained the fastest flowering age, namely the treatment of bokashi fertilizer at a dose of 100 g / polybag with MSG at a dose of 8 ml / l of water resulting in a flowering age of 30.33 DAS . This is because MSG acts as a growth stimulating hormone such as gibberellin which functions to spur the diversity of cell functions so that cells that are initially directed for leaf

shoot growth are diverted for growth of flower buds. The addition of a dose of bokashi containing substances needed by plants for the growth process must be adjusted to the plant's needs to absorb the elements it needs.

Harvest Age

Analysis the various ages of harvesting cayenne peppershowed that the application of bokashi fertilizer and monosodium glutamate had significant interactions. The results of the advanced test results for harvesting cayenne pepper are shown in Table 4. Table 4 shows that applying bokashi fertilizer with a dosage of bokashi fertilizer of 150 g / polybag and MSG 8 ml / L of water resulted in the fastest harvesting age of 61.00 DAS. The administration of bokashi fertilizer doses and different MSG doses with significantly different interactions with flowering age obtained the fastest flowering age, namely the treatment of bokashi fertilizer at a dose of 150 g / polybag and MSG with a dose of 8 ml / l of water resulted in a harvest age of 61.00HST.

Table 4. Age at first harvest of red chilies by giving rhizobacteria and pruning the seeds

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)		
	0	4 (HST)	8
Bokashi 0	64.33 Aa	63.67 Aba	62.67 Ba
Bokashi 50	64.33 Aa	62.00 Bb	61.25 Bb
Bokashi 100	61.22 Ab	61.05 Ab	61.10 Ab
Bokashi 150	62.67 Ab	61.33 Bb	61.00 Bb
KK = 0.66 %			

Column numbers followed by lowercase and inline letters followed by uppercase letters are not significantly different according to DNMRT 5%.

The diversity of harvesting ages is related to the rapid flowering of cayenne pepper, because the faster the flowering of the plants, the faster the plant's harvest age will be. The development from flower to fruit so that it can be harvested requires a number of assimilates. Assimilation is a substance produced from the assimilation process, one example of the assimilation process, namely the photosynthesis process. As well as the availability of water for plants is an important factor in terms of fruit ripening. In the fruit ripening process, enough water is needed to stimulate the ethylene hormone which can stimulate enzymes to work in the process of accelerating the softening of the fruit.

Fruit Circumference

The analysis of the circumference of cayenne pepper showed that the application of bokashi and monosodium glutamate fertilizers had no significant interaction, single use of bokashi fertilizer and monosodium glutamate were very significant. The results of the follow-up test of cayenne pepper are presented in Table 5.

Table 5 shows that the application of bokashi fertilizer has a very significant effect on the circumference of the cayenne pepper at a dose of 150 g / polybag resulting in the longest fruit circumference, which is 3.01 cm. The addition of the dosage of bokashi fertilizer 150 g / polybag can increase the circumference of the cayenne pepper plant.

Table 5. Length of red chilies with rhizobacteria and seed pruning

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)			Average
	0	4	8	
		(cm)		
Bokashi 0	1.87	2.07	2.00	1.98 d
Bokashi 50	2.43	2.33	2.43	2.40 c
Bokashi 100	2.60	2.80	2.83	2.74 d
Bokashi 150	3.00	3.07	2.97	3.01 a
Average	2.48	2.57	2.56	

KK = 5.30 %

The number of columns followed by lowercase letters is not significantly different according to DNMRT 5%.

This is because bokashi fertilizer can contribute nutrients and improve soil structure. In addition, the development of fruit circumference is largely determined by the speed of photosynthesis of a plant, if small photosynthate results will produce small fruit and vice versa, and environmental factors and soil conditions also influence the fruit circumference of cayenne pepper [35].

Table 5 also shows that the provision of MSG has a very significant effect on the circumference of the cayenne pepper. Giving MSG at a dose of 4 ml / l of water produces a fruit circumference of 2.57 cm, this is because by giving MSG in accordance with the dose will add certain nutrients to plants so that the nutrient content available to plants can be fulfilled so that plants can grow and increase production.

Fruit Length

The analysis of the length variance of cayenne pepper showed that the application of bokashi and monosodium glutamate fertilizers had no significant interaction, single administration of bokashi fertilizer and monosodium glutamate had very significant effects. The results of further test of the length of the cayenne pepper are presented in Table 6.

Table 6 shows that the application of bokashi fertilizer has a very significant effect on the length of the cayenne pepper with a dose of 150 g / polybag which produces the highest fruit length, namely 2.01 cm. The addition of bokashi fertilizer at a dose of 150 g / polybag can increase the length of cayenne pepper.

Table 6. Length of cayenne pepper with the effect of bokashi fertilizer and monosodium glutamate

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)			Average
	0	4	8	
		(cm)		
Bokashi 0	1.63	1.67	1.53	1.61 b
Bokashi 50	1.43	1.47	1.63	1.51 b
Bokashi 100	1.77	2.00	2.10	1.96 b
Bokashi 150	1.90	2.03	2.10	2.01 a
Average	1.68 B	1.79 AB	1.84 A	

KK = 8.57 %

Column numbers followed by lowercase and inline letters followed by uppercase letters

are not significantly different according to DNMRT 5%.

This is because bokashi fertilizer contains elemental N which functions as a constituent of amino acids, a protein component of chlorophyll pigment which is important in the photosynthesis process. Photosynthate produced by plants in the process of photosynthesis is used for plant growth and development. In addition, photosynthate products are also stored as food reserves. If the results of photosynthesis carried out by plants run optimally, the photosynthate produced is also optimal, which in turn affects the size and weight of the plant [34].

Table 6 also shows that the provision of MSG has a very significant effect on the length of the cayenne pepper. Giving MSG at a dose of 8 ml / l of water resulted in a fruit length of 1.84 cm. The addition of MSG at a dose of 8 ml / l of water can increase the length of the cayenne pepper.

Giving MSG a dose of 8 ml / l of water can increase the length of the cayenne pepper. This is due to the high content of N and Na in MSG so that it can affect the level of plant fertility, accelerate growth, accelerate the appearance of flowers, and fulfill plant nutrition so that plants do not die easily [36].

Number of Fruits Per Plant

The analysis of the variety of the number of fruits per cayenne pepper plant showed that the application of bokashi and monosodium glutamate fertilizers had no significant interaction, single use of bokashi fertilizer had a very significant effect, while monosodium glutamate had no significant effect. The results of further tests on the number of fruits per cayenne pepper plant are shown in Table 7.

Table 7. Number of fruits per cayenne pepper plant with the effect of bokashi fertilizer and monosodium glutamate

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)			Average
	0	4	8	
		(fruit)		
Bokashi 0	62.67	67.00	58.67	62.78 b
Bokashi 50	79.67	77.67	82.33	79.89 ab
Bokashi 100	89.00	95.33	103.00	95.77 a
Bokashi 150	116.00	125.33	124.33	121.88 a
Average	86.84	91.33	92.08	

KK = 8.66 %

The number of columns followed by lowercase letters is not significantly different according to DNMRT 5%.

Table 7 shows that the application of bokashi fertilizer has a very significant effect on the number of fruits per cayenne pepper plant. Giving bokashi fertilizer at a dose of 150 g / polybag produced the highest number of fruits per plant, namely 121.88 pieces. This shows that plant height and number of branches greatly affect the number of cayenne pepper. The higher the plant, it will increase the branching of the plant so that the number of fruits also increases.

Fruit Weight per Plant

The analysis the variety of fruit weights per cayenne pepper plant showed that the application of bokashi and monosodium glutamate fertilizers had a significant interaction, single also had a very

significant effect. The results of the further test of fruit weight per cayenne pepper plant are shown in Table 8.

Table 8 shows that the application of bokashi fertilizer at a dosage of 150 g / polybag of bokashi fertilizer and 4 ml / L MSG produces fruit weight per 57.33 g plants, giving bokashi fertilizer 150g / polybag and MSG 8 ml / L resulted in a fruit weight per plant of 60.67 g. Giving different dose of bokashi fertilizer and MSG dose with significantly different interactions with fruit weight per plant obtained the highest fruit weight per plant, namely the provision of bokashi fertilizer treatment at a dose of 150 g / polybag with MSG at a dose of 8 ml / 1 of water yield fruit per plant 60.67 g.

Table 8. Fruit weight per cayenne pepper with the effect of bokashi and monosodium glutamate fertilizer

Bokashi fertilizer (g / polybag)	Monosodium glutamate (ml / L water)		
	0	4 (g)	8
Bokashi 0	53.00 Aa	41.67 Bb	44.33 Bb
Bokashi 50	47.67 Ab	45.67 Bb	47.00 Ab
Bokashi 100	49.67 Bb	52.33 Aa	55.00 Aab
Bokashi 150	55.67 Ba	57.33 Ba	60.67 Aa
KK = 3.77 %			

Column numbers followed by lowercase and inline letters followed by uppercase letters are not significantly different according to DNMRT 5%.

Fruit weight per plant is influenced by fruit circumference, fruit length, and the number of fruits per plant indifferent. This is because the provision of the right organic material to cayenne pepper plants can increase the fruit weight of cayenne pepper plants. MSG can be used as an organic fertilizer because it has a high content of organic matter and nutrients such as elements N, P, and K. This is confirmed by research using MSG (Monosodium glutamate) with an optimum concentration of 15 g / plant, which states that MSG contains 5% N elements. , P 0.4%, and K 1.7%, thereby increasing the production of pakcoy plants [37].

4.Conclusion

There is an interaction between bokashi fertilizer and monosodium glutamate on the growth and yield of cayenne pepper (Capsicum frutescens L.), namely plant height by giving 150 g / polybag and 8 ml / 1 of airMSG, namely 59.25 cm, then flowering age by giving 100 g / polybag and 8 ml / 1 of MSG water is 30.33 DAS, the age of harvest by giving 150 g / polybag and 8 ml / 1 of MSG water is 61.00 DAS, and fruit weight per plant by giving 150 g / polybag and 8 ml / 1 of MSG water is 60.67 g. The effect of bokashi fertilizer on the growth and yield of cayenne pepper (Capsicum frutescens L.), namely the number of branches given 150 g / polybag, namely 9.22 branches, the circumference of the fruit by giving 150 g / polybag, namely 3.01 cm, the length of the fruit by giving 150 g / polybags are 2.01 cm, and the number of fruit per plant is 121.88.

References

[1] Harpenas, A and R. Generous. 2010. Cultivation of Superior Chili (Big Chili, Curly Chili, Cayenne Pepper, and Paprika). Self-help spreader, Jakarta, 108 pages.

[2] Osorio, D., Steele, J., Sepúlveda, M., Gayo, E. M., Capriles, J. M., Herrera, K., ... & Santoro, C. M. (2017). The Dry Puna as an ecological megapatch and the peopling of South

America: Technology, mobility, and the development of a late Pleistocene/early Holocene Andean hunter-gatherer tradition in northern Chile. *Quaternary International*, *461*, 41-53.

[3] Anugrah, R. D., & Safahi, L. (2021, April). The Effect of Eggshell Organic Fertilizer on Vegetative Growth of Cayenne Pepper (Capsicum frutescens L). In *IOP Conference Series: Earth and Environmental Science* (Vol. 755, No. 1, p. 012001). IOP Publishing.

[4] Vaishnavi, B. A., Bhoomika, H. R., & Shetty, G. R. (2018). Genetic parameters study for growth, yield and quality traits in bird's eye chilli (Capsicum frutescens L.). *Int. J. Curr. Microbiol. App. Sci*, *7*(5), 1813-1817.

[5] Zhong, Y., Cheng, Y., Ruan, M., Ye, Q., Wang, R., Yao, Z., ... & Wan, H. (2021). High-Throughput SSR Marker Development and the Analysis of Genetic Diversity in Capsicum frutescens. *Horticulturae*, *7*(7), 187.

[6] Rylski, I. (2019). Capsicum. In *CRC handbook of flowering* (pp. 140-146). CRC Press.

[7] Ansa, J. E. O., & Woke, C. (2018). Effect of Spacing and Poultry Manure Rates on Growth, Yield and Quality of Cayenne Pepper (Capsicum frutescens. L) in Southern Rain Forest of Nigeria. *International Journal of Environment, Agriculture and Biotechnology*, *3*(4).

[8] Nafeesa, M., Hussaina, R., Ahmada, I., Ahsana, M., Aslamb, M. N., Ahmadc, M., & Manzoord, A. (2019). Role of Foliar Application of Salicylic Acid and Cultivars in Chilli (Capsicum frutescens L.) Production in Arid Region of Bahawalpur. *Journal of Horticultural Science and Tech*, *2*(1), 5-9.

[9] Kpinkoun, J. K., Amoussa, A. M., Mensah, A. C. E. G., Komlan, F. A., Kinsou, E., Lagnika, L., & Gandonou, C. B. (2019). Effect of salt stress on flowering, fructification and fruit nutrients concentration in a local cultivar of chili pepper (Capsicum frutescens L.). *International Journal of Plant Physiology and Biochemistry*, *11*(1), 1-7.

[10] SOPIALENA, S., Sila, S., ROSFIANSYAH, R., & Nurdiana, J. (2018). The role of neem leaves as organic pesticides in chili pepper (Capsicum frutescens). *Nusantara Bioscience*, *10*(4), 246-250.

[11] Sasmita, E., Restiwijaya, M., Yulianto, E., Arianto, F., Kinandana, A. W., & Nur, M. (2019, May). Effect of ozone technology applications on physical characteristics of red cayenne pepper (Capsicum frutescens L.) preservation. In *Journal of Physics: Conference Series* (Vol. 1217, No. 1, p. 012007). IOP Publishing.

[12] Ariani, R., Nurida, N. L., & Dariah, A. (2021, February). Utilization of cacao shell biochar and compost to improve cayenne pepper (Capsicum frutescens L.) in acid upland. In *IOP Conference Series: Earth and Environmental Science* (Vol. 648, No. 1, p. 012182). IOP Publishing.

[13] Dwinianti, E. F., Mastuti, R., & Arumingtyas, E. L. (2019). Genetic variation analysis of EMS-induced chili pepper (Capsicum frutescens L.) mutants using SSR markers. *Journal of Tropical Life Science*, *9*(3), 223-228.

[14] Mustafa, M., Syahri, Y. F., & Rauf, M. (2019). Selection of Chilli Pepper (Capsicum frutescens L.) for Salinity Tolerance in Seed Germination. *Agrotech Journal*, *4*(2), 83-90.

[15] Sujitno, E. and Meksy, D. 2015. Harvest Production of Various New Superior Varieties of Cayenne Pepper (Capsicum frutenscens L.) in Dry Land, Garut Regency, West Java. Pros Nas Masy Biodiv Indo. 1 (4): 874-877.

[16] Ikpeme CE, Henry P, Okiri OA. 2014. Comparative evaluation of the nutritional, phytochemical and microbiological quality of three pepper varieties. J Food Nutr Sci 2 (3): 74-80.

[17] Nhita, F., Saepudin, D., & Wisesty, U. N. (2018). Planting Date Recommendation for Chili and Tomato Based on Economic Value Prediction of Agricultural Commodities. *The Open Agriculture Journal*, *12*(1).

[18] Kumar, H. P., Tevari, P., Beeraladinni, D., & Kammar, S. (2020). Price forecasting in chilli crop in major markets of Karnataka State, India. *Int. J. Curr. Microbiol. App. Sci*, *9*(05), 3221-3226.

[19] Geo, L., Ariani, W. O. R., & Saediman, H. (2020). Determinants and Profitability of Small-Scale Red Chili Production in Konawe District of Southeast Sulawesi. *Journal of Agriculture and Veterinary Science*, *13*(3), 51-55.

[20] Sukiyono, K., & Janah, M. (2019). Forecasting Model Selection of Curly Red Chili Price at Retail Level. *Indonesian Journal of Agricultural Research*, *2*(1), 1-12.

[21] Suwarsinah, H. K., Harwanti, N. F., Hastuti, H., & Firdaus, M. (2018). The pricing system of red onion and red chili commodities. *Jurnal Manajemen & Agribisnis*, *15*(2), 150-150.

[22] Central Bureau of Statistics and Directorate General of Horticulture. 2017. Production of Big Chili, Chili Rait and Shallots. Official Gazette of Statistics No.54 / 08 / year XVI. http: //.www.pertanian.go.id/Indikasi/tabel-2-prod-lspn-prodvitas-horti.pdf

[23] Caruso, G., Stoleru, V. V., Munteanu, N. C., Sellitto, V. M., Teliban, G. C., Burducea, M., ... & Butnariu, M. (2019). Quality performances of sweet pepper under farming management. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca*, *47*(2), 458-464.

[24] Abate, T. M., Dessie, A. B., & Mekie, T. M. (2019). Technical efficiency of smallholder farmers in red pepper production in North Gondar zone Amhara regional state, Ethiopia. *Journal of Economic Structures*, *8*(1), 1-18.

[25] Mahmoud, A. W. M., Abdelaziz, S. M., El-Mogy, M. M., & Abdeldaym, E. A. (2019). Effect of foliar ZnO and FeO nanoparticles application on growth and nutritional quality of red radish and assessment of their accumulation on human health. *Agriculture*, *65*(1), 16-29.

[26] Wahyuna, W., Marliah, A., & Nurhayati, N. (2021). PENGARUH JENIS PUPUK ORGANIK PADAT DAN KONSENTRASI PUPUK ORGANIK CAIR TERHADAP PERTUMBUHAN DAN HASIL TANAMAN CABAI RAWIT (Capsicum frutescens L.). *Jurnal Ilmiah Mahasiswa Pertanian*, *6*(4).

[27] Wijaya, KA 2008. Plant Nutrition as a Determinant of Yield Quality and Natural Plant Resistance. Literature Achievements. Jakarta.

[28] Sutedjo, MM. 2008. Fertilizer and Fertilization Method. Jakarta: Rinekacipta: Jakarta.

[29] Lasmini, S. A., Nasir, B., Hayati, N., & Edy, N. (2018). Improvement of soil quality using bokashi composting and NPK fertilizer to increase shallot yield on dry land. *Australian Journal of Crop Science*, *12*(11), 1743-1749.

[30] Ginting, S. (2019). Promoting Bokashi as an organic fertilizer in Indonesia: A mini review. *Horticulture*, *27*(2), 189-203.

[31] Viana, J. D. S., Borda, C. A. R., & Palaretti, L. F. (2020). Application of bokashi organic fertilizer in production oflettuce (Lactuca sativa). *Horticult Int J*, *4*(5), 200-201.

[32] Martini, D. K. T., & Paramita, D. P. R. (2021). The Effect of Planting Distance and Bokashi from Several Types of Organic Fertilizers on the Growth and Yield of Elephant Ginger Variety (Zingiber Officinale var. Roscoe).

[33] Tola, F., Hamzah. Dahlan and Kaharuddin. 2007. The Effect of Using Doses of Bokashi Cow Manure on Growth and Production of Corn. J. Agrisistem. 3 (1): 1-8.

[34] Cristea, AN, Buzescu, A., Avram, L., & Chirita, C. 2013. The addictive behavior induced by food monosodium glutamate. Practica Medicala, 4 (432), 229-234. Retrieved fromhttp://rjmp.com.ro/articles/2013.4/ PM_Nr-4_2013_Art-4.pdf

[35] Djunaedy, A. 2009. Effect of types and dosage of bokashi fertilizer on the growth and yield of long beans (Vigna sinensis L.). J. Agrovigor. 2 (1): 42-46.

[36] Hayati, E et al., 2012. The Effect of Organic Fertilizer Types and Varieties on Growth and Yield of Cayenne Pepper (Capsicum frutenscens L.). J floratek 7: 173-181.

[37] Benediktus, W., Imanuel, E., Awang, S., Persada, S., Sintang, K., & Pertamina-sengkuang, J. (2017). Effect of monosodium glutamate (MSG) on the growth of spinach (Amaranthus tricolor L.). Journal of Biology Education, 2 (1).

[38] Novi. 2016. The Use of MSG to Increase Vegetative Growth of Pakcoy Plants. BioConcetta. 2 (1): 24 - 38.