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PERFORMANCE OF GROWTH AND YIELD CAYENNE PEPPER (*Capsicum frutescens* L.) WITH DOSAGE OF NPK AND MONOSODIUM GLUTAMATE (MSG) FERTILIZER

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ABSTRACT

The demand for cayenne pepper always increases every year along with the increase in population. To increase the yield of cayenne pepper, among others, through fertilization by giving doses of NPK and monosodium glutamate (MSG) fertilizers. The purpose of the study was to determine the best dose of NPK and MSG fertilizer on the growth and yield of cayenne pepper plants. The research was carried out at the Practical Garden of the Faculty of Agriculture, UPN "Veteran" Yogyakarta in August - December 2021. The study used a factorial completely randomized design with 4 replications. The first factor is the dose of NPK fertilizer with levels: NPK fertilizer dose of 1.5 g/plant, and 3.0 g/plant. The second factor with the level: monosodium glutamate dose includes no MSG 0 g/plant; 2.5 g/plant; 5.0 g/plant; and 7.5 g/plant. The results showed that there was no interaction between the dose of NPK fertilizer and monosodium glutamate (MSG) on the growth and yield of cayenne pepper. The dose of NPK fertilizer 3 g/plant and MSG 5 g/plant can provide the best growth and yield of cayenne pepper including number of leaves, number of fruit per plant, total number of fruit per plant and total fruit weight per plant.

***Keywords**: Dosage, NPK, MSG, Cayenne Pepper*

INTRODUCTION

Cayenne pepper (*Capsicum futescens* L.) is one of the horticultural plants from vegetables that has a small size with a spicy taste and has many benefits for the community. Cayenne pepper is used as a cooking ingredient and contains complete nutritional content such as protein, fat, carbohydrates, calcium (Ca), phosphorus (P), iron (Fe), vitamins (such as vitamin C), and contains alkaloid compounds, such as capsaicin. , flavonoids, and essential oils (Ali, 2014).

As the population increases, the demand for cayenne pepper is also increasing and it can be seen that the consumption of cayenne pepper in 2021 has increased by 1.76 kg/capita (Ministry of Trade of the Republic of Indonesia, 2021).

With the increase in consumption, it is necessary to maintain the availability of cayenne pepper in the community and increase the yield of cayenne pepper. The problem that arises is about increasing the yield of cayenne pepper. To increase the yield of cayenne pepper, fertilization can be done at the right dose of NPK fertilizer and Monosodium Glutamate (MSG).

Nutrients contained in NPK 16-16-16 fertilizer are elements of N, P and K. The role of nitrogen (N) for plants is (a) to stimulate overall growth, especially stems, branches, and leaves; (b) plays an important role in the formation of green leaves which are very useful in the process of photosynthesis; and (c) form proteins, fats, and various other organic compounds. The role of phosphorus (P) for plants is (a) useful for stimulating root growth, especially seed roots and young plants; (b) as a raw material for the formation of certain proteins; (c) assist assimilation and respiration; and (d) and accelerate flowering, ripening of seeds, and fruit. The role of potassium (K) is (a) to help the formation of protein and carbohydrates; (b) strengthening the plant body so that leaves, flowers and fruit do not fall off easily; and (c) is a source of strength for plants in the face of drought and disease (Purba, et al., 2021). The use of Monosodium Glutamate (MSG) or known as Vetsin can reduce the use of high-priced chemical fertilizers. In addition, many farmers have fertilized with MSG. MSG is a sodium salt (Na) which is bound to an amino acid in the form of glutamic acid. MSG contains carbohydrates in the form of sugar and amino acids in the form of protein so that it can support the growth of plant flowers (Dewantri, et al., 2017). MSG also contains elements of hydrogen ions when mixed with water to produce gas needed for root and stem growth (Pujiansyah, et al., 2018).

The purpose of this study was to determine the best dose of NPK fertilizer and MSG dose for the growth and yield of cayenne pepper. To achieve this goal, it is necessary to conduct a plant experiment that is treated with a dose of NPK fertilizer and a dose of MSG using polybags in the field. With the hope of determining how many doses of NPK and MSG fertilizers are needed in cayenne pepper plants.

LITERATURE REVIEW

The description of Dewata's cayenne pepper is the origin of PT. East West Seed Indonesia. The lineage comes from 3045 x 3045. The variety group is a single cross hybrid. Plant height ranges from ± 50 cm. Age begins to flower 35 days after planting. Age begins to harvest 65 days after planting. The density of the plant canopy is compact. Stem color is green. Leaf shape is oval. Leaf edges are flat / not jagged. The tip of the leaf is pointed. Leaf surface is flat / not wavy. The size of the long leaves ranges from ± 4.5 cm. Width is ±2.0 cm. Green leaf color. The color of the flower petals is green. Green flower stalk color. The color of the flower crown is white. The number of strands of the crown is 5-6 strands. The color of the box is

purplish blue. The number of boxes is 5-6 cm. The color of the stigma is yellow. Fruit round shape. The fruit size is ±4.6 cm long; fruit diameter ranges from ± 0.8 cm. The surface of the fruit skin is smooth and shiny. The thickness of the fruit skin is ± 1 mm. The color of the young fruit is white. The color of the old fruit is orange-red. The number of fruit per tree is around ±369 fruit. Weight per fruit ranges from ±1.8 g. Fruit weight per plant ranges from ±700 g. The weight of 1,000 seeds is 4.8-5.2 g. Spicy fruit taste. Yield ranges from ±14.0 ton/ha. Adapts well in the lowlands to highlands with an altitude of 10-1300 m above sea level.

One of the factors that determine the success of plant growth and yield is fertilization. The definition of fertilization is the addition of materials (which are used to change the physical, chemical, biological properties of the soil) to the soil so that the soil becomes healthier and more fertile. Regarding good and correct fertilization procedures so that the fertilization process becomes more precise, it must be guided by the 5T principle, namely the right type, right dose, right time, right place and right method (Purba, et al., 2021). The classification of all nutrients needed by plants, both essential nutrients and non-essential elements can be seen in Table 1. Nutrients are said to be essential if they meet the following criteria: (a) If the nutrients are taken from the plant media, the plants will not be able to complete the vegetative growth or life cycle; (b) Its specific biochemical function cannot be replaced by other elements (nutrients); (c) Nutrients are components needed in the formation of essential metabolites.

Table 1: Classification of plant nutrients

Group	**Essential**		**Non-Essential**	
	Primary	**Secondary**	**Increase Production**	**Not Increase Production**
Macro	N, P, K	Ca, Mg, S	Na	Si, V
Micro	Fe, Mn, Zn, B, Cu	Mo, Co, Cl	Al, I	Ar, Ba, Be, Bi, Br, Cr, F, Li, Pb, Rb, Pt, Sr, Se

Source: Purba, et al., 2021

Table 1 it can be seen that the nutrients N, P and K are essential elements needed for cayenne pepper plants. In general, the elements of N, P and K must always be available for cayenne pepper and other plants, because they have an important role in the metabolic and biochemical processes of plant cells. The role of N as a builder of nucleic acids, proteins, bioenzymes and chlorophyll and as a constituent of amino acids, nicotine, alkaloids. The role of P as a building block of nucleic acids, phospholipids, bioenzymes, proteins, metabolic compounds and is an important part of ATP in energy transfer. Inorganic phosphate constituents which are part of the plant buffer system, nucleoproteins, part of enzymes, play a role in the synthesis of carbohydrates and fats. The role of K is to play a role in the synthesis

of carbohydrates and protein components, regulate enzyme activity and other processes and regulate the balance of ions in cells, which functions in regulating various metabolic mechanisms such as photosynthesis, carbohydrate metabolism and their translocation, protein synthesis plays a role in the respiration process and increases metabolism. resistance to pests and diseases (Subhan and N. Nurtika, 2004).

NPK 16-16-16 fertilizer contains 16% Nitrogen (consisting of 6.5% Nitrate-N and 9.5% Ammonium-N), 16% Phosphate or P205, and 16% Potassium or K20. With these ingredients, NPK 16-16-16 is suitable to be formulated for all types of horticultural crops, especially cayenne pepper. The benefits of NPK 16-16-16 fertilizer have given unsatisfactory results including: (1) In the study of Fuadi, et al., (2016) stated that the number of fruits per plant and fruit weight per plant increased with higher doses of NPK fertilizer used. given. (2) Treatment of NPK fertilizer at a dose of 3 g/plant and 4 g/plant can give the best results on the growth and yield of chili plants. (3) In the study of Prasetya and Maria (2014) found that doses of NPK fertilizer of 1.5 g/plant and 3 g/plant could increase the growth of curly red chili plants, especially on plant height growth at the age of 40 and 60 days and at harvesting chili peppers. . (4) The dose of NPK fertilizer 6 g/plant can increase the growth and yield of cayenne pepper plants (Silvia, 2016). (5) A dose of 1.5 grams of NPK fertilizer had a good effect on increasing the number of rombusa flower buds by about 54% compared to without using NPK fertilizer (Dewantri, et al., 2017). (6) The application of NPK fertilizer to cayenne pepper plants greatly affects the growth and yield of cayenne pepper. NPK fertilizer can provide a good response to increasing the number of branches so that it can increase the number of cayenne pepper flowers. This increase in the number of flowers can cause the number of fruits to increase so that the weight of cayenne peppers can also increase (Ali, 2014). (7) According to research by Nurjanani (2016), application of NPK fertilizer can increase plant height, total fruit weight, height and width of the plant crown, and stem diameter of cayenne pepper.

Administration of monosodium glutamate (MSG) can affect the growth and yield of cayenne pepper plants such as increasing plant height, number of leaves, stem diameter, wet fruit weight and accelerating flowering age of chili plants. MSG is a sodium salt (Na) which is bound to an amino acid in the form of glutamic acid. Monosodium glutamate (MSG) consists of 78% glutamate, 12% sodium and 10% water (Agitaria, et al., 2020). Sodium is a non-essential nutrient, but Na can replace K if there is a K nutrient deficiency in the soil. Without sodium, plants cannot increase the water content of leaf tissue. The high sodium content contained in MSG can play a role in accelerating plant growth, accelerating the appearance of flowers, fulfilling plant nutrients, helping to fertilize the soil, and helping plants not to die easily (Firdausia and Wahidah, 2020).

MSG can be used as plant fertilizer because MSG contains a lot of Nitrogen (N) which is a macro requirement for plants that can accelerate growth and thicken plant leaves. The nature of N is generally mobile, so to reduce N loss due to washing or evaporation, it should be given gradually (Jannah, et al., 2018). The mineral content in MSG waste can be used as fertilizer that is beneficial for plants and has high quality. MSG contains amino acids that can form protein. These amino acids are indicated to contain growth stimulating substances (ZPT) which are almost the same as gibberellins so that they can accelerate flowering in plants. This is in accordance with research by Dewantri, et al. (2017) where MSG has a content that has a role as a growth-stimulating hormone such as gibberellins so that cells that are directed as shoot growth are diverted to gibberellin growth hormone.

Soil fertility will increase if the soil organic matter is high, both physically, chemically and biologically. Hidayanto (2020) said that doses above 15 g/plant will cause flower and leaf loss, followed by stunted plants. The same thing also happened to peanuts, which experienced a decrease in growth at doses above 6 g/plant. The increase in maize biomass yield by using monosodum glutamate did not show a bad effect. The efficiency of using N from MSG is comparable to that of urea-N. In this study, MSG can be used for reforestation of maize at low cost and without adverse effects on soil properties (Singh, et al., 2011). Monosodium glutamate applied at a dose of 10% g/liter every 3 times a week for 6 weeks can provide the fastest growth in corn plants. The growth including plant height, diameter, number and length of leaves increased by 3 folds for each parameter compared to the control. This study is the first to report that Ajinomoto's MSG can have a positive effect on maize and is suitable for use in low-cost green practices (Seman and Mohamad, 2019).

According to Agitaria, et al., (2020) application of MSG to cayenne pepper plants can increase the growth and yield of cayenne pepper plants, especially on stem height, number of leaves, and stem diameter and can affect wet fruit weight. Administration of monosodium glutamate with the right dose can increase plant growth and yield, but if using high doses it can cause plants to dry and die, resulting in crop failure.

RESEARCH METHODOLOGY

The research was carried out at the Practical Garden of the Faculty of Agriculture, UPN "Veteran" Yogyakarta in August - December 2021. The soil type was regosol and the altitude was around 120 m above sea level. The research method was carried out using polybags with a factorial completely randomized design (CRD) with 2 factors and 4 replications. The first factor is the dose of NPK fertilizer: (a) P1 = 1.5 g/plant of NPK; (b) P2 = 3.0 g/plant NPK. The second factor is the provision of MSG: (a) M0 = 0.0 g/plant MSG; (b) M1= 2.5 g/plant MSG; (c) M2 = 5.0 g/plant MSG; M3 = 7.5 g/plant MSG. The treatments consisted of 8 treatment combinations and

32 experimental units. Each treatment unit contained 10 polybags by planting cayenne pepper 1 plant/polybag.

The materials used in this study were cayenne pepper seeds of Dewata variety, compound NPK fertilizer 16-16-16, monosodium glutamate (MSG), soil, husk charcoal, compost, pesticides, and polybags. The tools used include hoes, buckets, labels, rulers, scales, sprayers, staples, stationery, ovens and caliper.

The implementation of the research included the preparation of cayenne pepper seeds from the Dewata variety farm shop. Making planting media in the form of soil, husk charcoal and compost volume ratio 3: 1: 1, then put into polybags measuring 40 cm x 40 cm. Planting cayenne pepper seedlings aged 14 days after sowing. Each polybag consists of 1 cayenne pepper plant. Planting is done in the afternoon to avoid the sun. Plant maintenance includes embroidery, carried out 5 days after transplanting. Watering, weeding, and controlling pests and diseases. Plant pest organisms (OPT) that usually interfere with cayenne pepper plants are caterpillars and white pests, controlled by spraying pesticides, if they are attacked by fungi are controlled by spraying fungicides.

The application of NPK and MSG fertilizers in polybags was carried out 3 times, namely after the chilies were 7, 21, and 35 DAP. Giving by sprinkling around the stems of chili plants with a distance of 5-10 cm from the stems of cayenne pepper, then put fertilizer and MSG and then covered with soil. Harvesting was carried out after the Dewata cayenne pepper was 65 days after planting. The characteristics of cayenne pepper that are ready to harvest are that the fruit is really old, which is characterized by the formation of dense seeds, when pressed the fruit is hard, and the fruit is dark green, reddish green, or reddish yellow. Harvesting intervals are held every 7 days. In this study, harvesting was carried out 6 times.

Parameters observed included plant height, stem diameter, number of secondary branches, number of leaves, number of fruit per plant per harvest period, total number of fruit per plant, weight per fruit per harvest period, total fruit weight per plant, and harvest index. The research data were analyzed for variance (ANOVA) at 5% level. If in the analysis of variance there are significantly different variables, a further test of the Duncan Multiple Distance Test (DMRT) level of 5% is carried out.

RESULTS AND DISCUSSION

The results of observations about the growth and yield performance of cayenne pepper with doses of NPK and MSG fertilizers after analysis can be displayed in the following tables. Table 2 shows that the dose of monosodium glutamate (MSG) at 2 and 4 weeks of 2.5 g/plant and 5.0 g/plant resulted in the highest plant height compared to other treatments. However, the growth of cayenne pepper plants at the age of 2 weeks due to MSG did not show a significant difference. Likewise, the dose of NPK in the two treatments did not show a significant difference. The result of the

research was that the plant height was 24.78-27.68 cm, this result was lower than the 50 cm plant height in the description of Dewata cayenne pepper. This research still uses polybags with soil, husk charcoal and compost in a volume ratio of 3: 1: 1 and is not carried out on land. Thus the planting medium is very porous so that many nutrients are leached, so the plant height in this study could not approach the plant height in the description. Table 2 also shows that the MSG doses of 5.0 g/plant and 7.5 g/plant on plant height at observations 2 and 4 weeks were significantly different, where 5.0 g/plant was higher than 7.5 g/plant. , while 6 weeks did not show no significant difference. This means that giving the right MSG really helps the growth process of cayenne pepper plants, but if the dose of MSG given is too high it will cause the plant to die because the administration of excess Na nutrients can inhibit cell enlargement and division (Triyani, et al., 2013 cit. Hutasoit, 2019).

Table 2 shows that the stem diameter of cayenne pepper at observations 2, 4 and 6 weeks for all treatments showed no significant effect on the dose of NPK and monosodium glutamate (MSG) fertilizers. This was due to the fact that the P nutrients contained in the NPK and MSG fertilizers were effective in increasing cell growth laterally, while the diameter of the plant stems grew sideways. Monosodium glutamate (MSG) contains gibberellins which can trigger a diversity of cell functions that cause cells in the xylem and phloem tissues to increase (Agitaria, et al., 2020).

Table 2. Average plant height and stem diameter of cayenne pepper

Treatment	Plant height (cm)			Stem diameter (cm)		
	Observation time: weekly			Observation time: weekly		
	2	4	6	2	4	6
NPK fertilizer dosage						
P1 =1.5 g/plant	10,66 a	17,68 a	25,93 a	0,16 a	0,28 a	0,38 a
P2 =3.0 g/plant	11,10 a	18,31 a	26,06 a	0,18 a	0,31 a	0,41 a
MSG Dosage						
M0=0.0 g/plant	10,10 q	17,18 q	24,64 p	0,15 p	0,28 p	0,38 p
M1=2.5 g/plant	11,74 p	18,23 pq	26,88 p	0,17 p	0,29 p	0,42 p
M2=5.0 g/plant	11,59 p	19,45 p	27,68 p	0,20 p	0,32 p	0,43 p
M3=7.5 g/plant	10,09 q	17,13 q	24,78 p	0,15 p	0,30 p	0,35 p
Interaction	(-)	(-)	(-)	(-)	(-)	(-)

Note: Numbers followed by the same letter show no significant difference based on Duncan's Multiple Distance Test (DMRT) at the 5% level. The sign (-) indicates no interaction.

Table 3 shows that the number of leaves of cayenne peppers given NPK and MSG fertilizers on cayenne pepper plants is very important. The number of leaves at observations 2, 4 and 6 weeks with MSG treatment at 5.0 g/plant with 7.5 g/plant showed a significant difference, although at 6 weeks observations at 5.0 g/plant and

7.5 g/plant plants show not real. Thus the MSG 5.0 g/plant treatment showed the largest number of leaves, while the NPK fertilizer treatment was not significantly different. The addition of sufficient nitrogen elements will increase the absorption of phosphorus which results in a faster plant growth rate (Fairhurst, et al., 2009 cit. Hutasoit, 2019). Phosphorus can serve to strengthen plant leaves so they don't fall off easily. The nutrient Na contained in MSG can help accelerate the rate of plant growth. In addition, MSG also contains 7.5% N which is needed for the formation of plant vegetative parts such as leaves (Putra, et al., 2021). The number of leaves on the plant will increase with the increase in plant height because the growing point of the plant will increase the higher the plant (Hutasoit, 2019). MSG also contains amino acids that can help plant growth when young so that it can stimulate more leaves (Pujiansyah, et al., 2018).

Table 3 also shows that the number of secondary branches at 2 and 4 weeks on MSG administration was significantly different, while 6 MST did not show a significant difference. Likewise for the application of NPK fertilizer showed no significant difference. Treatment The treatment with MSG 5.0 g/plant was significantly different from the other treatments. This is because MSG can help accelerate plant growth such as research conducted by Jannah et al., (2018) that MSG contains N nutrients which can function to help accelerate plant growth, while phosphate elements can help N performance in cell formation and vegetative growth. such as the growth of plant shoots (Hutasoit, 2019).

Table 3. Average number of leaves and number of branches of cayenne pepper

Treatment	Number of leaves (strands)			Number of branches (branches)		
	Observation time: weekly			Observation time: weekly		
	2	4	6	2	4	6
NPK fertilizer dosage						
P1 =1.5 g/plant	15,92 b	68,33 a	122,42 a	4,17 a	9,42 a	12,75 a
P2 =3.0 g/plant	18,67 a	74,92 a	124,25 a	4,00 a	9,67 a	12,67 a
MSG Dosage						
M0=0.0 g/plant	15,33 q	63,83 q	100,00 q	3,33 q	9,00 q	12,17 p
M1=2.5 g/plant	15,67 q	71,17 q	120,00 pq	4,00 q	9,83 pq	13,00 p
M2=5.0 g/plant	21,33 p	87,83 p	147,50 p	5,17 p	11,33 p	13,83 p
M3=7.5 g/plant	16,83 q	63,67 q	125,83 pq	3,83 q	8,00 q	11,83 p
Interaction	(-)	(-)	(-)	(-)	(-)	(-)

Note: Numbers followed by the same letter show no significant difference based on Duncan's Multiple Distance Test (DMRT) at the 5% level. The sign (-) indicates no interaction.

Table 4 shows that in principle the number of fruits per plant from the first to the sixth harvest with NPK treatment at a dose of 1.5 g/plant and 3.0 g/plant can be said to show no significant difference in each harvest of cayenne pepper. It

appears that when the fifth harvest has shown the peak harvest of cayenne pepper, then the yield will decrease at the time of the sixth harvest. This happens because the making of the planting media is too porous so that nutrients are leached because it uses a ratio of soil, husk charcoal and compost with 3:1:1. The soil used is Regosol soil including light soil or sandy soil so it is less able to store water.

Table 4. Average number of fruit per plant per harvest (fruit)

Treatment	Yields					
	1	2	3	4	5	6
NPK fertilizer dosage						
P1 =1.5 g/plant	1,42 a	2,75 a	4,58 b	6,83 a	10,92 a	7,85 a
P2 =3.0 g/plant	1,41 a	2,92 a	5,67 a	6,83 a	12,33 a	8,52 a
MSG Dosage						
M0=0.0 g/plant	1,25 q	2,33 r	5,00 p	6,17 q	11,50 q	7,81 q
M1=2.5 g/plant	1,21 q	2,67 qr	5,50 p	5,67 q	11,17 q	7,88 q
M2=5.0 g/plant	2,02 p	3,33 p	5,50 p	9,83 p	14,50 p	10,01 p
M3=7.5 g/plant	1,17 q	3,00 pq	4,50 p	5,67 q	9,33 q	7,03 q
Interaction	(-)	(-)	(-)	(-)	(-)	(-)

Note: Numbers followed by the same letter show no significant difference based on Duncan's Multiple Distance Test (DMRT) at the 5% level. The sign (-) indicates no interaction.

The use of MSG at a dose of 5.0 g/plant can be said at the time of the first to sixth harvest shows the highest number of fruits per plant per harvest compared to other treatments, namely 0.0 g/plant, 2.5 g/plant and 7.5 g /plant. The MSG dose of 5.0 g/plant is the best for cayenne pepper, this is because the use of MSG that is too high can cause obstacles, while if there are too few plants will experience a lack of nutrients. Thus the side effects of MSG are the same as the effects of growth hormones. The gibberellin hormone from MSG causes cell elongation and accelerates cell division. Giving MSG with a sufficient dose can keep the flowers from falling so that more flowers become fruit (Gresinta, 2015).

Table 5 shows that the application of NPK fertilizer of 3.0 g/plant and MSG dose of 5.0 g/plant could provide a higher number of fruits per plant of cayenne pepper than NPK fertilizer of 1.5 g/plant and MSG of 0.0 g/plant, 2.5 g/plant and 7.5 g/plant. This means that the higher the dose of NPK fertilizer treatment, the higher the number of fruit produced. However, the higher the dose of MSG given can cause a decrease in plant fruit yields, as well as the lower the dose of MSG given.

The results of the highest number of fruit per plant in this study reached 37.84 fruit at the treatment dose of NPK fertilizer and MSG dose of 45.20 fruit. The results of the description reached the number of fruit per plant ranging from 369 fruit. The results of the study are still very far from approaching the results of the description. This can happen because the results of the cayenne pepper are

harvested not only 6 times, but the cayenne pepper is harvested many times even up to 2 years of age.

Table 5. Average number of total fruit per plant, Weight of total fresh fruit per plant and Harvest Index

Treatment	Total fruit number per plant (fruit)	Total fresh fruit weight per plant (g)	Harvest Index
NPK fertilizer dosage			
P1 =1.5 g/plant	34,35 b	34,46 b	0,50 a
P2 =3.0 g/plant	37,84 a	37,40 a	0,54 a
MSG Dosage			
M0=0.0 g/plant	34,06 q	33,22 q	0,49 p
M1=2.5 g/plant	34,07 q	33,99 q	0,52 p
M2=5.0 g/plant	45,20 p	47,53 p	0,58 p
M3=7.5 g/plant	31,03 q	28,99 r	0,49 p
Interaction	(-)	(-)	(-)

Note: Numbers followed by the same letter show no significant difference based on Duncan's Multiple Distance Test (DMRT) at the 5% level. The sign (-) indicates no interaction.

The planting medium used is a mixture of soil, husk charcoal and compost with a ratio of 3:1:1. By using Regosol soil type means less soil fertility. In the manufacture of planting media must always pay attention to soil fertility. The concept of planting media is 45% mineral material, 25% water, 25% air and 5% organic matter.

Table 5 also states that the doses of NPK 3.0 g/plant and MSG 5.0 g/plant on total fresh fruit weight per plant of cayenne pepper showed significantly different results compared to other treatment combinations. The use of NPK 3.0 g/plant resulted in higher fresh fruit weight per plant than 1.5 g/plant. This is because the increasing dose of NPK fertilizer can increase the amount of fruit weight per plant (Nurjanani, 2016). Meanwhile, MSG 5.0 g/plant at fresh fruit weight per plant was higher than 0.0 g/plant, 2.5 g/plant and 7.5 g/plant. Total fruit weight per plant with MSG administration of 7.5 g/plant caused a decrease in crop yields. This is due to high levels of Na which can cause plants to experience salinity (salt) and this event has been seen with a decrease in yield and affects the length of plant roots, where root length will affect the absorption of water and nutrients from the soil.

Harvest index is a comparison between economic products with biological products in a dry product state. The harvest index shows the comparison of the distribution of assimilated yields between yielded biomass and overall biomass. The harvest index is calculated to determine the ability of plants to distribute assimilate to the bottom or sink (Suwarto, et al., 2018). The results of the analysis of the diversity of the harvest index showed that there was no interaction between the

doses of NPK fertilizer and MSG, and showed that all treatments did not show a significant difference. This means that all treatment doses of NPK and MSG fertilizers in the ability of plants to distribute assimilate to the bottom or sink are the same.

From the tables above, it can be seen that the interaction between the doses of NPK fertilizer and MSG also did not show a significant difference. Interaction is the tendency of a factor to have a different effect on various levels of other factors (Sutjihno, 1992).

CONCLUSION

Based on the results of the analysis in this study, it can be concluded that:

1. There was no interaction between the dose of NPK fertilizer and monosodium glutamate (MSG) on the growth and yield of cayenne pepper.
2. The best dose of NPK 3.0 g/plant and MSG 5.0 g/plant for growth and yield of cayenne pepper includes number of leaves, number of fruits per plant, total number of fruits per plant and total fruit weight per plant.
3. The results of this study have not been able to approach the results in the description of the Dewata variety of cayenne pepper.

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