



RESEARCH ARTICLE

MICRO AND MACRO FERTILIZER TEST ON GROWTH AND YIELD OF CAYENNE PEPPER (*CAPSICUM FRUTESCENS L*)

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ABSTRACT

Micro and Macro Fertilizer Test on growth and yield of cayenne pepper (*Capsicum frutescens L*). Research were used a faktorial randomized design, first factor is micro fertilizer (K), consisted of 4 levels And secon factor is macro fertilizer (P) treatment consisted 4 levels, finally cannot be maximum utilized by plants, the best growth and yield obtained on application of micro fertilizer with a dosage 4 g L⁻¹ of water (K₂) for plant height ranges from 5-22 cm, number of leaves 6-69 strands, started flowering an aged 30,94 days, harvesting aged 64 days, and weight of fruit per plant in each harvest time 10,99 grams. On macro fertilizer treatment showed non significant effect in the initial growth, that on the plant height and number of leaves at aged 15 Days After Planting (DAP), highly significant effect on plant height aged 30 DAP and the number of leaves aged 30 and 45 DAP, as well as for harversting age and weight of fresh fruit in each harvest time, and for plant height aged 45 and 60 DAP, number of leaves aged 60 DAP and flowering age showed highly significant effect. The best growth and yield obtained on application of macro fertilizer with a dosage 10 gr polybag⁻¹ (P₃) which is for plant height ranges between 5-24 cm, number Of leaves 6-83 strands, flowering started on age 27,5 days, harvesting age 63,31 days and the results obtained 13,744 grams plant⁻¹ in each harvest time.

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INTRODUCTION

Organic farming is a holistic and integrated agricultural production system by optimizing the health and productivity of naturally agroecosystem to produce sufficient quality and sustainable of food and fiber (Tombe and Sipayung, 2010). Micro nutrient elements are nutrients which is needed by plants in small amounts or <50mg/kg of materials (<0.1%), such as Boron, iron, manganese, copper, zinc, clor, molybdenum and cobalt, all nutrients have the same effect that is harmful to the growth if it was a shortage, but if excessive it will become a toxic. One of micro organic fertilizer is organic prime fertilizer, the composition of the fertilizer content is cobalt 0,8 ppm, 1,06 ppm copper, manganese 5,54%, zinc 17,48 ppm, molybdenum 21,44 ppm, iron 39,8 ppm, and lead 9,92 ppm. Vedagro organic fertilizer is a new innovation of organic fertilizer which is a macro fertilizer processed in the factory, this fertilizer has been tested on several types of plants one of them it was given to rice plants in Bali and the results are very good, this fertilizer has a high nitrogen element. Due to the high nitrogen element contained in it, other than that this fertilizer is widely used in oil palm and rubber plantations.

The composition of macro organic material content is nitrogen element of 11-12%, potassium element (k₂O) 4,5-6% and phosphorus (P₂O₅) 0,4-0,5%, boron 0.0017%, iron 0.048% copper 0.0012% and zinc 0.001% (PT.PAFI, 2013) Cayenne pepper (*Capsicum frutescens L*.) is one of the important vegetable s, daily consumed as a seasoning flavor and high economic value. Currently, the demand for cayenne pepper from year to year increases. Generally, people consume cayenne pepper because of its spicy flavor. The spicy taste of cayenne pepper is caused by the content of capsaicin (Nugroho et al, 2006, in Halim, 2012). This research aims to determine the extent to which the combination of micro fertilizer and macro fertilizer on growth and yield of cayenne pepper (*Capsium frutescens L*).

RESEARCHI METHODS

The research was conducted on May up to August 2016. Started from preparation up to harvest. This research is located on campus of STIPER Kutai Timur's area. Materials method is local Cayenne pepper seeds, Micro organic fertilizer using Prima Organic type, macro organic fertilizer using Vedagro organic, top soil, Furadan 3G and Dithane M-45, polybag size 8 X 14 cm and 50 X 30 cm.

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Research tools used are hoe, sickle, scissors, meter, gembor (tools for flushing plant), measuring glass, sprayer, and stationery. The experiment was set up as a 4×4 factorial in a complete randomized design with 3 replications. The first factor was treatment of micro fertilizer Prime organic which consists for levels namely; K_0 (control), K_1 (dosage 3 gr L^{-1} of water), K_2 (dosage 4 gr L^{-1} of water), dan K_3 (dosage 5 gr L^{-1} of water). and the second factor was treatment of macro fertilizer vedagro organik with four levels namely; P_0 (control), P_1 (dosage 1.000 kg ha^{-1} atau 5 gr polybag $^{-1}$), P_2 (dosage 1.500 kg ha^{-1} atau 7,5 gr polybag $^{-1}$) dan P_3 (dosage 2.000 kg ha^{-1} atau 10 gr polybag $^{-1}$). Data obtained were analyzed by Analysis of Variance, if comparison of variance resulted was significant will be advanced test by least significant difference (LSD) test 5% of probability levels.

Initial preparation which is conducted in the research is a seedbed by filling polybags size 8 X 14 cm. Then sowing two seeds for each polybag of local cayenne pepper and watering with water, after the seeds in small polybags grow as high as 15 cm, leaved 5 or 1 month old, then the seedlings are ready to be transplanting into large polybag. Preparation location for laying the large polybag size 50 X 30 cm and filling polybags with soil, laying polybags size 50 X 30 cm in field with space in between polybags 50 X 100 cm (AAK, 1999). Weeding weed conducted on 2 weeks after planting by removing weeds that grow in polybags, plants watering conducted twice a day i.e morning and afternoon. Stching conducted 1 week after planting by replacing dead plants. Fertilizer application the dosage be adapted by treatment was 3 replications was applied for each dosage by using first stage comparison 20% for each one, second stage 35%, and third stage 45%. Treatment of micro fertilizer (organic prime) applied by sprayed by the leaf, the first stage applied 7 days after planting, the second stage applied 20 days after planting and the third stage applied 40 days after planting. The treatment of macro fertilizer (organic vedagro) in the first stage was conducted 3 days before planting, the second stage was conducted when the plant was 20 days after planting, and the third stage was conducted when the plant was 40 days after planting. The parameters observed were: Plant height (cm), Number of Leaves (Strand), Plant Aged of Flowering (DAP), Plant Aged at First Harvest (DAP), and Weight of fresh fruit per plant (g).

RESULTS AND DISCUSSION

Plant Height (cm)

The result of variance on the effect of micro fertilizer application on the average plants height aged 15, 30, 45 and 60 days after planting it showed non significant effect, as well as the effect of macro fertilizer treatment at aged 15 days after planting whereas the aged 30 and 45 days after planting was significant effect and 60 days after planting showed highly significant effect, and the interaction between the two treatments was not significant. Research result of micro and macro fertilizer on an average plant height of cayenne pepper age 15, 30, 45 and 60 days after planting is presented in Table 1. The application effect of micro and macro fertilizer on plant height 15 days after planting was non significant. This is because the micro and macro fertilizers provided have not been able to be utilized by the cayenne pepper due to the condition of the plant is still small and the macro fertilizer was applied was fully unavailable because the macro fertilizer was slow release. In accordance with PT. PAFI (2013) stated that macro

fertilizer vedagro organic type its granular/grain shaped which is slow release so that the fertilizer decomposes slowly and takes a relatively long time to be available for the plant. Analysis of variance result on micro fertilizer aged 30 days after planting was non significant it is suspected because the micro fertilizer which is applied through the leaves easily to evaporate so that the presence of nutrients are insufficient for supporting the photosynthesis activities. This is in accordance with opinion of Munawar (2011) stated that the provision of fertilizer through the leaves should pay attention to the weather conditions and crop conditions so as not to quickly evaporate. Furthermore Heddy (2010) stated that the micro nutrients needed in small amounts, micro nutrients can be sourced from mineral rocks, water, and remnants of organic materials. The result of the research on the effect of macro fertilizer application showed that the effect of macro fertilizer was significantly on average of plant height 30 days after planting. This is because at that time the whole part of plant has been formed perfectly including the roots so that it able to absorb the nutrients which is been given, on age 30 days after planting the required nutrients have been available for the plant. In accordance with opinion of Harjowigeno (2007) stated that the plants are sufficient with nutrients, especially nitrogen will improve vegetative growth in these plants.

Based on the result of LSD test 5% of probability levels shows that the treatment of macro fertilizer application with 10 gram polybag $^{-1}$ (P_3) dosage was not significant by the treatment of macro fertilizer application with dosage 7,5 gram polybag $^{-1}$ (P_2) and the treatment of macro fertilizer application with dosage 5 gram polybag $^{-1}$ (P_1), but significant by the treatment without macro fertilizer application (P_0). The treatment of macro fertilizer application with dosage 7,5 gram polybag $^{-1}$ (P_2) was not significant with the treatment of macro fertilizer application with dosage 5 gram polybag $^{-1}$ (P_1) and treatment without macro fertilizer application (P_0). The treatment of macro fertilizer application with a dosage 5 gram polybag $^{-1}$ (P_1) was not significant with the treatment without macro fertilizer application (P_0).

The result of the research on the effect of micro fertilizer application on average plant height 45 days after planting showed not significant. This is because the micro fertilizer which are applied by spraying through the leaves quickly evaporates so that when the plant in generative period the micro nutrient content was unavailable for the plant, in addition to the presence of micro nutrients needed in small quantities sufficient by the presence of macro fertilizer. This is in accordance with the opinion of Heddy (2010) that micro nutrients are needed in small quantities and the existence can be derived from mineral rocks, water and the remnants of organic materials.

The results of research on the effect of macro fertilizer application on average plant height age 45 days after planting showed a significant effect. This is because when the plant in the generative phase requires a lot of nutrients for the sustainability of flowering and fruit formation, the required nutrients are supplied with the application of macro fertilizer ready to be absorbed by the plant. In accordance with the opinion Harjowigeno (2007) stated that a plant will grow fertile, if nutrient needs was fulfilled, such as nutrient elements nitrogen, phosphorus and potassium are available both on planting media and nutrient content in fertilizers, especially in the vegetative growth phase in plants.

Table 1. The Application Effect of Micro and macro fertilizer on an average plant height of cayenne pepper Age 15, 30, 45 and 60 HST (Cm)

Treatment	Average Plant Height			
	15 dap	30 dap	45 dap	60 dap
Micro Fertilizer	ns	ns	ns	ns
P ₀	4,576	8,938	13,506	20,018
P ₁	5,275	9,325	13,550	20,375
P ₂	5,663	9,744	15,725	22,813
P ₃	4,036	8,644	13,144	18,806
Macro Fertilizer	ns	*	**	**
K ₀	4,694	7,713b	11,313b	15,253b
K ₁	5,131	8,600ab	13,713ab	20,316ab
K ₂	4,738	9,956ab	15,144a	22,175a
K ₃	5,438	10,381a	15,756a	24,269a
Value of LSD 5% of probability levels		2,574	3,783	5,045

The numbers were followed by the same letters in an average columns are non significant different on LSD test 5% of probability levels, ns = non significant, * = significant ** = highly significant

Table 2. The Application Effect of micro and macro fertilizer on an average number of leaves of cayenne pepper Age 15, 30, 45 and 60 HST (strand)

Treatment	Average Number of leaves			
	15 dap	30 dap	45 dap	60 dap
Micro Fertilizer	ns	ns	ns	ns
P ₀	5,625	13,938	28,188	57,813
P ₁	5,688	14,250	33,313	64,875
P ₂	6,313	15,063	33,563	68,940
P ₃	6,750	13,438	30,938	62,600
Macro Fertilizer	ns	*	*	**
K ₀	5,688	11,313b	24,063b	39,365c
K ₁	6,063	13,438ab	29,875sb	59,750bc
K ₂	6,188	13,938ab	34,875ab	66,750ab
K ₃	6,438	18,000a	37,188a	82,563a
Value of LSD 5% of probability levels		5,351	10,791	24,267

The numbers were followed by the same letters in an average columns are non significant different on LSD test 5% of probability levels, ns = non significant, * = significant ** = highly significant

Table 3. The Application Effect of micro and macro fertilizer on an average flowering age, harvesting age and fresh fruit yield per plant each harvest time

Treatments	Parameter		
	Age of Flowering (days)	Harvest Age (Days)	Fresh Fruits (grams)
Micro fertilizer	ns	ns	ns
P ₀	33,000	67,000	9,804
P ₁	31,880	66,190	11,404
P ₂	30,937	64,875	13,203
P ₃	32,500	66,250	10,991
Macro fertilizer	**	*	*
K ₀	35,500a	68,940a	10,228b
K ₁	35,000a	66,690ab	10,451b
K ₂	30,313a	65,380ab	10,978ab
K ₃	27,500b	63,310b	13,774a
Value of LSD 5% of probability levels	5,372	3,880	2,284

The numbers were followed by the same letters in an average columns are non significant different on LSD test 5% of probability levels, ns = non significant, * = significant ** = highly significant

Based on LSD test 5% of probability levels showed that the treatment of macro fertilizer application with dosage 10 gram polybag⁻¹ (P₃) was not significant with the treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) and the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), but significant by the treatment without the application of macro fertilizer (P₀). Treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁) but significant by the treatment without macro fertilizer application (P₀), the treatment of macro fertilizer application with 5 grams polybag⁻¹ (P₁) with not significant by the treatment without macro fertilizer application (P₀).

Non significant effect showed on average plant height by the treatment of micro fertilizer. This is because micro fertilizer is a fertilizer that is needed in small quantities so it does not affect on plants growth that will be into the generative phase, in addition to micro fertilizer provided through the application of spraying through the leaves quickly evaporate finally not available for plants. In accordance with Suttedjo (2008) stated that macro nutrients are more absorbed by plants in large quantities than micro nutrients absorbed by plants in small quantities. Suttedjo further stated that Nitrogen is the main nutrient for plant growth, which is generally necessary for the formation of vegetative parts of plants, such as leaves, stems, and roots, but if the lack of nutrients Nitrogen causes chlorosis in leaves, plant growth becomes slow and dwarfed.

Significantly effect on average plant height of cayenne pepper by the treatment of macro fertilizer on aged 60 days after planting. This is because the continued fertilizer was applied 20 days before planting has been decomposed so as to provide nutrients for generative growth of chili, especially the elements of N, P and K are needed for flowering, formation and ripening of fruit. This is in accordance with the opinion of Sutedjo (2008) stated that plants at the time of the generative period requires many essential nutrients to sustain growth and yield. Based on the result of LSD 5% of probability levels showed that the treatment of macro fertilizer application with dosage 10 gram polybag⁻¹ (P₃) was not significant by macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) and the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), but not significant from the treatment without the macro fertilizer application (P₀). Treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), but not significant with treatment without macro fertilizer application (P₀). Treatment of macro fertilizer application with dosage of 5 gram polybag⁻¹ (P₁) was not significant with treatment without the application of macro fertilizer (P₀).

Number of Leaves (strand)

Analysis of variance results the treatment effect of micro fertilizer application on average number of leaves aged 15, 30, 45 and 60 days after planting showed was not significant so for the treatment of macro fertilizer aged 15 days after planting, whereas the age 30 and 45 after planting was significantly, then age 60 days after planting was highly significant. The interaction between the two different treatments was not significant with the average number of leaves aged 15, 30, 45 and 60 days after planting. Results details the calculation analysis of variance as attached. The results of research on the effect of micro and macro fertilizer application on average number of leaves of cayenne pepper aged 15, 30, 45 and 60 days after planting are presented in Table 2. The effect of macro fertilizer application on average number of leaves of cayenne pepper aged 15 days after planting was not significant due to the micro fertilizer has not been maximum utilized, considering the plants are still small as well as the utilization of macro fertilizer that is slow release so that the nutrient needs which is forming the stems section of plant unavailable. This is in accordance with the opinion of PT PAFI (2013) stated that the macro fertilizer type of vedagro organic fertilizer was a slow release grains are not easily dissolved and not easily destroyed, the fertilizer will release nutrients slowly and the benefits are only seen after a few weeks after fertilization. Similar to the Statement of Anonymous (2007b) stated that the type of slow release fertilizer will be able to provide nutrients in the long-term and slowly into the soil.

Based on the result of LSD 5% of probability levels showed that the treatment of macro fertilizer with dosage 10 gram polybag⁻¹ (P₃) was not significant with the treatment of macro fertilizer with dosage 7,5 gram polybag⁻¹ (P₂) and the treatment of macro fertilizer with dosage 5 gram polybag⁻¹ (P₁), but not significant by the treatment without application of macro fertilizer (P₀). Treatment of macro fertilizer with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with treatment of macro fertilizer with dosage 5 gram polybag⁻¹ (P₁), but not significant with treatment without macro fertilizer (P₀). Treatment of macro fertilizer with dosage of 5 gram polybag⁻¹ (P₁) was highly significant with treatment without application of macro fertilizer (P₀).

(P₁) was not significant with treatment without application of macro fertilizer (P₀). Analysis of variance results the treatment effect of macro fertilizer was significant. This is because when the plants aged 30 days after planting, the plants in the generative phase (flowering) it's characterized by reduced vegetative phase growth rate, therefore the nutrient absorbed by plants was increasing, the nutrient needs are supplied from the application of macro fertilizer vedagro which contains many nutrients N, P and K. In accordance with Sutedjo (2008) stated that nitrogen as the main nutrient for plant growth, which is generally very necessary for the formation or growth of vegetative parts of plants, such as leaves, stems, and roots. The plant growth period are requires proper nutrition to support the vegetative growth. Therefore, the needs of both macro and micro nutrients is very important for each plant and can not be replaced by other elements, of course with different levels according to the plant species because if deficiency of nutrients will be obstruct the growth and yield of the plant itself.

Further Hermawan (2013) stated that the nutrient is a component required by plants a large quantities to support optimal plant growth. Based on the result of LSD 5% of probability levels showed that the treatment of macro fertilizer with dosage 10 gram polybag⁻¹ (P₃) was not significant by the treatment of macro fertilizer with dosage 7,5 gram polybag⁻¹ (P₂) and the treatment of macro fertilizer with dosage 5 gram polybag⁻¹ (P₁), but not significant by the treatment without application of macro fertilizer (P₀). Treatment of macro fertilizer with dosage 7,5 gram polybag⁻¹ (P₂) was not significant by treatment of macro fertilizer with dosage 5 gram polybag⁻¹ (P₁), but not significant by treatment without macro fertilizer (P₀). Treatment of treatment of macro fertilizer with dosage of 5 gram polybag⁻¹ (P₁) was not significant by treatment without the application of macro fertilizer (P₀).

Analysis of variance results the treatment effect of macro fertilizer was significant on average number of leaves aged 45 days after planting. This is be expected due to the availability of macro nutrients supplied from macro fertilizer able to meet the needs of cayenne pepper plants for vegetative phase and generative phase. Noviza (2007) argues that the success of plants in shaping the growth of leaves, stems, roots, flowers and fruits should be supported by the availability of sufficient nutrient supply. Anonymous (2010) stated that cayenne pepper plants require 1-4% nitrogen element, 0.1-0.4% phosphorus element and 1-4% of potassium element to prepare dry plant material. Based on the result of LSD 5% of probability levels showed that the treatment of macro fertilizer application with dosage 10 gram polybag⁻¹ (P₃) was not significant by the treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) and the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), but not significant by the treatment without application of macro fertilizer (P₀). Treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), but not significant with treatment without macro fertilizer application (P₀). Treatment of macro fertilizer application with dosage of 5 gram polybag⁻¹ (P₁) was highly significant with treatment without application of macro fertilizer (P₀).

Analysis of variance results the treatment effect of macro fertilizer was highly significant on average number of leaves 60 days after planting. This is because the macro fertilizer

applied has been decomposed perfectly so that chili plants can utilize the nutrient content in it. In accordance with opinion of Sutedjo Sutedjo (2008) stated that the granular fertilizer takes time to break down completely. Based on the result of LSD 5% of probability levels it can be seen that the treatment of macro fertilizer application with dosage 10 gram polybag⁻¹ (P₃) was not significant by the treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂), but not significant by the treatment of macro fertilizer application with a dosage 5 gram polybag⁻¹ (P₁) and treatment without application of macro fertilizer (P₀). Treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant by the treatment of macro fertilizer application with dosage of 5 gram polybag⁻¹ (P₁), but significant by the treatment without application of macro fertilizer (P₀). Treatment of macro fertilizer application with dosage of 5 gram polybag⁻¹ (P₁) was not significant by treatment without application of macro fertilizer (P₀).

Flowering Age, Harvest Age and Weight of Fresh Fruit per plant

Analysis of variance results the treatment effect of micro fertilizer on average flowering age, harvest age and fresh fruit yield per plant each harvest time showed a not significant effect on treatment effect of macro fertilizer application showed significant effect on parameter of harvest age and weight of fresh fruit per plant each harvest time while the flowering age showed highly significant, Results details the calculation analysis of variance as attached. The results of research on the effect of micro and macro fertilizer application on average flowering age, harvesting age and fresh fruit yield per plant each harvest time were presented in Table 3. The effect of micro fertilizer application on flowering age showed non significant effect. This is because the micro fertilizer was sprayed through the leaves was quickly evaporate and partly utilized by photosynthesis process as a catalyst. In accordance with Gardner's, et al (2008) opinion stated that the rate of photosynthesis depends on sunlight and nutrient reserves that exist in the soil and the ability of plants for process of photosynthesis. The effect of macro fertilizer application on first flowering age on cayenne pepper showed highly significant effect. This is because the nutrient content of macro fertilizer has been decomposed so that nutrients contained in the planting medium have been available for the plant, the content of fertilizers in the form of P and K contained in macro organic fertilizer gives a rapid influence on the process of flower formation on cayenne pepper plants. In accordance with Sutedjo (2008) stated that Element P is necessary for generative growth of plants that encourage the formation and growth of flowers and fruits, while the K element is necessary for shaping and sending (carbohydrates), regulating the water requirements of plant tissues and encouraging water absorption. The K element determines the productivity of the plants for producing the fruit, both in quantity and quality. Based on the result of LSD 5% of probability levels showed that the treatment of macro fertilizer with dosage 10 gram polybag⁻¹ (P₃) was significant by the treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂), the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁) and treatment without application of macro fertilizer (P₀). The treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), and treatment without application of macro fertilizer (P₀).

Treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁) was not significant with treatment without application of macro fertilizer (P₀).

The effect of macro fertilizer application on first harvest age showed highly significant effect. This is because the macro nutrients contained in the organic fertilizer vedagro able to accelerate and support the formation process of flowers and fruit so that at age 63, 125 days after planting showed a significant effect on the first harvest age. In accordance with Sutedjo (2008) stated that the nutrients of P (Phosphorus) accelerate flowering and ripening fruit, seeds or grain. Nutrients needed on generative phase precisely the P element that act in the formation of flowers and fruits, while the K elements act in the formation of carbohydrates and sugars that serve to make the quality of flowers and fruit produced will be better. The point is K fertilizer also needed by plants to strengthen the condition of plants so as not easily attacked by pests and diseases (Anonymous, 2007 b). While the application of micro fertilizer on the first harvest age showed non significant effect. It is suspected that micro fertilizer was needed in small quantities so that the requirement can be filled by the application of macro fertilizer. Due to in accordance with the opinion of PT PAFI (2013) that the macro fertilizer of organic vedagro type also contains some micro elements such as boron, zinc, copper, and manganese, added by novizan (2007) that micro fertilizer is the type of fertilizer needed by plants relatively small, but important for supporting the success of the processes in plants.

Based on the result of LSD 5% of probability levels it can be seen that the treatment of macro fertilizer application with dosage 10 gram polybag⁻¹ (P₃) is not significant with the treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂), and the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁), but significant with the treatment without application of macro fertilizer (P₀). The treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁) and treatment without macro fertilizer application (P₀). Treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁) was not significant with treatment without the application of macro fertilizer (P₀). The effect of micro fertilizer application on weight of fresh fruit per plant each harvest time shows non significant effect. This is because the micro nutrients obtained when application of fertilization age 40 days after planting has evaporated consequently the nutrients did not produce significant differences. In accordance with Novizan (2007) stated that the fertilizer provided by spraying on the leaves will easily evaporate, because the fertilizer is a liquid that if exposed by the sunlight will be easily evaporate. Analysis of variance results the treatment effect of macro fertilizer on yield of fresh fruit per plant on each harvest time shows significant this is because the macro fertilizer which is applied in accordance with the needs of the cayenne pepper so that it is able to complete the phase of its life, therefore macro fertilizer application on aged 40 days after planting has become available so that the generative period can utilize the nutrient content in it, especially the content of phosphorus and potassium elements are very useful for the formation of fruit and ripening. This is in accordance with the opinion of Mansyah (2015) stated that the element of phosphorus play an active role for the formation of roots, flowers, fruits and seeds. Fruit is included in the generative phase which is

also more influenced by external factors such as light, moisture, water supply and nutrient supply for it needs attention. Ripe fruit is determined by several things, among others: the number of flowers produced by the plant, the percentage of the pollinated flower, the percentage of the fertilized flowers and the percentage of young fruit that can grow until it becomes a ripe fruit (Darjanto and Satifah, 1984). These factors are inherited factors, although external factors such as environmental conditions, climate, and soil fertility can affect the crops. Furthermore Wahono, et al, (2011) stated that the granular fertilizer will be absorbed by the plant slowly (slow release) so it can be used in a long time this can save the use of fertilizer because the number of fertilizer was less wasted. Based on the result of LSD test of 5% of probability levels showed that treatment of macro fertilizer application with dosage 10 gram polybag⁻¹ (P₃) was not significant with the treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂), but significant with the treatment of macro fertilizer application with a dosage 5 gram polybag⁻¹ (P₁), and treatment without application of macro fertilizer (P₀). The treatment of macro fertilizer application with dosage 7,5 gram polybag⁻¹ (P₂) was not significant with the treatment of macro fertilizer application with dosage 5 gram polybag⁻¹ (P₁) and treatment without macro fertilizer application (P₀). Treatment of macro fertilizer with dosage 5 gram polybag⁻¹ (P₁) was not significant with treatment without application of macro fertilizer (P₀).

Conclusions and Suggestions

Conclusion

Based the results of research the effect of micro and macro fertilizer application on growth and yield of cayenne pepper (*Capsicum frutescens* L.) can be concluded:

- The effect of micro fertilizer application was not significant effect on growth and yield of cayenne pepper
- The best application of micro fertilizer application on growth and yield of cayenne pepper was shown on dosage 4 gram liter⁻¹ of water (K₂), weight of fresh fruit per plant each harvest time averages 13,203 grams.
- The effect of macro fertilizer application was not significant effect on the initial growth of plant height and number of leaves aged 15 days after planting.
- The effect of macro fertilizer application was highly significant effect on plant height age 30 and number of leaves aged 30, 45 days after planting, as well as for harvest age and weight of fruit per plant.
- The effect of macro fertilizer application was highly significant effect on plant height age 45 and 60 and number of leaves aged 60 days after planting, as well as for flowering age.
- The best application of macro fertilizer application on growth and yield was shown on dosage 10 gram polybag⁻¹ (P₃), for weight of fresh fruit per plant each harvest time average 13,744 grams
- The interaction between micro and macro fertilizers treatment was not significant, this shows that each treatment does not affect each other.

Suggestion

- Application of micro fertilizers should be adapted by the conditions of plants and weather so that it can be directly utilized by plants
- Cayenne pepper cultivation can used macro fertilizer vedagro organic type with a dosage 10 grams polybag⁻¹

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