

# Application of Inorganic Fertilizer on 8 Varieties of Red Chili (*Capsicum annum* L) in the Lowlands

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## ABSTRACT

The purpose of this study was to determine the productivity of eight varieties of large red chili (*Capsicum annum* L) against fertilization levels grown inorganically in the lowlands. Observations made in this study included non-destructive, destructive and harvest observations. Among others: Number of branches per plant, plant height, number of leaves, number of flowers, number of fruit, fruit set, for destructive observation is the measurement of leaf area, while for harvest observation: fresh weight of fruit planted, fresh weight of fruit per plot, number of fruit per plant, fruit size, number of fruit that are attacked by pests. Analysis of the observed data used analysis of variance (F count). If there were significant differences between the treatments, a Least Significant Difference (LSD) test was carried out with an error rate of 5%. Based on the research results from observational data, it shows that several doses of inorganic fertilizers on 8 large chili cultivars did not produce any interactions. Likewise with the use of inorganic fertilizers with large chili cultivars with doses of P1: Urea 100kg ha<sup>-1</sup> + Sp-36 150 kg ha<sup>-1</sup>, P2: Urea 175 kg ha<sup>-1</sup> + Sp-36 300 kg ha<sup>-1</sup>, and P3: Urea 250 kg ha<sup>-1</sup> + Sp-36 450 kg ha<sup>-1</sup> had no effect on the various observed variables. Significant effect was obtained from the use of various varieties of chili peppers. These significantly different responses were shown by the variable plant height, production per plant and yield components. Based on plant height observation data up to 84 hst, Jet set had the highest height compared to the other cultivars, which was 32.13% higher than Horizon cultivar. Meanwhile, based on yield component data, the Horizon cultivar produced the highest yield, which was 6.96 ton.ha<sup>-1</sup>, while the lowest was produced by the Hot Chili cultivar, which was 1.66 ton.ha<sup>-1</sup>.

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## 1. INTRODUCTION

Red chili is a vegetable commodity that has high economic value. Chili is an annual herbaceous plant that grows upright because the stems are mostly woody at the base. Generally, chili plants are very branched and can reach 50-150 cm in height (Yamaguchi and Rubatzky, 1995).

Chili plants have wide adaptability, so that their production locations are quite widespread in Indonesia (Adiyoga, 1996). The area of chili plants in Indonesia reaches 162,000 ha with an average national productivity of 4.3 tons/ha (Kusandriani, 1996). The need for red chilies per capita

per year in Indonesia always fluctuates from year to year. Adequate rainfall for the growth of red chili at the time of plant growth until the end of growth ranges from 600 mm-1250 mm per year. If excessive rainfall can cause disease. Lack of rain and no irrigation can also cause stunted chili plants (Pracaya, 2007).

Chili plants are suitable for living in areas with 70-80% humidity. When forming flowers and fruit optimal humidity conditions are very important, because high humidity or above 80% will trigger the growth of fungi which will be detrimental to the growth of chili plants. Conversely, a dry climate or below 70% will dry the chilies and interfere with their generative growth, especially during flower formation, pollination and fruit formation (Anonymous, 2008).

The demand for chili plants is very large because it is one of the most basic spices that requires production to be balanced with consumption, so the planting of chilies is increased so that it can balance the need for chilies. planting chilies in large quantities requires a lot of maintenance, such as fertilization. According to Lingga and Marsono (2007), fertilizer is an accumulation of one or more elements that function to replace elements that have been used up by plants.

Judging from the elements contained in fertilizers are divided into two, namely macro fertilizers and micro fertilizers. In the use of fertilizers, the important thing to note is the elements they contain. Based on the elements it contains, fertilizers are classified into two, namely macro fertilizers and micro fertilizers. Meanwhile, based on the origin, fertilizers are grouped into two types, namely: inorganic fertilizers such as urea (N fertilizer), TSP or SP-36 (P fertilizer), KCl (K fertilizer), and organic fertilizers such as manure, compost, humus and green manure. . Shows that several doses of inorganic fertilizers on 8 large chili cultivars did not produce any interactions.

Likewise with the use of inorganic fertilizers with large chili cultivars with doses of P1: Urea 100kg ha<sup>-1</sup> + Sp-36 150 kg ha<sup>-1</sup>, P2: Urea 175 kg ha<sup>-1</sup> + Sp-36 300 kg ha<sup>-1</sup>, and P3: Urea 250 kg ha<sup>-1</sup> + Sp-36 450 kg ha<sup>-1</sup> had no effect on the various observed variables. Significant effect was obtained from the use of various varieties of chili peppers. These significantly different responses were shown by the variable plant height, production per plant and yield components. Based on plant height observation data up to 84 dap, Jet set cultivar had the highest height compared to the other cultivars, which was 32.13% higher than Horizon cultivar. Meanwhile, based on yield component data, the Horizon cultivar produced the highest yield, which was 6.96 ton.ha<sup>-1</sup>, while the lowest was produced by the Hot Chili cultivar, which was 1.66 ton.ha<sup>-1</sup>.

## **2. METHOD**

### **2.1 Types of research**

The research method used in this study is the experimental method. The experimental method is a form of observation under artificial conditions, where these conditions are created and regulated by the researcher. That is, basically conducting an experiment to see the results, and the results of the experiment will confirm how the causal position is between the variables being investigated.

### **2.2 Research variable.**

This study used 8 large red chili cultivars with the stimulation of chili plants to fertilizer.

### **2.3 Research design**

The study used a split plot design (RPT) which consisted of 2 factors. The first factor (main plot) was three levels of inorganic fertilization and the second factor (subplot) was eight large chili varieties. Each treatment was repeated 3 times.

### **2.4 Sampling location**

Non-destructive observations were carried out 7 times with an interval of 1 week. The samples observed in non-destructive observations were 4 plants in each treatment unit and destructive observations were carried out 3 times, namely on the 3rd, 5th and 7th week. The samples observed in destructive observations were 2 plants in each treatment unit.

### **2.5 Time and Place of Research.**

The research was conducted from February 2009 to May 2009. The research took place in Kedungrejo Village, Rowokangkung District, Lumajang Regency, with a height of 29 m above sea level.

### **2.6 Tools and materials**

This study used 8 cultivars of red chili (Gada Omega, Hot Beauty, Chilli, Restu, Horizon, Jet Set, TM 888), Urea, SP-36, pesticides, stake. While the tools used in this study were rulers, analytical scales, silver black plastic mulch, gembor, trowel, hoes, sickles, and writing implements.

## 2.7 Research procedure

Implementation begins with the nursery and preparation of nursery land and plant maintenance with the stages of irrigation, weeding, fertilizing and pest control and observation.

## 2.8 Data analysis.

Data obtained from observations were tested using the F test with an error rate of 5%. If the data shows a significant difference, continue with the BNT test with an error rate of 5%.

## 3. RESULTS AND DISCUSSION

### 3.1 Research result

#### 3.1.1 Plant height.

From the results of analysis of variance on plant height variables, it was shown that there was no interaction between the use of several doses of inorganic fertilizers and different large chili cultivars, and the treatment of different doses of inorganic fertilizers also did not give significantly different results. Significant differences resulted from the use of different cultivars. The average plant height at the age of observation 14 to 84 days after planting due to the use of several doses of fertilizer and different cultivars of big chili.

**Table 1.** The average height of large chili plants due to the treatment with the use of fertilizer doses inorganic and various cultivars of big chili.

Dosage of inorganic fertilizer Urea + SP36 (kg ha <sup>-1</sup> )		Plant height (cm) day to					
		14 HST	28 HST	42 HST	56 HST	70 HST	84 HST
100+150	(P1)	25.17	38.13	54.25	64,24	70,68	74,34
175+300	(P2)	23.56	37.25	53.20	63,27	71,43	71.52
250+450	(P3)	22.90	36.25	25.52	69.63	84, 71	74,29
BNT 5%	mr	mr	mr	mr	mr	mr	mr

Table 1 shows that the treatment using different cultivars had a significant effect on the variable plant height for all ages of observation. At the beginning of the observation it was shown that the Gada cultivar had the lowest plant height yield which was 33.23% lower than the Hot Chili cultivar. Meanwhile, at the end of the observation (84 hst) it was shown that the Jet set cultivar had the highest height compared to the other cultivars, which was 32.13% higher than the Horizon cultivar.

#### 3.1.2 Production Per Plant

Produksi tanaman pertanaman dapat dilihat pada tabel:

**Table 2.** Average production per large chili plant due to use treatment doses of inorganic fertilizers and various cultivars of large chilies.

Dosage of inorganic fertilizer Urea + SP36 (kg ha <sup>-1</sup> )		Production Per Plant (kg ha <sup>-1</sup> ) 2nd Harvest					
		Harvest 1	Harvest 2	Harvest 3	Harvest 4	Harvest 5	Harvest 6
100+150	(P1)	18.33	23.03	17.03	10.50	5.35	1.20
175+300	(P2)	24,84	24,84	22,72	11.15	4.04	2.60
250+450	(P3)	18,11	28,72	22.15	10.00	2.92	1.00
BNT 5%	mr	mr	mr	mr	mr	mr	mr

The results of the analysis of variance showed that there was no interaction between the use of various doses of inorganic fertilizers and different cultivars of chili peppers, and the treatment of different doses of inorganic fertilizers also did not give significantly different results. Significantly different results were only produced from the use of different cultivars. The average production per plant in the 1st, 2nd, 3rd, 4th, 5th and 6th harvest due to the use of several doses of fertilizer and different cultivars of large chilies. The treatment of using different cultivars had a significant effect on the variable production per plant for all time harvest, except for harvest 1 and harvest

In the 3rd harvest, it was found that Horizon cultivar had the highest production per plant, which was 85.32% more than the Hot Chili cultivar. Furthermore, at the end of the observation, namely at the 6th harvest, it was shown that Horizon cultivar was the cultivar that had the largest production per plant, namely with an amount of 8.75 grams. Thus, from this amount it can be assumed that the production per plant on the Horizon cultivar is 100% more than the other cultivars (except the Omega cultivar).

### 3.1.3 Yield components.

The results of the analysis of variance on the variable fruit weight per fruit, number of fruit formed and the weight per hectare indicates that there was no interaction between the use of several doses of inorganic fertilizers and large chili cultivars different. In the treatment of different doses of inorganic fertilizers did not gives real difference results, real difference results only result from usage different great chili cultivars. Average fruit weight per fruit, number of fruit formed and weight per hectare.

### 3.2 Discussion

The results of the analysis of variance on the variables of fruit weight per fruit, number of fruit formed and weight per hectare showed that there was no interaction between the use of several doses of inorganic fertilizers and different cultivars of big chilies. In the treatment of different doses of inorganic fertilizers also did not give significantly different results, the results were only significant differences resulting from the use of different chili cultivars. Average fruit weight per fruit, number of fruit formed and weight per hectare. From the observational data it was found that at the end of the observation (84 hst) the highest plant height was achieved by the Jet Set variety, which was 90.69 cm.

Meanwhile, the Horizon cultivar is the variety that has the lowest height, which is 61.55 cm. This means that genetically the Jet Set cultivars have vertical or upright growth. This can be seen from the relatively large addition of the Jet Set variety plant height even though it has entered the generative phase. This discrepancy is caused by environmental factors such as soil acidity and high humidity in the planting area. According to Pitojo (2007), the ideal pH or degree of acidity for the growth of chili plants ranges from 5.5 to 6.8. In conditions of soil pH less than 5.5 or more than 6.8, chili production is less than optimal. This is because acidic soils tend to cause poisoning problems with aluminum, iron, and manganese elements; whereas in alkaline soils such as the land used for research, with an acidity degree of 7.69 (appendix 9), it tends to cause problems with inhibiting soil nutrient uptake because it contains bicarbonate elements which hinder the absorption of the ions needed by plants. The high level of humidity in the research area as presented in Appendix 10 also causes a discrepancy between the growth observation variables and the observed yield component variables.

This is in accordance with what was disclosed by Sunaryono (1990) that climatic factors that affect the growth of chili plants include: sunlight, rainfall, air temperature, humidity and wind. tends to cause problems with inhibition of soil nutrient uptake because it contains bicarbonate elements which hinder the absorption of ions needed by plants. The high level of humidity in the research area as presented in Appendix 10 also causes a discrepancy between the growth observation variables and the observed yield component variables. This is in accordance with what was disclosed by Sunaryono (1990) that climatic factors that affect the growth of chili plants include: sunlight, rainfall, air temperature, humidity and wind. tends to cause problems with inhibition of soil nutrient uptake because it contains bicarbonate elements which hinder the absorption of ions needed by plants. The high level of humidity in the research area as presented in Appendix 10 also causes a discrepancy between the growth observation variables and the observed yield component variables. This is in accordance with what was disclosed by Sunaryono (1990) that climatic factors that affect the growth of chili plants include: sunlight, rainfall, air temperature, humidity and wind. also causes a discrepancy between the growth observation variables with the observed variables of the harvest yield components obtained. This is in accordance with what was disclosed by Sunaryono (1990) that climatic factors that affect the growth of chili plants include: sunlight, rainfall, air temperature, humidity and wind. also causes a discrepancy between the growth observation variables with the observed variables of the harvest yield components obtained. This is in accordance with what was disclosed by Sunaryono (1990) that climatic factors that affect the growth of chili plants include: sunlight, rainfall, air temperature, humidity and wind.

## 4. CONCLUSION

Based on the results of the study it can be concluded that there is no interaction between the use of inorganic fertilizers and chili cultivars so that the hypothesis in this study was rejected, this is because environmental factors dominate the growth of chili plants and the dose of Urea 100kg ha<sup>-1</sup> + Sp-36 150 kg ha<sup>-1</sup> , Urea 175 kg ha<sup>-1</sup> + Sp-36 300 kg ha<sup>-1</sup>, and Urea 250 kg ha<sup>-1</sup> + Sp-36 450 kg ha<sup>-1</sup>. It did not affect the various observed variables and the vultivars Horizon, Omega and Hot

Beauty had higher yields per hectare than the other cultivars, respectively 6.96 ton.ha<sup>-1</sup>, 4.75 ton.ha<sup>-1</sup>, 4.04 ton. .ha<sup>-1</sup>.

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Further research is needed regarding Horizon, Omega and Hot Beauty chili cultivars that are optimally cultivated at the fertilization level of P1 Urea 100kg ha<sup>-1</sup> + Sp-36 150 kg ha.

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