JRUCS Journal of Rural and Urban Community Studies

Agribusiness Study Program
The Faculty of Agriculture
Universitas Tunas Pembangunan Surakarta (UTP)

Response To The Growth And Production Of Criting Chili (Capsicum Annuum L.) To Liquid Organic Fertilizer Types and Concentrations

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Article Information

Received: 16 Agustus 2023

Revised: 18 Agustus 2023

Accepted: 28 Agustus 2023

Abstract

This study aims to look at the growth and yield of curly chili plants against POC Rabbit Urine, PGPR, and Pineapple Mol with different usage concentrations in dry land. This research was conducted from August 2022 to January 2023 in Dukuh Pokoh, Musuk Village, Musuk District, Boyolali Regency. With an altitude of 845 meters above sea level. Latosol soil type. The study used the factorial method with the basic pattern of Complete Randomized Block Design (RAKL) consisting of two factors, The first type of fertilizer (M) is divided into three levels, namely: M1=Rabbit Urine, M2=PGPR and M3=Pineapple Mole. The second factor is Concentration (K) which consists of four levels namely; K0: control, K1=10ml/Lt, K2=20ml/Lt, K3 30ml/Lt. Growth parameters: plant height, plant fresh weight, and plant dry weight. Yield Parameters: Number of Green Fruits, Weight of Green Fruits, Number of Red Fruits, Weight of Red Fruits Planted, and Red Fruits per plot. The results of the study: the type of fertilizer treatment had a very significant effect on plant height, number of red fruit, weight of red fruit planted, and weight of red fruit per plot, and had no effect on the number of green fruit and weight of green fruit. POC concentration significantly affected plant height, fresh weight and dry weight of plants, number of red fruit planted, weight of red fruit per plant and per plot, and had no effect on the number of green fruit and green fruit weight. The combination of fertilizer types and concentrations had a very significant effect on plant height, plant fresh weight, plant dry weight, number of red fruit, weight of red fruit per plant, weight of red fruit per plot and had no effect on number of green fruit and weight of green fruit.

Keywords: Curly Chili, Rabbit Urine POC, PGPR and Pineapple Mol

Introduction

Curly chili (Capsicum annuum L.) is a type of chili that has high adaptability. This plant can grow and develop both in the lowlands and highlands, in paddy fields and dry fields. Curly chili is a very commercial commodity in horticultural agriculture. Curly chili is cultivated by many farmers because it has a high selling price and has several health benefits and is a must-have cooking spice. The price of curly chili on the market is also quite stable when compared to cayenne pepper which is very volatile. The need for curly chilies continues to increase every year in line with the increasing population, in addition to the development of the food industry which requires more and more curly chili raw materials which will cause the demand for curly chilies to increase. The increasing demand for curly chili which is getting higher in the market is not matched by a significant increase in production. Increasing the production of curly chilies can be done by maximizing the input or the input of the factors that affect the production of curly chilies, including land area, labor, number of seeds and fertilizers.

How to cite : Tyas Soemarah Koernia Dewi, Teguh Supriyadi, Sri Puji Lestari (2023). Response To The Growth And Production Of Criting Chili (Capsicum Annuum L.) To Liquid Organic Fertilizer Types and Concentrations. JRUCS : Journal of Rural and Urban Community Studies.1(1).https://doi.org/10.36728/jrucs.v1i1.2852

E-ISSN : 3025-5090

Published by : Universitas Tunas Pembangunan Surakarta

One of the main obstacles in chili cultivation is Fusarium wilt disease caused by the fungus Fusarium oxysporum f.sp.capsici (Foca). This pathogenic fungus can attack chili plants from germination to maturity. The existence of Foca attacks is one of the barriers that causes a decrease in chili production. Losses due to fusarium wilt disease on chili plants are quite large. According to Rostini (2011), this disease can cause up to 50% loss and crop failure during post-harvest. This disease attacks parts of the plant, namely the stem, which is a serious problem for farmers (Sujatmiko et al., 2012; Sitohang, 2005). Another problem is that curly chili production is not maximal, namely the average per hectare is 8.5 tons/ha, one of which is the combination of the use of production factors used in the production process. Factors affecting agricultural production, namely land, labor, fertilizers, pesticides, seeds, and technology.

The combination of the use of production factors by farmers will affect the production of curly chili. It is necessary to identify what factors can be maximized in curly chili farming to increase curly red chili production. Cayenne pepper production in Indonesia will reach 1.39 million tons in 2021. The Central Statistics Agency (BPS) notes that this number is down 8.09% from 2020 which amounted to 1.5 million tons. The decline in cayenne pepper production in 2021 is the first time in the last five years. In 2017, cayenne pepper production was recorded at 1.15 million tons, then production continued to increase until 2020.

Meanwhile, Central Java was in second place, contributing 12.93% with production reaching 179.29 thousand tons. High rainfall and wet climate can cause plants to get sick. Conversely, low rainfall can inhibit the growth of chili plants and affect the size of the fruit. Good rainfall intensity for plant growth is 600-1250 mm per year. Chilies are sensitive to bright sunlight but require full sun all day. Chilies are vulnerable to heavy rain and cloudy weather. However, chilies are shade tolerant up to 45%. Chili plants are plants that require at least 8 hours of sunlight per day. Low light intensity can affect the orientation of plant chloroplasts. Chili plants that lack light cause the plants to become weak, and pale, and their growth tends to be elongated.

Method

A. Place and Time of Research

This research was conducted in Dukuh Pokoh, Musuk Village, Musuk District, Boyolali Regency. The implementation time is from August 2022 to January 2023. Soil type Alfisol (PPT) = Latosol, altitude 845 masl with an average rainfall of 3,024 mm per year in Central Java in 2022.

B. Materials and Research Tools

Materials and tools :

Ciko Variety Curly Chili Seeds, POC Rabbit Urine, PGPR, Pineapple Mol, Insecticide, manure, Phonska, Za, silver black mulch. Hoes, sickles, scales, drums, hand sprayers, measuring tools, stationery, buckets, mixers.

C. Research Design

This study used a factorial method with a complete randomized block design (RAKL). The first factor was the type of fertilizer (M). M1 = Rabbit Urine Liquid Organic Fertilizer, M2 = PGPR and M3 = Pineapple Mol. The second factor is Concentration (K)

consisting of 3 levels, K1 = 10 ml/lt, K2 = 20 ml/lt, and K3 = 30 ml/lt. From the 2 treatments, 9 combinations were obtained, each with 3 replications.

The data obtained were analyzed statistically using analysis of variance Completely Randomized Block Design (RAKL).

Observation:

1. Plant Growth; plant height, fresh stover weight, and dry stover weight.
2. Plant Yield: Number of red fruit planted, the weight of red fruit planted, weight of Red fruit per plot, number of green fruit, and green fruit weight.

D. Data Analysis

Research data analysis was carried out using Duncan's Multiple Range Test 5%.

RESULT AND DISCUSSION

A. Effect of Type and Concentration of Liquid Organic Fertilizer Rabbit Urine, PGPR, and Pineapple Mole on Growth and Yield of Curly Chili (Capsicum annuum L). To find out the results of observations of growth parameters, an analysis of variance was carried out at the 5% level which is presented in Table 1.

Table 1 . Duncan's 5% Multiple Range Test Effect of Type and Concentration of Rabbit Urine Liquid Organic Fertilizer, PGPR, and Pineapple Mole on the Growth and Yield of Curly Chili (Capsicum annuum L)

Perlakuan		Parameter Pertumbuhan	
(Treatment)	Tinggi Tanaman (cm)	Berat Segar Tanaman (g)	Berat Kering Tanaman (g)
M1	65.4950b	1.66667b	0.099667b
M2	69.0375a	1.75000a	0.105000a
M3	65.5933b	1.70000ab	0.102000ab
K0	63.5133c	1.67778b	0.100667b
K1	66.1244b	1.61111b	0.096222b
K2	66.0333b	1.66667b	0.100000b
K3	71.1633a	1.86667a	0.112000a
M1K0	62.8267f	1.56667cd	0.094000cd
M1K1	64.6067e	1.46667d	0.086667d
M1K2	64.6067e	1.66667bc	0.100000bc
M1K3	69.9400b	1.96667a	0.118000a
M2K0	63.8300e	1.70000bc	0.102000bc
M2K1	69.1600b	1.73333b	0.104000b
M2K2	65.9400d	1.66667bc	0.100000bc
M2K3	77.2200a	1.90000a	0.114000a
M3K0	63.8833e	1.76667b	0.106000b
M3K1	64.6067e	1.63333bc	0.098000bc
M3K2	67.5533c	1.66667bc	0.100000bc
M3K3	66.3300d	1.73333b	0.104000b

a. Plant height

The ability of organic fertilizers, even though the quantity is very small, is able to have a big influence on the soil which can be useful for stimulating the growth of roots, stems, leaves, and flowers, increasing productivity and accelerating harvests. Liquid organic fertilizer that is put into the soil will be broken down by microorganisms and the nutrients released from decomposition become available and absorbed by plant roots so that plant growth will increase, especially plant height (Bagas 2015). Table 1 shows the effect of the type of fertilizer treatment (M) which has a very significant effect on plant height. Likewise in the treatment of fertilizer concentration (K), the combination treatment of types of fertilizer (M) and the concentration of fertilizer (K) gave results that had a very significant effect on plant height. However, there is a difference in the average plant height, which ranges from 63 to 77 cm.

b. Plant Fresh Weight

The high content of nutrients, especially nitrogen, makes the amount of leaf chlorophyll increase, this is because basically, nitrogen is one of the main components of chlorophyll. When more nitrogen is absorbed by plants, more chlorophyll is formed so that the photosynthesis process takes place faster, and more photosynthesis is produced. The photosynthate will then be translocated to other parts of the plant (Munawar, 2011). Table 1 shows the effect of different fertilizer treatments (M) on plant fresh weight. In the treatment, the concentration of fertilizer (K) was significantly different from the fresh weight of the plants. The combination treatment between the types of fertilizer and the concentration of fertilizers gave significantly different results to the fresh weight of the plants, which ranged from 1.4 to 1.9 kg.

c. Plant Dry Weight

Plant dry weight is affected by plant biomass, which is composed of nitrogen elements, so the richer the nitrogen nutrients, the greater the biomass formed.

Putriantari, et al. (2014) in Rahayu (2017) which state that nitrogen, in addition to increasing the number of leaves, number of branches, and wet weight, also has an effect on increasing the dry weight of plants. Plant biomass contains an average of 1-2% nitrogen and may be greater, namely 4-6%.

Table 1 shows the effect of different fertilizer treatments (M) on plant dry weight. In the treatment, the concentration of fertilizer (K) was significantly different from the dry weight of the plants. The combination treatment between the type of fertilizer and the type of fertilizer treatment gave significantly different results to the dry weight of the plants, which ranged from 0.08-0.11 Kg

The best treatment for this research is the use of PGPR. The best concentration is 30ml/lt. The best combination of the 2 treatments is a PGPR concentration of 30 ml/lt because it has a very significant effect on plant height, plant fresh weight, and plant dry weight.

Effect of Kinds and Concentrations of Rabbit Urine Liquid Organic Fertilizer, PGPR, and Pineapple Moles on Yields of Curly Chili (Capsicum annuum L)

To find out the effect of the type and concentration of Rabbit Urine Liquid Organic Fertilizer, PGPR, and Pineapple MOL on the yield of curly chili (Capsicum annuum L) a DMRT (Duncan's Multiple Range Test) test was carried out with the results in table 2.

Table 2 . Duncan's multiple range test 5% Yield Curly Chili (Capsicum annuum L)

Perlakuan	Parameter Hasil				
(Treatment)	Jumlah Buah Merah (buah)	Berat Buah Merah/tanaman (g)	Berat Buah Merah/petak (g)	Jumlah Buah Hijau (buah)	Berat Buah Hijau (g)
M1	452.0000a	425.237a	2551.42a	0.42750a	43.917a
M2	436.0000b	408.278b	2449.67b	0.37083a	38.250a
M3	382.0000c	358.415c	2150.50c	0.41333a	42.500a
K0	444.0000a	416.814a	2500.89a	0.38556ab	39.667ab
K1	418.0000c	390.426b	2342.56b	0.34778b	35.889b
K2	422.0000b	397.926b	2387.56b	0.38556ab	39.667ab
K3	409.3333a	384.074b	2304.44 b	0.49667a	51.000a
M1K0	474.000a	443.89a	2663.33a	0.4967ab	51.00ab
M1K1	464.000b	438.22a	2629.33a	0.3300ab	34.00ab
M1K2	456.000c	427.83a	2567.00a	0.4433ab	45.33ab
M1K3	414.000e	391.00b	2346.00b	0.4400ab	45.33ab
M2K0	406.000f	383.44b	2300.67b	0.2733b	28.33b
M2K1	416.000e	382.67b	2296.00b	0.2733b	28.33b
M2K2	458.000c	432.56a	2595.33a	0.3833ab	39.67ab
M2K3	464.000b	434.45a	2606.67a	0.5533a	56.67a
M3K0	452.000d	423.11a	2538.67a	0.3867ab	39.67ab
M3K1	374.000g	350.39c	2102.33c	0.4400ab	45.33ab
M3K2	352.000h	333.39c	2000.33c	0.3300ab	34.00ab
M3K3	350.000h	326.78c	1960.67c	0.4967ab	51.00ab

a. Number of Green Fruits

Table 2 shows that the effect of the type of fertilizer treatment (M) was not significantly different on the number of green fruits. In the treatment of fertilizer concentration (K) was not significantly different from the amount of green fruit. The combination treatment between the type of fertilizer and the type of fertilizer treatment also gave results that were not significantly different from the number of green fruits.

b. Green Fruit Weight

Table 2. shows the effect of the type of fertilizer treatment (M) was not significantly different on the weight of green fruit. In the treatment of fertilizer concentration (K) was not significantly different from the weight of green fruit. The combination treatment between the type of fertilizer and the type of fertilizer treatment also gave results that were not significantly different from the weight of green fruit.

c. Number of Red Fruits

Table 2. shows the effect of the type of fertilizer treatment (M) is very different on the number of red fruit. In the treatment, the concentration of fertilizer (K) was significantly different from the amount of red fruit. The combination treatment between the type of fertilizer and the type of fertilizer treatment also gave significantly different results on the number of red fruits. However, there is a difference in the average number of red fruit, which ranges from 374-474 fruit.

d. Weight of Planted Red Fruit

This is in accordance with Rochman (2015) who said that the application of fertilizers has physical, chemical, and biological properties of the soil so that the soil can provide nutrients in a balanced amount. In addition, there is a positive correlation between organic fertilizers and soil productivity so crop production can increase along with soil productivity. With high nutrients in the soil, the supply of nutrients and minerals will be higher and the results of photosynthesis will also be more and more, so that it can increase the process of forming proteins which are formed as food reserves so that the greater the food reserves formed in the fruit, the greater the amount and the size produced by the plant. Increasing the number of fruits and the size of the fruit also increases the weight of the fruit produced per plant.

Table 2 shows the effect of the type of fertilizer treatment (M) which was significantly different on the weight of the red fruit plants. In the treatment, the concentration of fertilizer (K) was significantly different from the weight of the red fruit plants. The combination treatment of the type of fertilizer and the type of fertilizer treatment also gave significantly different results on the weight of the red fruit plants. However, there is a difference in the average weight of the red fruit per plant, which ranges from 326.78 to 443.89 g.

e. The weight of the red fruit per plot

Table 2 shows the effect of different fertilizer treatments (M) on the weight of red fruit per plot. In the treatment, the concentration of fertilizer (K) was significantly different from the weight of red fruit per plot. The combination treatment of the type of fertilizer and the type of fertilizer treatment also gave significantly different results on the weight of the red fruit per plot. However, there is a difference in the average weight of red fruit per plot, which ranges from 1960-2663 g.

Conclusion

From the research results it can be concluded:

1. Treatment of various types of fertilizers (M) had significantly different effects on the growth of plant height, number of red fruit, weight of red fruit per plant, and weight of red fruit per plot. However, it has a significant effect on plant fresh weight and plant dry weight, number of green fruit, and green fruit weight.
2. Treatment of various concentrations (K) had highly significant different effects on plant height, plant fresh weight, plant dry weight, number of red fruit, weight of red fruit per plant, and weight of red fruit per plot. However, it did not have a significant effect on the number of green fruit and green fruit weight.
3. The combined treatment of Fertilizer Types and Concentration (MxK) had significantly different effects on Plant Height, Fresh Weight of Plants, Dry Weight of Plants, Number of Red Fruits, Weight of Red Fruits planted and Red Fruit Weight per plot. However, it has no significant effect on the number of green fruit and the number of red fruit.

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