

Onion Growth and Yield on Red Yellow Podsollic Soil based on Dosage and Duration of Incubation of Kirinyu Green Manure

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ABSTRACT

The increase in onion production on red-yellow podzolic soils is faced with physical and chemical properties that are not good for plant growth so that efforts are needed to improve the land by applying a combination of kirinyu green manure and incubation duration. This study aims to determine the best dose and duration of incubation of kirinyu fertilizer against the growth and yield of onions on red-yellow podsilik soils. The research was carried out on the experimental land of the Faculty of Agriculture. The research time is from April 12 to May 27, 2020. The method used in the study was a Complete Randomized Design (RAL) by giving a combination of doses and incubation time of kirinyu green fertilizer which was repeated 3 times, and consisted of 3 sample plants so that the sample plants were entirely 81 plants. . The treatment in question is k_1 (375 g / polybag of kirinyu green manure incubated for 2 weeks); k_2 (375 g/polybag of kirinyu green manure incubated for 3 weeks); k_3 (375 g/polybag of kirinyu green manure incubated 4 weeks); k_4 (750 g/polybag of kirinyu green manure incubated for 2 weeks); k_5 (750 g/polybag of kirinyu green manure incubated for 3 weeks); k_6 (750 g/polybag of kirinyu green manure incubated for 4 weeks); k_7 (1125 g/polybag of kirinyu green manure incubated for 2 weeks); k_8 (1125 g/polybag of kirinyu green manure incubated for 3 weeks); k_9 (1125 g/polybag of kirinyu green fertilizer incubated for 4 weeks The results showed that the combination of dose and duration of incubation of kirinyu green fertilizer had an unreal influence on all observation variables, namely plant height, number of leaves, number of saplings, root volume, and fresh weight of plants.

Keywords: Kirinyu Green Fertilizer, Incubation Duration, Onion, Red Yellow Podzolic Soil.

INTRODUCTION

Onion (*Allium fistulosum*) is one of the horticultural crop commodities that deserves to be intensively developed in Indonesia. Leeks are widely used as flavoring ingredients (seasonings) and mixed ingredients of various foods. According to the Directorate of Nutrition of the Ministry of Health (1981) the nutritional balance contained in leeks every 100 g of ingredients eaten are: Calories = 29.00 Cal, Protein = 1.80 g, Carbohydrates = 60.00 g, Calcium = 35.00 mg, Vitamin C = 48.00 mg, Vitamin A = 910.00 SI, Fat = 0.40 g, Fiber = 0.90 g.

Efforts that can be made to increase onion crop production are to utilize Red yellow Podzolic soil (PMK) as a plant growing medium. The distribution of FMD land in West Kalimantan covering an area of 9.2 million ha or 63.01% of the area of West Kalimantan, has the potential to be used as agricultural land. The use of FMD soil for the development of onions is applied at low soil fertility and productivity levels (Nurfaizin et al, 2022). This is due to the physical properties of its dense soil and high clay content, low organic matter content, medium to high alkaline saturation, N, P, K, Ca nutrients are generally low and the soil's pH is low.

Kirinyu (*Chromolaena odorata*) is a wild plant that has the potential to be a source of organic matter (green fertilizer) whose availability is quite abundant in several vegetable crop production centers (Collange et al, 2011). Synchronization between the dosage and incubation time needs to be considered so that it is more effective and the nutrients contained in green manure can be utilized by plants so that the nutrient needs in plants can be fulfilled. The right dosage needs to be considered to determine the need for

organic matter needed by plants with the time of applying green manure if it is given too quickly the nutrients contained in the fertilizer are not available to plants and if it is too long immobilization can occur, namely the occurrence of nutrient competition between plants and microorganisms (Munawaroh & Ami, 2021). The purpose of this study is to find out the best dose and duration of incubation of kirinyu fertilizer against the growth and yield of onions on FMD soils.

METHOD

The research material consists of, onion seedlings, FMD soil, kirinyu green manure, dolomite lime, basic fertilizers, pesticides. The tools used in this study were sprayers, hoes, polybags, soil sieves, drills, analytical scales, label paper, stationery, documentation tools, measuring cups, thermohygrometers, and other necessary tools. The method used in the study was a Complete Randomized Design (RAL) for a combination of doses and the duration of incubation of kirinyu green manure. The treatment in question is k_1 (375 g / polybag of kirinyu green manure incubated for 2 weeks); k_2 (375 g/polybag of kirinyu green manure incubated for 3 weeks); k_3 (375 g/polybag of kirinyu green manure incubated 4 weeks); k_4 (750 g/polybag of kirinyu green manure incubated for 2 weeks); k_5 (750 g/polybag of kirinyu green manure incubated for 3 weeks); k_6 (750 g/polybag of kirinyu green manure incubated for 4 weeks); k_7 (1125 g/polybag of kirinyu green manure incubated for 2 weeks); k_8 (1125 g/polybag of kirinyu green manure incubated for 3 weeks); k_9 (1125 g/polybag of kirinyu green manure incubated 4 weeks). Each treatment was repeated 3 times, and consisted of 3 sample plants so that the sample plants were entirely 81 plants.

The implementation of the research consists of the preparation of the research site, preparation of planting media, application of green manure, planting, application of basic fertilizers, maintenance and harvesting. The variables observed in the study were plant height, number of leaves, number of saplings, fresh weight of plants, and root volume. The average data of the observation results were analyzed for diversity using the costat statistik application to find out whether the treatment given had an effect on the observed variables, if it had a real effect, it was continued with the BNJ test with a level of 5% to find out the differences at each level of treatment.

RESULT AND DISCUSSION

The results of the diversity analysis showed that the combination of dose and duration of incubation of kirinyu green manure had an unreal influence on all observation variables. The average values of observations are presented in table 1.

Table 1. The average result of observations of plant height, number of leaves, number of saplings, root volume and fresh weight of the plant.

Kirinyu green manure (g/polybag) and incubation duration (weeks)	Observation Variables				
	plant height (cm)	number of leaves (strands)	number of saplings (son)	root volume (cm ³)	fresh weight of the plant (g)
375 + 2	44,09	18.00	5,77	9,33	66,67
375 + 3	44,08	20.00	6,77	8,89	78,89
375 + 4	46,99	21,33	6,33	11,33	78,33
750 + 2	41,45	17,22	5,33	7,33	67,22
750 + 3	42,53	19.00	5.00 pm	8,22	67,22
750 + 4	43,23	19,33	5,55	8.00pm	75.00
1125 + 2	41.00	17,59	5,44	8.00pm	66,11
1125 + 3	43,35	16,66	5.00 pm	8,44	75.00
1125 + 4	42,85	22,77	5.00 pm	7,33	58,33

The results showed that the combination of dose and duration of incubation of kirinyu green manure did not have a noticeable influence on all observation variables. This is due to inappropriate environmental factors such as high rainfall at the time of the study.

High rainfall causes the process of decomposition rate of green manure material to be hampered and even not decomposed and the rainfall that is in accordance with the requirements for growing onions

is 1,500 – 2,000 mm / year. During the research process, the rainfall was quite high, namely 2,273 – 2,593 mm / year. This causes the plant to be flooded and the green manure applied is not perfectly decomposed, so the micro-remains cannot work optimally. This is supported by Huang et al (2020) opinion which states that the rate of decomposition decreases during anaerobic conditions (during floods and floods). Chang et al, (2009) also stated that water content has an important role in the composting process because the decomposition of organic matter depends on the availability of water content.

The rate of decomposition of organic matter is determined by its own organic matter factors and external (environmental) factors. According to Bulseco et al, (2019) environmental conditions are factors that influence the decomposition process of kirinyu green fertilizer such as temperature, humidity, rainfall and soil pH. Temperature at the time of the study was 28.02 - 28.45 °C, and humidity was 82.93 - 83.21 %, while the desired temperature of the onion duan plant was 19 - 24 °C and humidity was 80 - 90 %. According to Soong (2020) Lower or higher humidity can cause microorganisms not to develop or die. Ghosh & Tripathi (2021) also stated that if the water content is too high or too low, it can reduce the efficiency of the composting process. Water content below 40% will slow down the activity of the remains. Meanwhile, the water content of more than 60% will cause the nutrients in the organic matter to run out and odors arise due to anaerobic conditions and slow down the rate of decomposition.

The amount of moisture during the study was not optimal for the metabolism of microbodies, thus inhibiting the rate of decomposition of green manure. This is in accordance with the opinion of Chakrawal et al (2020) states that, an increase in temperature can stimulate the metabolic activities of micro flora and fauna to accelerate the rate of the process of decomposition of organic matter. The planting medium has a soil pH of 4.24 after the incubation period and is classified as sour. At the time of determining the low soil pH, the decomposition process of organic matter did not run well because at pH 4.24 the body could not move optimally so that the decomposition process was slow. This is in accordance with Adamczyk et al, (2019) the content of nic remains (soil flora and fauna) such as bacteria, fungi work better on medium ph soils (6-7), at low pH the bodies of the sonics do not work well. Organic matter that is not perfectly decomposed leads to inhibition of the process of providing nutrients to plants. According to Baćmaga et al (2018) this soil fauna plays a role in the process of humanification and mineralization or nutrient release, even being responsible for the maintenance of soil structure.

Kirinyu green fertilizer as organic matter plays a role in improving macro pores and micropores in the soil so that it is balanced for the development of plant roots. The average root volume at the time of the study ranged from 7.33 – 11.33 cm³. Kirinyu green manure that is not perfectly decomposed results in dense FMD soil so that the root of the plant is hampered. This is in accordance with the opinion of Russel (1977) that if the density of the soil increases then the macro pore space decreases and root penetration is inhibited.

Inhibition of root development affects the variable plant height because the nutrients absorbed by the roots are used for plant growth. The roots function to absorb nutrients in the soil that will be translocated to all plant organs. The absorption of nutrients with active energy can take place if metabolic energy is available. Such metabolic energy is produced from the respiratory process of plant roots. During the breathing process of plant roots, metabolic energy will be produced and this energy encourages the absorption of nutrients. The results of the observation of plant height at week 6 after planting ranged from 41.00 – 46.99 cm and according to the description of leek plants by Rukmana (1995) the height of onion plants ranged from 30– 60 cm.

The results showed that the number of leaves and the number of saplings gave the same response to each treatment. It is suspected that there are environmental factors that affect the growth of leaves and the number of saplings. The number of plant leaves is a component that can show plant growth. Leaf formation is influenced by the genetic properties of the plant, but an unsuitable environment can inhibit the growth of leeks such as rainfall, temperature and light intensity.

Based on the results of research on the application of kirinyu green manure and the duration of incubation, the average fresh weight of onion plants ranges from 58.33 - 78.89 g. The fresh weight of a plant is the result of the growth of a plant obtained from the process of photosynthesis. According to Sitompul (2005), the results of photosynthesis are used by plants for the formation of new cells such as leaves, buds and roots so that they can affect the fresh weight of the plant. The balanced nutrient content in the soil has an important role as long as the plant grows so that it can increase plant growth and affect crop production.

During the study, pests and diseases of onion plants were found. The pest that attacks plants is the onion caterpillar (*Spodoptera exigua*), which results in hollow leaf tips, while for diseases found in the field during the study, namely root neck rot (*Botrytis allii*), causing the stem neck to become soft and ash-colored, wet, and eventually rot. The attack of pests and diseases has not disturbed and harmed the overall crop yield, but control is still carried out by spraying an ekstrak solution of papaya leaves, garlic and tobacco in the morning to prevent the spread of onion caterpillars.

CONCLUSION

The results showed that the combination of dose and duration of incubation of kirinyu green fertilizer in each treatment gave an unreal effect after statistical analysis on the variables of plant height, number of leaves, number of saplings, fresh weight, and root volume.

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