

The Effect Concentration Of Kirinyuh Leaf Liquid Organic Fertilizer On Efficiency Inorganic Fertilizer

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Abstract – The availability of nutrients in the soil affects rice production. To meet the nutrients in rice plants and generally farmers use inorganic fertilizers. Continuous use of inorganic fertilizers reduces soil fertility. Giving inorganic fertilizers without being balanced with the use of organic fertilizers can reduce physical properties such as soil structure, chemical reduction in Cation Exchange Capacity (CEC), and soil biology such as the decreased activity of soil microorganisms. Rice farmers generally use inorganic fertilizers phonska and urea. Kirinyuh plants (*Chromolaena odorata* L.) as weeds can be used as basic ingredients of liquid organic fertilizer because they contain high nitrogen 2.65%, P and K so that they can reduce the dose of urea and NPK fertilizers. The study aimed to obtain efficient quantities of phonska and urea compound fertilizers at Kirinyuh concentrations to increase rice yields. The study used a completely randomized design with a factorial pattern. The treatment consisted of factor I (A)= concentration of Kirinyuh liquid organic fertilizer. A₀ = without liquid organic fertilizer Kirinyuh; A₁= 100 ml liquid organic fertilizer Kirinyuh/1 liter of water, A₂= 200 ml liquid organic fertilizer Kirinyuh/1 liter of water; A₃= 200 ml liquid organic fertilizer Kirinyuh / 1 liter of water. Factor II (B)= dosage of phonska+urea fertilizer. B₁= 100 kg of phonska + 100 kg of urea/ha; B₂= 200 kg phonska + 200 kg urea/ha, B₃= 300 kg phonska + 300 kg urea/ha. Each experimental unit was repeated three times to obtain 36 experimental pots. The data were analyzed using analysis of variance and if there were differences, it was continued with the Least Significant Difference (LSD) test at the level of 5%. The results showed that a concentration of 200 ml liquid organic fertilizer Kirinyuh/liter of water made efficient use of phonska inorganic fertilizer. Doses of 200 kg phonska/ha+200 kg urea/ha at a concentration of 200 ml liquid organic fertilizer/liter of water increased the weight of milled dry unhulled grain.

Keywords – Fertilization Efficiency; Kirinyuh Plant; Liquid Inorganic Fertilizer

I. INTRODUCTION

Rice fields are generally cultivated by farmers continuously throughout the year so that many nutrients are transported along with the crops. Semi-organic farming in rice fields is very suitable because the condition of agricultural land, especially rice fields, has experienced a lot of degradation due to the continuous use of chemical fertilizers. In general, fertilizer recommendations for rice plants are urea of 200 kg-250 kg, SP36 of 100 kg-150 kg, and KCl of 75 kg-100 kg. The general recommendation for balanced fertilization is 500 kg/ha petrogenic, 300 kg/ha phonska, and 200 kg/ha urea [1].

Kirinyuh liquid organic fertilizer is used to improve soil's physical, chemical, and biological. Kirinyuh is a weed that contains a high nitrogen nutrient of 2.65% and produces high biomass so it has the potential to be used as a source of organic matter [2]. Farmers generally use urea fertilizer in rice at doses that are not recommended, causing excess doses and waste. Therefore, it requires alternative organic fertilizers to substitute nitrogen nutrients.

Kirinyuh contains nutrients nitrogen, phosphorus, and potassium as other micronutrients. Able to produce high biomass so that it has the potential to be used as a source of organic matter [3]. Giving of liquid inorganic fertilizer Kirinyuh affected tomato

height at 21 and 28 days after planting, age at first flowering, harvest, total yield, and crop yield. The best concentration of Kirinyuh liquid inorganic fertilizer was given at 40% (400 ml L⁻¹ water) for the growth and yield of tomatoes [4].

Research on the concentration of liquid organic fertilizer made from Kirinyuh leaves for the efficient use of phonska and urea fertilizers in lowland rice has never been done. The study aimed to obtain efficient quantities of phonska and urea compound fertilizers at the concentration of Kirinyuh liquid organic fertilizer in increasing rice yields.

II. METHOD

The research was conducted in Tompaso District, Minahasa Regency from May to October 2021. Analysis of Kirinyuh leaf liquid organic fertilizer at the Baristand Industri Manado, North Sulawesi, Indonesia. The tools and materials used are rice seeds Serayu variety, Kirinyuh weed (*Chromolaena odorata* L.), effective microorganism-4, rice water, sugar, nitrogen, phosphorus, and potassium compound fertilizer, urea fertilizer, pots, soil media, meter, scales, oven, and stationery.

The study used a completely randomized design with a factorial pattern. The treatment consisted of factor I (A)= concentration of Kirinyuh liquid organic fertilizer. A₀ = without liquid organic fertilizer Kirinyuh; A₁= 100 ml liquid organic fertilizer Kirinyuh/1 liter of water, A₂= 200 ml liquid organic fertilizer Kirinyuh/1 liter of water; A₃= 200 ml liquid organic fertilizer Kirinyuh/1 liter of water. Factor II (B)= dose of phonska+urea fertilizer. B₁= 100 kg of phonska + 100 kg of urea/ha; B₂= 200 kg phonska + 200 kg urea/ha, B₃=300 kg phonska+300 kg urea/ha. Each experimental unit was repeated three times to obtain 36 experimental pots. The data were analyzed using analysis of variance and if there were differences, it was continued with the *Least Significant Difference* (LSD) test at the level of 5%.

III. RESULT AND DISCUSSION

3.1. Total Tillers of Rice

Statistical test results showed that the interaction between Kirinyuh leaf liquid organic fertilizer and phonska+urea fertilizer had no significant effect on the total number of tillers. The single effect of phonska+urea fertilizer was significant on the total tiller number of rice plants. *Least Significant Difference* (LSD) test at the level of 5% in table 1.

Table 1. The Effect of Phonska+Urea Fertilizer on Total Rice Tiller

Treatments	Total Tiller of Rice
B ₁ = 100 kg phonska/ha+100 kg urea/ha	22,50 a
B ₂ = 200 kg phonska/ha+200 kg urea/ha	35,50 a
B ₃ = 300 kg phonska/ha+300 kg urea/ha	38,88 b
LSD 5%	10,03

Note: Numbers followed by the same letters are not significantly different based on the *Least Significant Difference* (LSD) test at the level of 5%

3.2. Productive Tillers

Statistical test results showed that there was no interaction effect between Kirinyuh leaf liquid organic fertilizer and phonska+urea fertilizer on the total productive tillers. The effect of phonska+urea fertilizer application was significant on the number of productive tillers. *Least Significant Difference* (LSD) test at the level of 5% in table 2.

Table 2. The Effect of Phonska+Urea Fertilizer on the Productive Tillers

Treatments	Productive Tillers
B ₁ = 100 kg phonska/ha+100 kg urea/ha	12,12 a
B ₂ = 200 kg phonska/ha+200 kg urea/ha	20,46 b
B ₃ = 300 kg phonska/ha+300 kg urea/ha	19,42 ab
LSD 5%	8,26

Note: Numbers followed by the same letters are not significantly different based on the *Least Significant Difference* (LSD) test at the level of 5%

3.3. Weight of Harvested Dry Grain

Statistical test results showed that there was no interaction effect between organic fertilizer from Kirinyuh leaves and phonska+urea fertilizer on the weight of harvested dry grain. The effect of phonska+urea fertilizer was significant on the weight of harvested dry grain. *Least Significant Difference (LSD)* test at the level of 5% in table 3.

Table 3. The Effect of Phonska+Urea Fertilizer on Weight of Harvested Dry Grain

Treatments	Weight of Harvested Dry Grain
B ₁ = 100 kg phonska/ha+100 kg urea/ha	30,24 a
B ₂ = 200 kg phonska/ha+200 kg urea/ha	49,10 b
B ₃ = 300 kg phonska/ha+300 kg urea/ha	54,62 b
LSD 5%	18,13

Note: Numbers followed by the same letters are not significantly different based on the *Least Significant Difference (LSD)* test at the level of 5%

3.4. Weight of Milled Dry Grain

Statistical test results showed that the effect of interaction between liquid organic fertilizer from Kirinyuh leaves and phonska+urea fertilizer was significant on the weight of dry milled grain. *Least Significant Difference (LSD)* test at the level of 5% in table 4.

Table 4. The Effect of Kirinyuh Leaf Liquid Organic Fertilizer and Phonska+Urea Fertilizer on Weight of Milled Dry Grain

Treatments	Weight of Milled Dry Grain		
	100 kg	200 kg	300 kg
	phonska/ha+100	phonska/ha+200 kg	phonska/ha+300
	kg urea/ha B ₁	urea/ha B ₂	kg urea/ha B ₃
A ₀ = Without liquid organic fertilizer	17,34 a (a)	33,91 a (b)	33,89 a (b)
A ₁ =100 ml liquid organic fertilizer/ liter of water	20,26 a (a)	31,54 a (a)	30,37 a (a)
A ₂ =200 ml liquid organic fertilizer/ liter of water	18,69 a (a)	37,51 a (b)	28,67 a (ab)
A ₃ = 300 ml liquid organic fertilizer/ liter of water	19,92 a (a)	38,47 a (b)	25,63 a (ab)
LSD 5%			14,30

Note: Numbers followed by the same letter in the sign () Read Horizontally and not in the sign () Read Vertically are not significantly different based on the *Least Significant Difference (LSD)* test at the level of 5%.

The results showed that the total number of tillers was affected by phonska+urea fertilization. The dose of 300 kg phonska/ha+300 kg urea/ha gave the highest number of tillers and was different from the other doses. For the number of productive tillers, the dose of 200 kg phonska/ha+200 kg urea/ha gave the highest number of productive tillers, 20.46, and was not significantly different from the dose of 300 kg phonska/ha+300 kg urea/ha, with 19.42 productive tillers. The increase in the number of tillers is due to the increase in the dose of phonska+urea fertilization, at such doses, the nutrients can provide nutrition to produce a large number of tillers. Likewise, the weight of harvested dry grain, based on the LSD 5% test at a dose of 200 kg phonska/ha+200 kg urea/ha, was not different from a dose of 300 kg phonska/ha+300 kg urea/ha, namely 49.10 grams and 54.62 grams for dry grain harvest per pot.

The interaction between liquid organic fertilizer from Kirinyuh leaves and phonska+urea had a significant effect on the increase in the weight of a dry-milled grain of rice. The concentration of 200 ml of liquid organic fertilizer/liter of water and 200 kg of phonska/ha + 200 kg of urea/ha gave the best dry-milled grain weight of 37.51 grams per pot. The efficiency of phonska

inorganic fertilization was 300 kg/ha phonska and 200 kg/ha urea to 200 kg/ha phonska and 200 kg/ha urea at a liquid organic fertilizer concentration of 200 ml/liter of water. Application of Kirinyuh organic fertilizer can reduce the use of urea fertilizer by 50% for the height and number of rice tillers [5]. The nitrogen of Kirinyuh organic fertilizer in solid form is 3.55%. According to the criteria for assessing the chemical properties of the soil, this value is in the very high category [6].

Nitrogen is the mineral that most often limits plant growth and crop production. Plants need nitrogen as a building block for proteins, nucleic acids, and other important organic molecules [7]. The formation and filling of fruit are strongly influenced by the nutrients nitrogen, phosphorus, and potassium which will be used in the photosynthesis process, as a constituent of carbohydrates, fats, proteins, minerals, and vitamins which will be translocated to the fruit storage section [8].

The content of organic liquid fertilizer from Kirinyuh leaves is lower than the standard liquid organic fertilizer based on Minister of Agriculture Regulation No.70/Permentan/SR.140/10/2011 of 3-6%. The interaction of Kirinyuh liquid organic fertilizer and phonska+urea fertilizer each other's nutrient needs for rice. Rice can absorb 20% to 40% of nitrogen, and the remaining nitrogen that is not absorbed by plants to volatilization, denitrification, and experience leaching towards the groundwater zone [9]. Liquid organic fertilizers can improve the physical, chemical, and biological properties of soil, also help increase crop production, improve product quality, and reduce the use of inorganic fertilizers as an alternative to manure [10].

IV. CONCLUSIONS

Kirinyuh liquid organic fertilizer at a concentration of 200 ml/liter of water can efficiently use inorganic fertilizers to 200 kg/ha phonska and 200 kg/ha urea. To reduce inorganic fertilizers, the use of Kirinyuh liquid organic fertilizer can be utilized by rice farmers as an alternative fertilizer.

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