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RESEARCH ARTICLE

THE EFFECT OF LIQUID ORGANIC FERTILIZER ARENGA PALM [*ARENGA PINNATA* (WURMB) MERR] UPTAKE THE NPK NUTRIENT ON THE WET RICE

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ABSTRACT

Research of the effect of liquid organic fertilizer Arenga palm [*Arenga pinnata* (WURMB)MERR] uptake the npk nutrient on the wet rice. The objective on this research is to know the best dosage of liquid organic fertilizer (lof) of Arenga palm uptake N, P, K nutrient on wet rice. the experiment used a randomized block design with 9 treatment combinations and 1 control each with 3 repetitions. The results obtained from this experiment were the highest value of N nutrient absorption in the provision of LOF 25,25 L ha⁻¹, was 24.52 kg ha⁻¹ to 33.86 kg ha⁻¹, the absorption of P-1.60 kg ha⁻¹ in the weight dried straw of 2.32 ton ha⁻¹ and the absorption of K ranged from 27.81 to 42.55 kg ha⁻¹.

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INTRODUCTION

The success of the agricultural production process depends on the ability to manage land resources more optimally and sustainably (Hakim *et al.*, 1986). A Land resource in question is the ability of a land to keep and maintain the soil fertility. According to Foth (1994), land plays an important role in the success of agricultural production. Plants can grow optimally if the soil has good physical, chemical and biological properties. Further success is also determined by the availability of superior seeds, cultivation technology and the use of fertilizer as a source of nutrients for plants. Provision of fertilizer is required to replace nutrients that are transported by plants during harvest, especially if the land used for cultivation has a low fertility rate. Plants can grow and develop optimally if the nutrients in the soil are easily available and easily absorbed by plants. The high price of fertilizer and increasing public awareness of environmental quality become the rationale to find alternative replacement organic plant-based nutrition source, one of them by using liquid organic fertilizer. Liquid organic fertilizer is a liquid-shaped fertilizer or a solution containing certain nutrients that are beneficial to plant growth. Liquid fertilizer raw materials can come from a variety of organic materials adapted to local conditions. Organic fertilizers play a role in influencing the availability of macro and micro nutrients, nutrient efficiency, performance of enzyme systems, increase metabolism, growth and crop yields. Although qualitatively, the nutrient content present in organic fertilizers cannot be higher than inorganic fertilizers or

chemical fertilizers, some research shows that with the provision of liquid organic fertilizer in plants can increase crop production through the activation of microorganisms contained therein and in the environment. Arenga palm is one of the alternative organic liquid fertilizer raw materials that have many microorganisms. Organic fertilizers have been reported to improve nutrient absorption efficiency, improve growth and yield and increase resistance to pest and disease attacks (Hardianto, 2000). The purpose of this research is to know the effect of the use of Liquid Organic Fertilizer (LOF) to NPK nutrient uptake on the wet rice.

MATERIALS AND METHODS

This research was conducted in experimental field of BPTP Sidondo Central Sulawesi. Soil chemical analysis and plant tissue analysis were carried out in the soil laboratory and agro technology laboratory of the Faculty of Agriculture, Tadulako University of Palu. The materials used are mekongga rice varieties, paddy fields and LOF of Nira aren which has been analyzed in the laboratory then tested at different doses. Tools used: Hand tractor, hoe, machete, spool, sprayer, scales, meter, sample bag, sickle, name plate and stationery. The fertilizer used is made of palm juice (1400 ml), fish meal (400 g), shrimp skin flour (75 g), coconut water (500 ml), rice washing water (400ml), brown sugar (400 g) and distilled water (700ml), each sample containing 3 liters in liquid form and then put into a closed container for fermentation for 42 days. Then the fermentation results are analyzed in the Laboratory,

with the analysis containing Nitrogen (1.37%) Phosphorus (0.25%), Potassium (3.98%), IAA Hormones (0.493 ppm) and GA3 (6.458 ppm).

Research design: This research used Randomized Block Design (RBD) method of 10 treatments with 3 replications so that 30 test plots were obtained, if in the treatment affect significantly, then Tukey's Honest Significance Difference Test (HSD Test) will be continued. at the level of 5%.

The dosage of fertilizer use is:

- A0 = Control = without fertilizer treatment
- A1 = 5.25 L.ha⁻¹ arenga palm fertilizer
- A2 = 5.50 L. ha⁻¹ arenga palm fertilizer
- A3 = 5.75 L. ha⁻¹ arenga palm fertilizer
- A4 = 12.75 L. ha⁻¹ arenga palm fertilizer
- A5 = 13.00 L. ha⁻¹ arenga palm fertilizer
- A6 = 13.25 L. ha⁻¹ arenga palm fertilizer
- A7 = 25.25 L. ha⁻¹ arenga palm fertilizer
- A8 = 25.50 L. ha⁻¹ arenga palm fertilizer
- A9 = 25.75 L. ha⁻¹ arenga palm fertilize

Design of Analysis

$$Y_{ij} = \mu + \tau_i + \beta_j + \epsilon_{ij}$$

Y_{ij}: observation on the treatment to - i and the group to - j

μ: general average

i: the effect of the treatment to - i

β_j: the influence of the group to - j

ε_{ij}: a random effect on the treatment to - i and the group to - j

RESULTS AND DISCUSSION

The Nutrients uptake on NPK

The Nutrient uptake N: The result of analysis of N nutrient uptake in the use of LOF of Nira Aren combined with shrimp shell flour, the average of treatment did not give any significant effect. Furthermore, to know the effect of LOF usage with different concentration on each treatment was done 5% level of BNJ test. The result of BNJ test showed that N Absorption of plant at LOF Nira Aren treatment of 25,25 L h⁻¹ gives a significant difference with control treatment and other treatments, with the highest absorption value of 38,86 kg ha⁻¹ on dry weight of straw 2,32 ton ha⁻¹ while the lowest value in the use of LOF Nira Aren of 5,25 L ha⁻¹ is 24.52 kg ha⁻¹ on the dry weight of straw 2.20 tons ha⁻¹. The research results showed that each hectare of rice plants absorbed N 24.52 kg ha⁻¹ to 33.86 kg ha⁻¹. According to Madjid (2013) the N essential absorption on the rice straw is about 33.60 kg ha⁻¹ on dry weight of 2.80 tons ha⁻¹. Meanwhile, according to Makarim (2005) that every hectare of rice plants still absorb 41.2 kg of N. Cho and Kobata (2002) stated that the straw is the main organic material for paddy rice because it can bind N from fertilizer and slowly release through the process of decomposition, furthermore Eagle et al. (2000) states that straw can bind N each growing season by 19 kg ha⁻¹.

The Nutrient uptake P: Result of analysis of P- uptake variation in plants using LOF Nira Aren gives a real effect. The result of 5% BNJ test of LOF Nira Aren treatment 25,25 L ha⁻¹ gives a real difference from all treatment, including control. The highest absorption value of P is 1.60 kg ha⁻¹ on

dry weight of straw 2.32 tons ha⁻¹, while the lowest of P absorption value is on the use of LOF Nira Aren 5,75 L ha⁻¹ ie 0.93 kg ha⁻¹ with weight dried straw 1,75 tons ha⁻¹. The results showed that each hectare of rice plants absorbed P 0.93 kg ha⁻¹ to 1.60 kg ha⁻¹. The use of LOF 25,25 L ha⁻¹ is the best dose for P fertilization, it is suspected that: LOF can be absorbed by plants in sufficient quantities. Makarim (2005) states that every hectare of paddy plants absorbs P about 2.8 kg while Madjid (2013) rice plants absorb P in the network of about 5.60 kg ha⁻¹. Furthermore Bolan (1991) states an increase in P absorption by plants due to an expansion in the volume of soil that can be explored by plant roots and the acceleration of P movement into the hypha. P fertilizer can be used only 10-30% of the amount of fertilizer (Jones, 1982). The optimal levels of phosphorus in the plant at the time of vegetative growth were 0.3% - 0.5% of the dry weight of the plant (Tufaila et al., 2014).

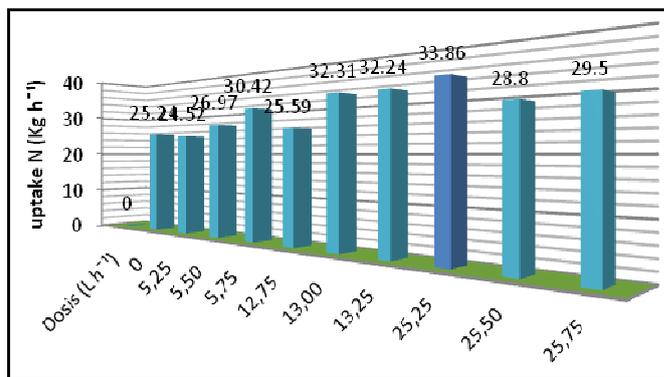


Figure 1. N Absorption of Plant Tissue Aged of 43 HST

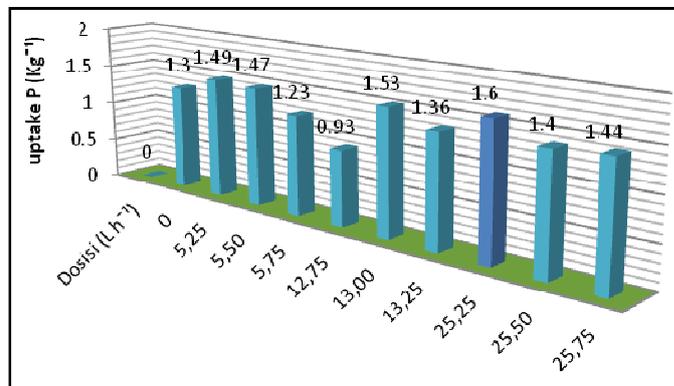


Figure 2. P Absorption of Plant Tissue Aged of 43 HST

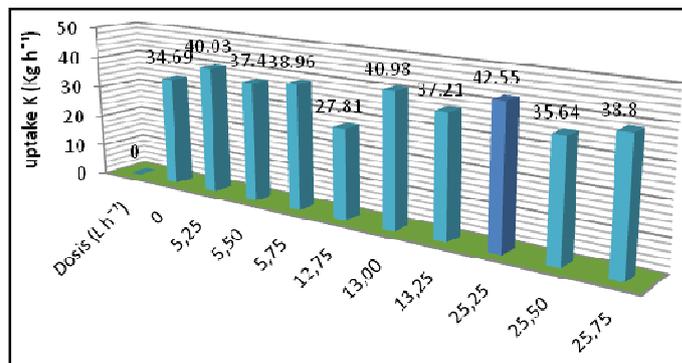


Figure 3. K Absorption of Plant tissue aged 43 HST

The Nutrient uptake K: The result the analysis of the effect of the use of LOF of Nira Aren to the uptake of K nutrients of the plant did not give a real effect. Furthermore, the result of

level 5% BNJ test, the highest K Absorption level was found in the use of POC Nira Aren 2,525 ml ha⁻¹ compared to other treatments with 42, 55 kg ha⁻¹, dry weight straw of 2,32 tons ha⁻¹ and the lowest absorption value was 27.81 kg ha⁻¹ in the use of LOF Nira Aren (12,75 L ha⁻¹). The results showed that each hectare of rice plant uptake K 27,81 kg ha⁻¹ to 42,55 kg ha⁻¹. According to Madjid (2013) that the essential absorption of rice straw with a weight of 2.80 tons ha⁻¹ is 65 kg ha⁻¹. The use of POC on the above treatment is considered optimal, the absorption value ranges from 27.81 to 42.55 kg ha⁻¹. This is allegedly due to the high content of potassium found in Nira Aren which is K 14.56%.

Conclusion

The use of LOF combination of Nira Aren with dose of 25,25 L ha⁻¹ is the best dose of NPK uptake in the rice plant tissue with absorption value that is every hectare of rice plant absorb N 24,52 kg ha⁻¹ up to 33,86 kg ha⁻¹, the highest P uptake is 1,60 kg ha⁻¹ on the dry weight of straw 2,32 tons ha⁻¹ and the uptake ranges from 27,81 to 42.55 kg ha⁻¹.

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