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Growth and Production of Rice (*Oryza sativa* L.) on a Variety of Combination Dosage Liquid Organic Fertilizer and Inorganic

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Abstract

This study aims to determine the effect of various doses of liquid organic fertilizer (bio-urine) and inorganic fertilizer on rice plants. The study was conducted in Sabantang Hamlet, Toddopulia Village, Kec. Tanralili Kab. Maros from January to May 2017. This research was conducted in an experimental form using the Randomized Block Design (RBD) method, which was divided into three groups, each group was divided into 6 treatments consisting of control / farmer method (100 kg NPK + 125 kg urea / ha), Without POC Bio-Urine + 300 kg / ha NPK +125 kg / ha Urea), 3 liters / ha POC Bio-Urine + 250 kg / ha NPK + 125 kg / ha Urea, 6 liters / ha POC Bio- Urine + 200 kg / ha NPK + 125 kg / ha Urea, 9 liters / ha POC Bio-Urine + 150 kg / ha NPK + 125 kg / ha Urea, and 12 liters / ha POC Bio-Urine + 100 kg / ha NPK + 125 kg / ha Urea. So that there are 18 observation units. Based on the research results that have been carried out, it can be concluded that the combination of using liquid organic fertilizer (Bio-urine) and inorganic fertilizers with a dose of 6 liters of POC Bio Urine + 200 kg NPK + 125 kg Urea/ha. Giving the best influence on growth and productivity in rice plants.

Keywords: Rice Plants, Liquid Organic Fertilizer, Organic

Introduction

Rice (*Oryzasativa* L.) is an essential food crop commodity in Indonesia. As a staple food ingredient in Indonesia is rice from rice, which is produced by rice plants. Besides, in Indonesia, rice is also the staple food of countries on the Asian continent. Others such as China, India, Thailand, Vietnam and others. Rice is a plant in the form of clumping grass. This agricultural crop comes from tropical and subtropical Asia and West Africa.

South Sulawesi Province is a rice granary in Eastern Indonesia (KTI). The total area of rice fields is 657,101 ha. With rice production in South Sulawesi in 2016, we are reaching 8,211,901 tons of GKG (South Sulawesi Provincial Agriculture Office, 2016).

This high level of productivity is a tangible manifestation of the government's outstanding efforts (UPSUS), case the Ministry of Agriculture. Still, this condition must, of course, be improved or maintained to achieve national food sovereignty.

Efforts to meet food needs in the agricultural sector are an absolute necessity. Increased production is faced with all the limitations of resources and production facilities and demands to keep the environment from being damaged to produce sustainably.

The use of liquid organic fertilizers combined with the use of NPK Phonska and Urea is expected to obtain the right formulation to increase the absorption of nutrients in rice plants. Liquid Organic Fertilizer (Bio-Urine) has a total N-composition of 4.68%, P205 = 4.22%, K2O = 3.11%, C-organic = 7.44%, pH = 4.41, Fe = 317 ppm, Mn = 619 ppm, Cu = 896 ppm, Zn = 763 ppm, Co = 7.94 ppm, Mo = 5 ppm, pathogenic microbes: *E. Coli*= negative; *Salmonella sp*= negative (Lab. BPTP Sulsel, 2015).

Liquid organic fertilizer is made through the process of processing livestock waste, namely cow urine with a little touch of technology, producing liquid organic fertilizer which has a double advantage, which is not only beneficial for plants but also to improve nutrients in soil that are not owned by chemical fertilizers, so that soil fertility can be maintained. Besides, it can reduce the cost of inorganic fertilizers by 20% (Matheus Sariubang, 2014).

Materials and Methods

This research was conducted in Sabantang Hamlet, Toddopulia Village, Kec. Tanralili Maros Regency took place from January - May 2017.

By using an experimental form based on a randomized block design (RBD) with 6 repeated treatments of 3 (three) groups, the treatment was as follows: P0 = Farmer's control / method (100 kg NPK + 125 kg urea / ha), P1 = Without POC Bio-Urine + 300 kg / ha NPK +125 kg / ha Urea, P2 = 3liter / ha POC Bio-Urine + 250 kg / ha NPK + 125 kg / ha Urea , P3 = 6 liters / ha POC Bio-Urine + 200 kg / ha NPK + 125 kg / ha Urea, P4 = 9 liters / ha POC Bio-Urine + 150 kg / ha NPK + 125 kg / ha Urea, P5 = 12 liter / ha POC Bio-Urine + 100 kg / ha NPK + 125 kg / ha Urea.

Results and Discussion

a. Plant height

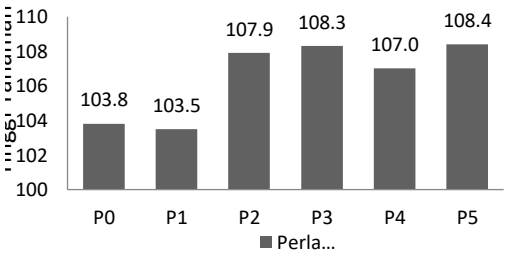

Figure 1. Histogram of Average Rice Plant Height in Dose Combination Treatment of Liquid and Inorganic Organic Fertilizer

The histogram in Figure 1. shows that the treatment (P5) is the use of POC Bio Urine 12 liters/ha combined with Inorganic 100 kg NPK and 125 kg Urea/ha. Tends to produce higher plant height than other treatments. Meanwhile, treatment (P1) showed the lowest plant height.

b. Number of Productive Tillers

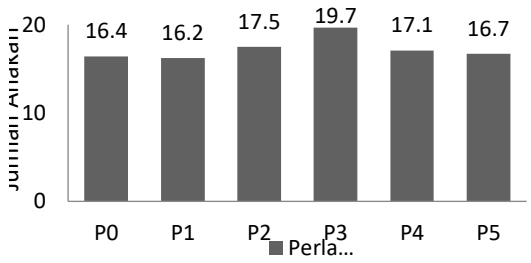

Figure 2.Histogram of Average Number of Productive Tillers in Dose Combination Treatment of Liquid and Inorganic Organic Fertilizer.

The histogram in Figure 2. shows that the treatment (P3) is the use of POC Bio Urine 6 liters/ha combined with 200 kg NPK inorganic and 125 kg Urea / ha. It can produce more productive tillers compared to other treatments, while Treatment (P1) shows a small number of productive tillers.

c. Panicle length (cm).

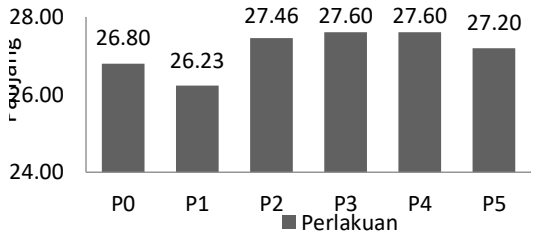

Figure 3.The Average Histogram of Rice Panicle Length in Dose Combination Treatment of Liquid and Inorganic Organic Fertilizer.

The histogram in Figure 3. shows that the treatment (P3) is the use of POC Bio Urine 6 liters/ha combined with Inorganic 200 kg NPK and 125 kg Urea / ha, and (P4) is the use of POC Bio Urine 9 liters/ha combined with Inorganic 150 kg NPK and 125 kg Urea / ha. Shows better panicle length compared to other treatments. Treatment (P1) showed the lowest panicle length.

d. Total Grain Fill Per Panicle.

Table 1. Contrast Test Results Total Grain Content per panicle.

TREATMENT	F.Hit	F. Table 0.05	F. Table 0.01	Average
(C1) P0, P1 VS P2, P3, P4, P5	4.45 *	4.36	10.4	191.65 VS 210.70
(C2) P0 VS P1	0.99^{tn}			184.3 VS 199.0
(C3) P2, P3 VS P4, P5	1.61^{tn}			217.3 VS 204.1
(C4) P2 VS P3	3.45^{tn}			203.6 VS 231.0
(C5) P4 VS P5	0.37^{tn}			199.6 VS 208.6

The contrast test results in Table 1 show that the effect of contrast (C1) without POC Bio-Urine (P0, P1) is significantly different from the treatment given POC Bio-Urine (P2, P3, P4, P5). Furthermore, the C2 contrast without control treatment (P0) and POC Bio-Urine (P1) was not significantly different. Contrast C3 (P2, P3, P4, P5), the effect of other treatments was not significant. Contrast C4 treatment (P2 VS P3) was also not significantly different. Likewise, the contrast of treatment C5 (P4 VS P5) was not significantly different.

e. Grain Weight per 1,000 Seeds.

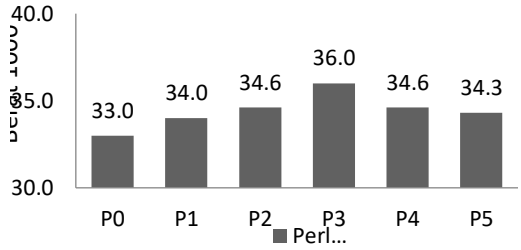

Figure 4.Histogram of Average Weight / 1,000 seeds (gram) in the Combination Treatment of Liquid and Inorganic Organic Fertilizers.

The histogram in Figure 4. shows that the treatment (P3) is the use of POC Bio Urine 6 liters/ha combined with 200 kg NPK inorganic and 125 kg Urea / ha. Produces the number of grain weight per 1,000 seeds, which is more than the other treatments, while the Control Treatment (P0) shows the lowest total grain weight per 1,000 seeds.

f. Percentage of Void Grain.

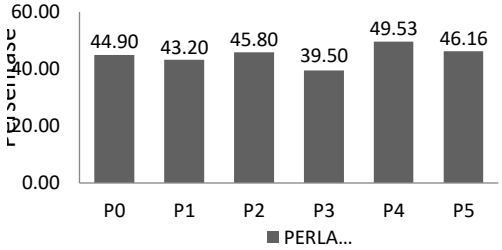

Figure 5.Histogram Average Percentage (%) of Unhusked Grain in Dose Combination Treatment of Liquid and Inorganic Organic Fertilizer.

The histogram in Figure 5. shows that the treatment (P3) is the use of POC Bio Urine 6 liters/ha combined with 200 kg NPK inorganic and 125 kg Urea / ha. Produces the lowest percentage (%) of empty grain compared to other treatments, while Treatment (P4) shows the highest rate (%) of bare grain.

g. Yield of Harvested Dry Grain (20% moisture content).

Table 2. Contrast Test Results of Harvested Dry Grain Production tonnes/ha.

TREATMENT	F.Hit	F. Table 0.05	F. Table 0.01	Average
(C1) P0, P1 VS P2, P3, P4, P5	46.85 **	4.36	10.4	5.1 VS 6.47
(C2) P0 VS P1	2.95^{tn}			4.8 VS 5.4
(C3) P2, P3 VS P4, P5	0.32^{tn}			6.4 VS 6.55
(C4) P2 VS P3	13.22 **			5.8 VS 7.0
(C5) P4 VS P5	1.02^{tn}			6.7 VS 6.4

The contrast test results in Table 2 show that contrast (C1) without POC Bio-Urine (P0, P1) has a very significant effect on the treatment given POC Bio-Urine (P2, P3, P4, P5). Furthermore, the C2 contrast without control treatment (P0) and POC Bio-Urine (P1) treatment effects were not significantly different. Contrast C3 (P2, P3 VS P4, P5), other treatments' impact was not significant. Contrast C4 treatment (P2 VS P3) was significantly different. Meanwhile, the contrast of treatment C5 (P4 VS P5) was not significantly different.

h. Yield of Milled Dry Grain (water content 14%).

Table 3. Contrast Test Results for Production of Milled Dried Grain tonnes/ha

TREATMENT	F.Hit	F. Table 0.05	F. Table 0.01	Average
(C1) P0, P1 VS P2, P3, P4, P5	50.16 **	4.36	10.4	4.85 VS 6.2
(C2) P0 VS P1	4.68 *			4.5 VS 5.2
(C3) P2, P3 VS P4, P5	0.18^{tn}			6.5 VS 6.25
(C4) P2 VS P3	16.66 **			5.5 VS 6.8
(C5) P4 VS P5	0.66^{tn}			6.4 VS 6.1

The contrast test results in Table 3 show that contrast (C1) without POC Bio-Urine (P0, P1) the effect was very significant with the treatment given by POC Bio-Urine (P2, P3, P4, P5). Furthermore, the contrast of C2 without control treatment (P0) with no POC Bio-Urine (P1) treatment was significantly different. Contrast C3 (P2, P3 VS P4, P5), other treatments' effect was not significant. Contrast C4 treatment (P2 VS P3) was significantly different. Meanwhile, the contrast of C5 (P4 VS P5) was not significantly different.

Conclusion

Based on the results of the research that has been carried out, it can be concluded that the treatment (P2, P3, P4, P5) in the combination of POC (Bio-Urine) and Inorganic (NPK and Urea) application doses gave a better effect on the amount of grain filled with permalai. Likewise, the treatment of P2 and P3 gave a better effect on the production of harvested dry grain and milled dry grain production. Meanwhile, farmer control fertilization (P0) with recommendation (P1) gave a better effect on milled dry, unhulled rice production.

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