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EFFECT OF BIO URINE AND COMPOST APPLICATION ON RICE INPARI-13 PRODUCTION AT MANDAILING NATAL DISTRICT

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ABSTRACT: This study aims to improve the productivity of rice crop in the Mandailing Natal (Madina) district from 4.7 tons / ha to 10 tons / ha. This experiment uses bio compostable material and urine of goat manure, which is widely available in the district of Madina. Increasing rice production management system using integrated crop management (ICM) of lowland rice irrigation was recommended by the Agriculture Ministry Research and Development Board of Republic Indonesia. In rice plants using compost noted that the plant height reached 127 cm, 28 cm panicle length, number of tillers per hill 19, and BWD scale of 3.5 after 60 days after transplanting (DAT). While the rice plants without the use of compost plant height of 116 cm recorded on, panicle length 26 cm dap, the number of 10 tillers per hill, and BWD scale 4 after 60 days after transplanting (DAT). Applications addition of compost and bio urine on rice crops planted with Inpari-13 is able to produce rice as much as 10.4 tons / ha. Rice paddy untreated bio compost and urine obtained rice yield as much as 6 tons / ha. On the other hand the average production of rice paddy crop in the district of Madina 4.7 tons / ha. The high yields in rice paddies without compost treatment in this study due to the mud of a rice field with composting flowing into the fields of the untreated compost so that nutrients are absorbed by rice paddy fields. The use of compost and bio urine rice crop in this study, increased rice crop amounted to 121%.

KEYWORDS: Bio Urine, Compost, Inpari-13 Rice, Mandailing Natal.

1 INTRODUCTION

The level of crop production of lowland rice in Mandailing Natal (Madina) district only 4.7 tons / hectare (ha) for once time planting. In fact, many policies have been issued by the government, including the Batang Gadis irrigation development, rice cultivation system with integrated crop management (ICM), seed and fertilizer subsidized. However, production levels of rice produced in the district of Madina still has not been able to fill the needs of the rice throughout the year in this district. Paddy fields in Madina district has an area of 37 918 ha (Central Bureau of Statistics of the Republic Indonesia Year 2014). With a land area of lowland rice in the district of Madina makes Madina district has ranked the fifth largest rice field in North Sumatra province compared to 33 districts / cities after Simalungun, Deli Serdang, Serdang Bedagai and Langkat.

The production of rice crop in the Madina district still could be improved by the intensification of agriculture, in order to obtain the higher rice harvest productivity. High rice yields will deliver Madina district as one of the rice granary of North Sumatra. This predicate will help to fill the needs of national rice in the region of the former South Tapanuli district and the surrounding area. The low production of paddy rice caused scarcity, this scarcity has resulted in the price of rice to be unstable for four months a year in Madina district. Rice cultivation which does not follow a system of irrigated rice paddy Integrated Crop Management in the Madina district cause lower rice crop production. As for the actions that lead to low

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yields is the use of seeds that are used over and over, age nursery seedlings, spacing not use Legowo row, a dose of chemical fertilizer are not exact, the lack of the use of organic fertilizers, irrigation methods, and post-harvest handling.

Chemical fertilizers are used constantly by farmers caused a decline in the quality of soil nutrient. Excessive use of chemical fertilizers also cause farmland become saturated due to residual substance derived from fertilizers. As a result of these treatments led to a decline in paddy crop production both in quantity and quality. In addition, the biological soil ecosystem also become unbalanced so that fertilization which aims to replenish nutrients in the soil not be achieved (Supatha, 2012). The use of compost and bio urine sourced from organic materials and urine then decomposed by microbes can provide nutrients needed by the rice crop. Decomposers can be obtained commercially or made itself through organic materials that serve to break down nitrogen and carbon from organic waste so that it can provide nutrients needed by plants.

The existence of decomposers will accelerate the composting than the absence of decomposers (Nurrahma, 2013). Compost obtained through the decomposition process can be a buffer properties of the soil chemical, physical and biological so that it can boost the productivity of land and improve rice yields. Meanwhile, biourine can help supply the nitrogen nutrient in plants. The use of organic fertilizer in addition useful for the rice plant, it will also reduce the waste of livestock that will bring economic benefits to the farmer.

Various studies using compost and bio urine in rice crop has been widely publicized and as a result were able to increase the growth and production of the rice harvest. Santosa et al (2014), have used biourin in rice plants. The use biourin can produce rice with higher rice, leaves more, and the leaves are wider than without biourin. The use of compost (a mixture of straw and manure) on the types of Upland rice plants has also increased crop production (Ciptadi et al, 2009). The use of Azolla compost can increase yields up to 8 tons per hectare in rice varieties Ciherang (Supartha et al, 2012). The addition of organic fertilizer in rice varieties ciherang has significantly increase the yield of dry grain harvest by 4.4% - 17.4%. The combination of organic and chemical fertilizers has proven to improve the growth of upland rice. The combination of organic and chemical fertilizers has proven to improve the growth of upland rice (Alavan, 2015).

Rice productivity will be increased by implementing proper rice cultivation. One of them is the proper implementation of the agricultural system is to implement a system of Integrated Crop produced by the Research and Development of the Ministry of Agriculture of the Republic Indonesia. An important component in the system is a fertilizer that combines the organic with the inorganic fertilizers. This study aimed to determine the effect of organic fertilizers and biourin to increased rice crop production.

2 Materials And Methods

2.1 Time and place research

This research conducted in the Kotasiantar village, it's about 1 km to the east of the Panyabungan city, Capitol of Mandailing Natal district-North Sumatra. The research location is at an altitude of 400-750 m above sea level. Land used in this study for the treatment of compost area of 0,032 ha, while the untreated of compost land area of 0,008 ha. Tillage is done three weeks before planting (24 September to 15 October 2015) because the land previously used for farming of pepper plants. Research began on October 16, 2015 until January 18, 2016 (94 days).

2.2 Tools and materials

Materials used are rice seed Inbrida-Padi-Sawah 13 (Inpari 13) varieties, composted goat manure, bio urine goat manure, NPK, urea, and natural pesticide from the sour soup leaves. The tools used in this study hoes, rakes, rulers, scales, syringes, sickles, camera, length measuring tools, and stationery. The tools used in this research are hoes, rakes, rulers, scales, syringes, sickles, camera, length measuring tools, and stationery.

2.3 Experimental methods

Seedlings planted at the age of 23 days after sowing (old seed). Water conditions at planting time was macak-macak or under aerobic conditions, or in other words that the soil moist but not waterlogged.

The study was conducted using an experimental field trials and comparison between the two systems, namely:

1. Without compost:
   a. Chemical fertilizers (NPK 7 kg and 4 kg of urea at 14 days after planting, 7 kg of urea at 25 days after planting, and 4 kg of urea at 60 days after planting)
   b. Fertilization and management of paddy using conventional methods as commonly done by farmers around the field trials.
2. Compost treatment:
   a. Chemical fertilizers are given as to the treatment without compost
   b. Spraying urine bio goat manure (200 liters / ha) at 20 days after planting and 30 days after planting.
   c. Soursop leaf natural pesticide spraying (100 liters / ha) at 70 days after planting.
   d. Management of the fields according to the Balitbangtan recommendation of integrated crop management (ICM-2013) consisting of:
      - Compost goat dung of 3 tons / ha
      - Watering dry wet (PBK) where 5 cm above the ground and 15 cm below the ground surface.
      - Planting method uses a Legowo system 4: 1 (25 cm x 12.5 x 50 cm)
      - The number of seeds 2-3 stems per hole
      - Fertilization of N is based on the leaf color chart (LCC).

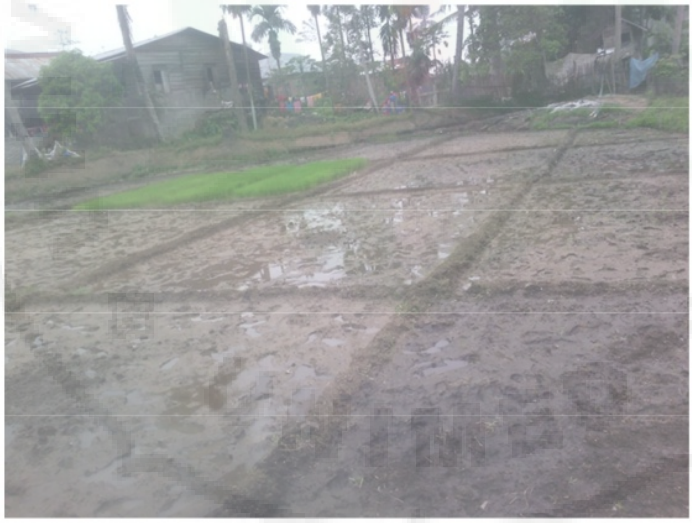

Fig. 1. The land is prepared and mixed with compost treatment

3 RESULTS

Results of an observational analysis of growth and Inpari rice production with compost and without compost treatment shown in table 1. Figure 2, 3 and 4 show the growth of rice with compost treatment before and after 60 days after planting.

Table 1. The observation of the growth and Inpari rice production of 13 days after planting

Observation	Without Compost (dap)				With Compost (dap)			
	60	70	90	92	60	70	90	92
Plant height (cm)	118	117	116	n.m	127	127	128	n.m
Number of tillers	10	10	10	n.m	19	19	19	n.m
Tiller Productivity	8	8	8	n.m	19	19	19	n.m
BWD (No.)	3,5	n.m	n.m	n.m	4	n.m	n.m	n.m
Panicle length (cm)	26	27	26	n.m	28	28	27	n.m
Number of panicles clumps	9	12	12	n.m	14	14	14	n.m
Number of grains / panicle	n.m	n.m	n.m	n.m	190	n.m	n.m	n.m
The number of leaves / stems	4	3	t.d	t.d	4	4	n.m	n.m
1000 grain dry weight (g)	n.m	n.m	n.m	n.m	6,02	n.m	n.m	n.m
Estimated yield (tons / ha)	n.m	n.m	n.m	n.m	17	n.m	n.m	n.m
Yields (t / ha)	n.m	n.m	n.m	6,0	n.m	n.m	n.m	10,4

*) n.m= not measured, dap=days after planting

Figure 2. Rice grown with compost treatment prior to 60 days after planting

Figure 3. Growth of rice with compost treatment at the time of close to 60 days after planting

Figure 4. Growth of rice with compost treatment at the age after 60 days after planting

4 DISCUSSION

In this study, the use of compost, bio urine and Legowo row system can increase rice yields as presented in Table 1 in the amount of 10.4 tons / ha. Meanwhile, the rice plants without composting obtained a yield of 6 tons / ha. The observations are consistent with previous studies showing that rice production is affected by the provision of compost (Kaderi, 2004; Ciptadi 2009; Sennang, 2012, Mungara, 2013), bio urine (Santosa, 2014), and methods of planting Legowo row system (Erythrina , 2014).

In Table 1 are presented that composting increase vegetative growth of rice plants. At the age of 60 days after planting, the rice plant height was observed at 127 cm a[13] 19 the number of tillers per hill. While on treatment without compost, at 60 days afte[6]planting was observed at 118 cm plant height and number of tillers 10 per hill. Vegetative growth such as plant height and number of tillers affected by fertilizer N. The number of grains per panicle, harvest grain weight in addition affected by fertilizer N is also influenced by the vegetative growth of the plant itself. Proportional to the vegetative growth of rice production (Mezuan 2002, Ciptadi, 2009).

In Table 1 are also presented that the use of compost increa[11][12]he number of productive tillers per hill that is 19 while it was on treatment without compost produced only 8 productive tillers per hill. The number of productive tillers is very closely related to the number of panicles per hill so it needs to be observed, and it turns out the use of compost can increase the number of panicles per hill. The combination of chemical fertilizer with compost can be complementary. The organic fertilizer is a complete fertilizer that contains elements despite low levels, which can provide nutrients for plants. Compost as one of the organic fertilizer containing micronutrients that can produce more productive tillers.

The ability of the rice plant tillering form, genetically different on each type of rice (Purwanto, 2009). But environmental factors, nutrients and how the cultivation take effect on tillering. Tillering will stop when the N content in the leaf blade to 2%, P 0.03%, and K 0.5%. Tiller formation rate increases with increasing N content up to 5%, P up to 0.2% and K up to 0.5%. Above that value will have no effect on tillering. In addition to the lowland system of Integrated Crop Management also stated that the number of seedlings is also affected by plant spacing, light, nutrient supply, and other environmental factors are supportive. Leaf color chart (LCC) shows the N content identification through assessment of green color in leaves. In table 1 is presented that the LCC at 60 dap on treatment without compost scale is lower (3.5) than in treatment with compost (4). This suggests that composting can increase N content in rice plants.

The more organic manure combined with inorganic fertilizers supplied to rice plant will produce high crop yields (Kustiono, 2012). By measuring parameters such as observation of plant height, number of panicles / hill and weight of dry milled grain is seen that there is the effect of treatment composting. These results indicate that the content of organic fertilizer can help the availability of N, P, K, and other nutrients for optimal growth of rice.

In Table 1 are presented that administering a combination of compost and chemical fertilizer can produce 28 cm panicle length and the number of panicle is 14 panicles per hill at 60 days after planting. Meanwhile the only treatment with chemical fertilizer produces shorter length panicles is 26 cm and the number of panicles per hill just as much as 9 panicles at 60 days after planting.

Total grain is closely related to variations panicle length (Widodo, 2004). Based on the above statement can be interpreted that the longer panicles produced will have more grain number. On the other hand, the more the amount of grain produced, the yield will increase. In this research, the amount of grain as much as 190 grains per panicle at 60 days after planting, while on treatment without composting is not done the calculations.

1000 grain weight measurement parameters to determine differences in the use of rice varieties show the results were not significantly different. This shows that the rice variety used is the same variety Inpari 13. Meanwhile, the number of leaves per stem equally good outcome between treatment with the addition of compost or composted without the addition of as many as four leaves per stem at 60 days after planting.

In this study also found that the larger phenomenon of rice crop production produced may result in a high percentage of rice plants were uprooted. Observations at the site showed that the number of rice plants were uprooted as many as 50% of the total population. Because of the incident, the rice harvest is done more quickly than it should. Inpari harvest age - 13 is at the age of 92 days after planting. The high percentage of rice plants were uprooted thought to be caused by a lack of supply of potassium and phosphorus in rice plants, causing rice crop easily collapse. Its needs further research.

5 CONCLUSIONS

The use of compost and bio urine can increase vegetative and generative growth of rice plants. In rice plants with compost treatment at 60 days after planting recorded plant height 127 cm, 28 cm panicle length, number of tillers per hill 19, and BWD scale 4. While the rice plants were treated without the use of compost at 60 days after planting record plant height 116 cm, 26 cm panicle length hst, the number of 10 tillers per hill, BWD scale of 3.5. Application of treatments the addition of compost and bio urine on rice crops Inpari-13, delivers 10.4 tons / ha. Meanwhile, in the treatment without compost and bio urine only yields as much as 6 tons / ha. The use of compost and bio urine in rice, increased rice harvest up to 121%. In subsequent studies necessary to add potassium and phosphorus are sourced from organic materials and chemicals so that the level of the rice plants were uprooted can be reduced.

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