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RESEARCH ARTICLE

THE EFFECT OF COMBINATION ORGANIC AND INORGANIC FERTILIZERS ON THE SOIL CHEMICAL PROPERTIES, GROWTH AND YIELD OF SEVERAL RICE VARIETIES.

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Key words:-
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Abstract

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The purpose of this study was to determine the effect of the combination of organic and inorganic fertilizers on the change of soil chemical properties, growth and yield of several rice varieties. The study was conducted in farmer rice fields in Bireuen Districts, Aceh Province from June to December 2016. Soil analysis was carried out at Soil Laboratory, Assessment Institute of Agricultural Technology, Banda Aceh. Factorial pattern of Randomized block design (RBD) with 3 replications was used in this study. The first factor of the treatment consist of 4 levels combination of organic and inorganic fertilizers as follows P_0 = without organic fertilizers + 250 kg ha^{-1} Urea + 150 kg ha^{-1}SP-36 + 100 kg ha^{-1} KCl, P_1 = 5 ton ha^{-1} organic fertilizers + 225 kg ha^{-1} Urea + 125 kg ha^{-1}SP-36 + 75 kg ha^{-1} KCl**,** P_2 =10 ton ha^{-1} organic fertilizers + 200 kg ha^{-1} Urea + 100 kg ha^{-1} SP-36 + 50 kg ha^{-1} KCl, P_3 = 15 ton ha^{-1} organic fertilizers + 175 kg ha^{-1} Urea + 75 kg ha^{-1}SP-36 + 25 kg ha^{-1} KCl. The second factor of the treatment consists of 4 rice varieties as follows Batutegi, Situ Bagendit, Situ Patenggang and Inpari 30**.** The results showed that the treatment combination of organic and inorganic fertilizers increased C-organic, CEC, P-available, and K-available. The combination treatment of organic and inorganic fertilizers has not been able to improve plant growth, yield components, and rice yields. Rice yields in 5 ton ha^{-1} organic fertilizers + 225 kg ha^{-1} Urea + 125 kg ha^{-1}SP-36 + 75 kg ha^{-1} KCl treatment was reached 7.00 tons ha^{-1}. Yields of Inpari 30 variety has reached 7.29 tons ha^{-1}, which is not significantly different from Situ Bagendit and Situ Patenggang varieties.

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Introduction:-

Rice is the main food crop consumed by almost all of Indonesian people because of it contain enough nutrients, boosters for the human body and easily converted into energy. However, with the high rate of population growth, the need for rice consumption is increasing (Humaedah et al., 2010).Various obstacles faced by paddy fields in supporting rice growth and production such as low soil nutrients availability low quality of soil chemical and physical properties. One way to improve rice growth and yields could be done by improving the soil, chemical and physical properties such as by implementation the cordination of inorganic and organic fertilizers.

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Bakrie et al., (2010) stated that the development of inorganic fertilizers had a positive effect on increasing rice production, but on the other hand the use of inorganic fertilizers also had a negative impact, such as environmental pollution and inefficiency of fertilization in most rice cultivation areas. Amoah et al. (2012) revealed that the improper and continuous use of inorganic fertilizers for intensive crop cultivation can cause soil degradation, environmental pollution and consequently lower yields. On the other hand, organic fertilizer has the potential to improve the chemical, physical and biological properties of the soil. According to Rochmah (2009), the continuous use of inorganic fertilizers without the application of organic fertilizers can cause nutrient imbalance in the soil, low fertilizer efficiency, damage to soil structure and decreasing of soil microbiological activities. This causes the need for innovation by combining inorganic fertilizers and organic fertilizers in order to improve land quality also increased growth and yield.

Organic fertilizers have roles such as increasing nutrient levels, increasing chemical, physical and microbial activity (Yang et al., 2004). Widowati (2009) added that the application of organic fertilizer can increase fertilizer efficiency. The greater number of soil microbes makes activities in the soil higher, including assimilation of nutrient N which is useful for plant (Supriyadi et al, 2018). In addition, the provision of appropriate and balanced fertilizers will reduce fertilization costs, making plants healthier even though at a lower dose of fertilizer but rice yields are relatively the same (Partohardjono, 1999). By adding organic matter to the soil, especially in soils with low organic matter content, fertilizer application becomes more effective and efficient (Arafah, 2011). The treatment of 160 g of rice straw litter + 160 ml of microbial + 50% inorganic fertilizer consortium was producing tillers reaching 54,87 tillers, the number of grain per panicle reached 130.57 grains with crop grain weight reaching 150.08 grams (Allamah et al., 2018). In addition to the use of organic and inorganic fertilizers, selection of varieties also determines optimal rice crop production. Superior varieties are one of the innovative technologies that are reliable for increasing productivity through increasing the potential or yield of plants as well as tolerance and resistance to biotic and abiotic stresses (Sembiring, 2008). Rahayu and Harjoso (2011) show that the effect on growth is not only due to fertilizer application, but varieties are very influential because each variety has different genetic, morphological and physiological properties.

Satoto and Suprihatno (1998) state that differences in growth and yield are due to the genetic traits of each strain and environmental conditions. The varieties used were Batutegi, Situ Bagendit, Situ Patenggang and Inpari 30 varieties which had resistance to leaf blight and blast disease (Wahab et al., 2017). The four varieties include upland rice varieties. The use of the four varieties aims to determine the adaptability and productivity of lowland paddy fields. Based on the description above, it is necessary to conduct research on the effect of a combination organic and inorganic fertilizers on the change of soil chemical properties, growth and yield of several rice varieties.

Materials and Method:-

Plant Cultivation Procedure

This research was carried out in farmer rice fields in Bireuen Districts, Aceh Province from June to December 2016. Soil analysis was carried out at Soil Laboratory, Assessment Institute of Agricultural Technology Aceh.

Rice planting was carried out on paddy fields. Land preparation was carried out before transplanting. The land was prepared by two ploughings. Rice plant were grown in plots (plot size 4 m x 3 m) at a spacing of 25 cm x 25 cm. In order to recover from the transplanting shock, a thin layer of standing water is kept for 3 to 5 days after transplanting. Organic fertilizer was applied a week before planting, while inorganic fertilization according to treatment. Urea fertilizer was applied in 3 times, at 7 days after planting (DAP), 30 DAP and 45 DAP. SP-36 fertilizer was applied at 7 DAP, while application of KCl is done 2 stages, namely at 7 DAP and 45 DAP.

Table 1:-The Parameters Soil Chemical Properties Analysis

Parameters	Analytical methods	Reference
pH (H_2O)	Electrometric method	Soil Research Institute, 2005
C-Organic (%)	Walkey and Black method	Soil Research Institute, 2005
N-total (%)	Kjeldahl method	Soil Research Institute, 2005
P-available (mg kg^{-1})	P Bray II method	Soil Research Institute, 2005
K- available (mg kg^{-1})	Flamefotometry method	Soil Research Institute, 2005
CEC(cmol kg^{-1})	Ammonium acetate extraction	Soil Research Institute, 2005

Soil Chemical Properties Analysis
Soil chemical properties analysis was carried out at Soil Laboratory, Assessment Institute of Agricultural Technology Aceh. Parameters of soil chemical properties analyzed are presented in Table 1.

Growth and Yield Analysis
Factorial pattern of Randomized block design (RBD) with 3 replications was used in this study. The first factor of the treatment consist of 4 levels combination of organic and inorganic fertilizers as follows: P_0 = without organic fertilizers + 250 kg ha^{-1} Urea + 150 kg ha^{-1} SP-36 + 100 kg ha^{-1} KCl, P_1 = 5 ton ha^{-1} organic fertilizers + 225 kg ha^{-1} Urea + 125 kg ha^{-1}SP-36 + 75 kg ha^{-1} KCl**,** P_2 =10 ton ha^{-1} organic fertilizers + 200 kg ha^{-1} Urea + 100 kg ha^{-1} SP-36 + 50 kg ha^{-1} KCl, P_3 = 15 ton ha^{-1} organic fertilizers + 175 kg ha^{-1} Urea + 75 kg ha^{-1}SP-36 + 25 kg ha^{-1} KCl. The second factor of the treatment consists of 4 rice varieties as follows Batutegi, Situ Bagendit, Situ Patenggang and Inpari 30**.**

The observed growth and yield variables of rice plants included plant height, number of tillers, number of productive tillers, the percentage of filled grain, the percentage of empty grain, weight of 1000 grains and yield. The data obtained were analyzed using the F test (analysis of variance), if there is a significant effect on the treatment, then to distinguish between treatment levels followed by Least Significant Difference (LSD) test at 5% significance level.

Results and Discussion:-

The Changes of Soil Chemical Properties by Application of Organic and Inorganic Fertilizer
Based on the results of the initial soil analysis (Table 2) shows that the soil at the study site has C-organic is very low, with a pH of 7.18 (neutral), N-total is low, P and K available is very low, K available is low and CEC is medium.

Table 2:-The Soil Chemical Properties Before and After the Treatment Combination of Organic and Inorganic Fertilizers

Parameters	Before Treatments	After Treatments			
		P_0	P_1	P_2	P_3
pH (H_2O)	7,18 (Neutral)	6,40 (Rather Acid)	6,60 (Neutral)	6,60 (Neutral)	6,50 (Rather Acid)
C-Organic (%)	0,81 (Very Low)	1,90 (Low)	1,90 (Low)	1,90 (Low)	1,30 (Low)
N-total (%)	0,19 (Low)	0,10 (Low)	0,10 (Low)	0,10 (Low)	0,10 (Low)
P-available (mg kg^{-1})	3,50 (Very Low)	8,50 (Low)	11,50 (Low)	11,4 (Low)	12,10 (Low)
K- available (mg kg^{-1})	0,22 (Low)	4,00 (Very High)	2,00 (Very High)	2,00 (Very High)	2,50 (Very High)
CEC(cmol kg^{-1})	19,60 (Medium)	9,00 (Low)	10,50 (Low)	9,50 (Low)	10,50 (Low)

Information: Information: P_0 = without organic fertilizer + 250 kg ha^{-1} Urea + 150 kg ha^{-1} SP-36 + 100 kg ha_{-1} KCl; P_1 = 5 tons ha^{-1} organic fertilizer + 225 kg ha^{-1} Urea + 125 kg ha^{-1} SP-36 + 75 kg ha^{-1}KCl; P_2 = 10 tons ha^{-1} organic fertilizer + 200 kg ha^{-1} Urea + 100 kg ha^{-1} SP-36 + 50 kg ha^{-1} KCl; P_3 = 15 tons ha^{-1} organic fertilizer + 175 kg ha^{-1} Urea + 75 kg ha^{-1} SP-36 + 25 kg ha^{-1} KCl.

Table 2 shows that the application of organic and inorganic fertilizers did not have a significant effect on soil pH in a treatments despite a decrease compared to the initial pH reaching 7.18. This is presumably due to the nutrient content of nitrogen in inorganic fertilizers that are acidic causing a decrease in soil pH. However, when compared with the treatment of 100% inorganic fertilizer (P_0), the combination treatment of organic and inorganic fertilizers tends to increase soil pH even though it is still in the neutral category. This shows that organic and inorganic fertilizers are able to maintain soil pH values in neutral conditions.

The results of the analysis of C-organic content before the study showed very low levels of 0.81%. The C-organic content increased after treatment of the combination organic and inorganic fertilizers, where the C-organic value at the beginning of the study was 0.81% (very low) increased to 1.9% (low) in the treatments P_0, P_1, P_2 and 1.3% on P_3.

Changes in soil organic matter content were observed to be relatively small, from very low to low, this is because land management is relatively similar and decomposition of organic matter in the tropics is relatively fast and requires more time and relatively long changes to observe changes in C-organic content land (Anas et al., 1995).

Nitrogen is a major component in soils of various substances. Most soil N is in the form of organic N. Nitrogen is released in the form of ammonium, and when both the ammonium dioxid environment is turned into nitrite then nitrate. The results of the analysis of N-total content at the study site were classified as low at 0.19% at the initial analysis reduced to 0.10% in all treatments combined with organic and inorganic fertilizers. Bara and Chozin (2009) stated that organic nitrogen compounds are highly soluble and easily lost in drainage water or lost to the atmosphere. The level of P-available after treatment is classified as low at P_0 to P_3, respectively 11.5; 11.4; and 12.1 mg kg^{-1} compared to before treatment which is 3.5 mg kg^{-1}. Chairani (2005) stated that the increase in P available soils with the addition of a combination of organic and inorganic fertilizers was caused by the results of the decomposition of organic acids such as citric acid, askalat, tartaric, and malonic acid. The resulting organic acids can bind metal ions of Al, Fe or Mn that bind P, so that P is released into the soil solution and becomes available to plants.

The K (potassium) content in the soil because the potassium nutrients in the soil are more stable than nitrogen and are faster mobile than the phosphorus nutrients so that it is easily carried by rain water and the temperature can accelerate the release and weathering of minerals in potassium leaching. The analysis showed that K- available before treatment was classified as very low (0.22 mg kg^{-1}) and after treatment, K- available in the soil increased to 4.0 mg kg-1 in P_0 treatment (without organic fertilizer + 250 kg ha^{-1} Urea + 150 kg ha^{-1} SP-36 + 100 kg ha^{-1} KCl), 2.0 mg kg^{-1} at P_0 and P_1 treatments and 2.5 in P_3 treatments was classified as very high.

The results of the CEC analysis showed that at before treatment was 19.6 cmol kg-1 (medium) and decrease to 9 cmol kg-1 in the P_0 treatment (without organic fertilizer + 250 kg ha^{-1} Urea + 150 kg ha^{-1} SP-36 + 100 kg ha^{-1} KCl); 10.5 cmol kg-1 in P_1 treatment 5 tons ha^{-1} organic fertilizer + 225 kg ha^{-1} Urea + 125 kg ha^{-1} SP-36 + 75 kg ha^{-1}KCl); 9.5 cmol kg-1 in P_2 treatment (10 tons ha^{-1} organic fertilizer + 200 kg ha^{-1} Urea + 100 kg ha^{-1} SP-36 + 50 kg ha^{-1} KCl) and 10.5 cmol kg-1 in treatment P_3 (15 tons ha^{-1} organic fertilizer + 175 kg ha^{-1} Urea + 75 kg ha^{-1} SP-36 + 25 kg ha^{-1} KCl) are all included in the low category. Exchange of cations for the supply of plant nutrients has a very important meaning. A soil containing high CEC requires fertilization of certain cations in large quantities to be available to plants. When given in small amounts, it is less available to plants because more is absorbed. Soil pH in this study ranged from 6.4-7.8 so the increases of pH value continuously to alkaline cations can decrease CEC value. According to Supriyadi et al (2018), if alkaline cations is too much or dominant in the soil, it will bind other nutrients such as P and make the CEC decrease.

Effect of Application Organic and Inorganic Fertilizer on Growth and Yield of Rice

Plant height and Tiller Numbers

The results of the analysis of variance showed that the treatment combination of organic and inorganic fertilizer has not significantly effect on the plant height and tillers number of several rice varieties. The treatment of varieties showed significantly effect on the plant height and tiller numbers at 3, 6 and 9 WAP (Week After Planting).

Table 3 shows that plant height and tiller numbers of rice at 3, 6 and 9 WAP 9 WAP was not statistically between treatments. Plant height and tiller numbers of rice at 3 and 9 WAP was found significant different between variety of rice. Plant height at 3 and 9 WAP in Batutegi varieties that were significantly different from the other varieties (Situ Bagendit, Situ Patenggang and Inpari 30). The highest plant height at 6 WAP was found in Batutegi varieties that were significantly different from Situ Bagendit and Inpari 30 varieties, but were not significantly different from Situ Patenggang. According to Rahayu and Harjoso (2011) the effect on plant growth is not only due to fertilizer application but also highly influenced by variety factors, because each variety has different genetic, morphological, and physiological characteristics. Sujitno et al. (2011) added that plant height is influenced by genetic traits and environmental conditions.

The highest tiller numbers at 3, 6 and 9 WAP was found in in Situ Bagendit varieties that were significantly different from the Batutegi, Situ Patenggang and Inpari 30 varieties. This indicated that Situ Bagendit varieties had quite good adaptability so that it has a higher number of tillers than other varieties. The besides, each rice variety has genetic factors and different environmental adaptability. In accordance with Alavan et al., (2015) differences in varieties affect differences in plant appearance, namely differences in traits in plants (genetic) or the presence of environmental influences. Krismawati et al., (2011) revealed that differences in the number of tillers of each variety were determined by interactions between genotypes and the environment. Situ Bagendit varieties had the ability to adapt and grow on growing media with low total N soil content (Table 2) so as to produce the highest number of tillers.

Table 3:-Effects of Combination of Organic and Inorganic Fertilizer on Plant Height and Tillers Number of Several Rice Varieties

Treatments	Plant Height (cm)			Tiller Number		
	3WAP	6WAP	9WAP	3WAP	6WAP	9WAP
P_0	57,28	100,47	137,34	18,05	26,33	20,17
P_1	56,96	99,48	137,50	18,15	26,66	20,95
P_2	55,75	98,48	133,58	17,95	25,09	19,10
P_3	55,90	98,13	132,40	17,38	25,97	20,02
Batutegi	63,93 d	115,33 b	167,74 c	10,55 a	13,27 a	13,20 a
Situ Bagendit	52,99 b	85,62 a	112,02 a	27,32 d	44,81 d	28,34 d
Situ Patenggang	58,20 c	112,83 b	146,80 b	13,55 b	17,28 b	16,69 b
Inpari 30	50,78 a	82,79 a	114,26 a	20,11 c	28,69 c	22,02 c

Information: Information: P_0 = without organic fertilizer + 250 kg ha^{-1} Urea + 150 kg ha^{-1} SP-36 + 100 kg ha$_{-1}$ KCl; P_1 = 5 tons ha^{-1} organic fertilizer + 225 kg ha^{-1} Urea + 125 kg ha^{-1} SP-36 + 75 kg ha^{-1}KCl; P_2 = 10 tons ha^{-1} organic fertilizer + 200 kg ha^{-1} Urea + 100 kg ha^{-1} SP-36 + 50 kg ha^{-1} KCl; P_3 = 15 tons ha^{-1} organic fertilizer + 175 kg ha^{-1} Urea + 75 kg ha^{-1} SP-36 + 25 kg ha^{-1} KCl. The numbers followed by the same letter the same column was not significantly different at the 5% level with the Least Significant Difference (LSD) test for each treatment.

Yield Component of Several Rice Varieties

The results of the analysis of variance showed that the treatment combination of organic and inorganic fertilizer has not significantly effect on the tiller productive numbers, percentage of filled grain, percentage of empty grain, weight of 1000 grains and yields of several rice varieties, while the difference in varieties showed a very significant effect on the tiller productive numbers, percentage of filled grain, percentage of empty grain, weight of 1000 grains and yields.

Table 4 shows that the yields tends to be higher in the treatment P_1 (5 tons ha^{-1} organic fertilizer + 225 kg ha^{-1} Urea + 125 kg ha^{-1} SP-36 + 75 kg ha^{-1}KCl), although not statistically significantly different from other fertilization treatments. This shows that the combination of organic and inorganic fertilizers tends to have a positive impact on yields of rice. It is suspected that the application of inorganic fertilizer will have a real effect if the organic matter content of the soil or the application of organic material is relatively low. In accordance with the opinion of Sakhidin et al., (2013) that fertilizing N, P and K can increase rice growth and yield. Besides organic fertilizer has a slow nature (slow release) in providing nutrients for plants because it requires time for the decomposition process. In addition, it is also thought to be the process of reducing the amount of nutrients in the soil by microbial activity (immobilization) so that the levels of nutrients that can be used by plants is reduced.

Table 4 shows that the number of productive tillers due to differences in the best varieties was found in Situ Bagendit varieties that were significantly different from Batu Tegi, Situ Patenggang and Inpari 30 varieties. This is due to the ability of the Situ Bagendit variety to adapt and grow on growing media with low soil nutrient content (Table 2).

Table 4 shows that the filled grain of rice due to the best treatment of various varieties was found in Situ Bagendit varieties that were not significantly different from Inpari 30 varieties. This was due to the genetic influence of each different variety. This is consistent with the results of the research of Darti (1992) which revealed that the nature of each genetic and environment where plants grow can affect the density of each panicle and the amount of grain formed. While the number of empty grains due to the treatment of the lowest is found in Situ Bagendit varieties it was not significantly different from Situ Patenggang and Inpari 30 varieties. The higher the empty grain shows that the more unproductive rice grains causes a decrease in the quantity of paddy produced by Batutegi varieties.

Furthermore, the highest weight of 1000 grain were found in the treatment of Situ Patenggang varieties which were significantly different from the Batutegi variety but were not different from Situ Bagendit and Inpari 30 varieties. This is in line with the results of the study of Idawanni et al. (2016) who reported that the highest 1000 seed weights were found in Situ Patenggang varieties that were significantly different from the local Arias, Inpago 5 and Batutegi varieties. This is thought to be closely related to the ability of each variety to absorb nutrients in the soil especially P nutrients which plays a role in seed formation. Warisno (1998) suggested that the ability to absorb P nutrients in different amounts photosynthates produced also different which results in differences in the amount of photosynthate translocation to seeds. The amount of filled grains and the weight of seeds formed in a panicle is very dependent on the photosynthetic process of the plant during its growth and the genetic characteristics of the rice plant that is cultivated. In accordance with the opinion of Masdar (2007) high and low seed weight depends on whether or not the dry matter contained in the seeds. Dry matter in the seeds is obtained from photosynthesis which can then be used for seed filling.

Table 4:-Effects of Combination of Organic and Inorganic Fertilizer on Yield Component of Several Rice Varieties

Treatments	Tiller Productive Numbers	Percentage of Filled Grain (%)	Percentage of Empty Grain (%)	Weight of 1000 Grain (Gram)	Yield ($t.ha^{-1}$)
P_0	15,88	84,50	15,50	26,89	6,90
P_1	16,52	80,40	19,60	27,03	7,00
P_2	15,63	83,22	16,78	26,99	6,87
P_3	15,11	84,71	15,29	26,93	6,83
Batutegi	10,38 a	73,20 a	26,80 b	23,52 a	6,00 a
Situ Bagendit	20,96 d	92,93 c	7,07 a	28,11 b	7,27 b
Situ Patenggang	13,36 b	87,50 b	12,50 a	28,34 b	7,03 b
Inpari 30.	18,45 c	91,88 c	8,12 a	27,87 b	7,29 b

Information: P_0 = without organic fertilizer + 250 kg ha^{-1} Urea + 150 kg ha^{-1} SP-36 + 100 kg ha_{-1} KCl; P_1 = 5 tons ha^{-1} organic fertilizer + 225 kg ha^{-1} Urea + 125 kg ha^{-1} SP-36 + 75 kg ha^{-1}KCl; P_2 = 10 tons ha^{-1} organic fertilizer + 200 kg ha^{-1} Urea + 100 kg ha^{-1} SP-36 + 50 kg ha^{-1} KCl; P_3 = 15 tons ha^{-1} organic fertilizer + 175 kg ha^{-1} Urea + 75 kg ha^{-1} SP-36 + 25 kg ha^{-1} KCl. The numbers followed by the same letter the same column was not significantly different at the 5% level with the Least Significant Difference (LSD) test for each treatment.

Table 4 shows that the yields of rice due to the differences in the best varieties was found in the Inpari 30 variety which was significantly different from the Batutegi variety but not significantly different from the Situ Bagendit and Situ Patenggang varieties. The Batutegi variety produces less yields compared to Situ Bagendit, Situ Patenggang and Inpari 30 varieties (Table 4). This shows that the varieties of Inpari 30, Situ Bagendit and Situ Patenggang have genetic characteristics with better adaptability to the conditions of the paddy field than Batutegi varieties. Kamal (2001) revealed that differences in total rice yield are caused by genetic differences in each rice cultivar which causes different responses to the environment. Idawanni et al., (2016) added that the weight difference yields was caused by differences in the nature of each variety and the environmental conditions in which it grown. In other words, the harvest index was strongly influenced by the grain weight with the total biomass obtained by each variety (Hambali and Lubis, 2015).

Conclusion:-

The combination of organic and inorganic fertilizers increased C-organic, CEC, P-available, and K-available. The combination of organic and inorganic fertilizers has not been able to improve plant growth, yield components, and rice yields of of Batutegi, Situ Bagendit, Situ Patenggang and Inpari 30 varieties. Rice yields in 5 ton ha^{-1} organic fertilizers + 225 kg ha^{-1} Urea + 125 kg ha^{-1} SP-36 + 75 kg ha^{-1} KCl treatment was reached 7.00 tons ha^{-1}. The highest yield was found in the Inpari 30 variety reaching 7.29 ton ha^{-1}, which is not significantly different from Situ Bagendit and Situ Patenggang varieties.

References:-

1. Alavan, A., Hayati, R and Hayati, E. (2015): The effect of fertilization on the growth of several upland rice varieties (*Oryza sativa* L.). J. Floratek., 10: 61 – 68.
2. Allamah, A., Hapsoh, Wawan, and Dini, I.R. (2018): The growth and yield of rice (*Oryza sativa* L.) with organic and inorganic fertilizer application by cellulolytic microbes in peat. Indonesian J. Agricultural Research., 1(03):295 – 306.
3. Amoah, A.A., Miyagawa, S and Kawakubo, N. (2012): Effect of supplementing inorganic fertilizer with organic fertilizer on growth and yield of rice-cowpea mixed crop. Plant Prod. Sci., 15 (2): 109-117.
4. Anas, I. 1989. Laboratory Instructions: Soil Biology in Practice. Bogor Agricultural University. Bogor.

5. Arafah. 2011. Study on the use of organic fertilizer in lowland rice plants at Pinrang Sulawesi Selatan. J. Agricultural Technology Study and Development., 4(1): 11-18.
6. Bakrie, M.M., Anas,I., Sugiyatna and Idris. K. (2010): Application of inorganic and organic fertilizers in SRI rice cultivation (System of Rice Intensification). J. Land Environment., 12(2): 25-32.
7. Bara, A., and Chozin, M.A. (2009): Effect of dose of manure and frequency of urea fertilizer on growth and maize production (*Zea mays* L.) in the dry land. Seminar Paper on the Department of Agronomy and Horticulture. Bogor Agricultural Institute. Pp: 7.
8. Chairani. (2006): Effect of phosphorus and cow manure on the soil chemical properties and growth of rice plants (*Oryza sativa* L) on rain-fed rice fields in Districts Langkat, North Sumatra. J. Indonesian Agricultural Research., 25(1): 8-17.
9. Darti, E. (1992): Effect of fertilizer placement on several rice varieties in dry soil on growth and production. Skripsi. Andalas University Faculty of Agriculture. Padang.
10. Hambali, A. and Lubis, I. (2015): Productivity evaluation of several rice varieties. Bul. Agrohorti., 3(2): 137-14
11. Humaedah, U., Sundari, Astuti, S., Trisedyowati, Y. (2010): Farming business with PTT approach. Agricultural Extension Development Center, Jakarta.
12. Idawanni, Hasanuddin and Bakhtiar. (2016): Adaptation test of some upland rice among young oil palm in Aceh Timur District. J. Floratek., 11 (2): 88-95
13. Kamal, F. (2001): Genetic parameters of some lines introduced by lowland rice (Oryza sativa L.). Skripsi. Andalas University Faculty of Agriculture. Padang.
14. Krismawati, A and Arifin, Z. (2011). Yield stability of some paddy varieties. Journal of Agricultural Technology Study and Development., 14(2): 84-92.
15. Masdar. (2007): Interaction of spacing and number of seedlings per plant point in the rice intensification system on vegetative growth of plants. Jurnal Akta Agrosia., (1): 92-98.
16. Partohardjono, S. (1999): Efforts to increase the efficiency of using Nitrogen fertilizer to reduce N_2O gas emissions from rice fields. In: Partohardjono, S., J. Soejitno and Hermanto (eds). Minutes of Seminar on Greenhouse Gas Emissions Research Results and Increased Rice Productivity in Rice Fields. Bogor, 24 April 1999. Puslitbangtan. Bogor.
17. Rahayu, A.Y. and Harjoso, T. (2011): Application of husk ash in upland rice (Oryza sativa L.) on leaf silicate and proline content as well as amylose and seed protein. J. Biota., 16 (1): 48-55.
18. Rochmah, H.F. (2009): Effect of organic and inorganic fertilizers on the growth and yield of lowland rice (Oryza sativa L.). Skripsi. Department of Agronomy and Horticulture, Faculty of Agriculture Bogor Agricultural University. Bogor.
19. Sakhidin, Darudriyo and Kharisun. (2013): Component results and yields of four rice varieties at several doses of fertilizer fertilization. J. Agrin., 7 (1): 122-129.
20. Satoto and Suprihatno, B. (1998): Heterosis and yield stability of hybrid male infertile rice hybrids IR62829A and IR58025A. J. Food Crop Agriculture Research., 17(1): 33-37.
21. Sembiring, H. (2008): Research policies and summaries of ICRR research findings in support of increasing national rice production. J. Litbang : 39-59.
22. Soil Research Institute (2005): Analysis of Soil, Plant, Water and Fertilizer Chemistry. Agriculture Department, Bogor (Id).
23. Sujitno, E., Fahmi, T. and Teddy, T. (2011): Study on adaptation of some superior varieties of upland rice on lowland dry land in Garut Regency. J. Assessment and Development of Agricultural Technology., 14 (1): 62-69.
24. Suparyono and Setyono. (1997): Overcoming the Problem of Rice Cultivation. Penebar Swadaya. Jakarta.
25. Supriyadi, I.A., Mustikaningrum, A., Herawati, P., Purwanto and Sumani, S. (2018): Soil quality assessment in organic and nonorganic paddy fields in Susukan, Indonesia. Bulgarian Journal of Agricultural Science., 24 (5): 777-784
26. Wahab, M.I., Satoto, R., Rachmat, A., Guswara and Suharna. (2017): Description of new rice superior varieties. Agricultural Research and Development Agency Ministry of Agriculture. Bogor.
27. Warisno. (1998): Hybrid Corn. Kanisius. Yogyakarta.
28. Widowati, L.R. (2009): The role of organic fertilizer on the efficiency of fertilization and the level of need for vegetable crops in soil inseptisols. J. Tropical Land., 14 (3): 221-228.
29. Yang, S.M., Mahli, P.,Wang, D. R., Wang, J.G. (2004): Long-term fertization effect on crop yield a Nitrate-N accumulation of organic mature and fertilizers on crop yield and nitrate-N accumulation in soil in Northwestern.