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Effect of use Organic Fertilizer on Yield component yield and quality of Hatri 10, Hatri 475 rice on Chau Phu a Giang, Vietnam

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Abstract— *The present study aimed to determine the effect of different organic and inorganic source of fertilizers on growth and performance of rice. The experiment was conducted at locations: Chau Phu A Giang province with two varieties of improved rice with HATRI 10 and HATRI 475. Each experiment has seven treatments. Treatments included a combination of organic and inorganic nutrients at seven rates (F1: 80-40-40+ organic manures 10 t ha-1; F2: 60-40-40+ organic manures 10 t ha-1; F3: 40+40+40+ organic manures 10 t ha-1; F4: 20-40-40+ organic manures 10 t ha-1. F5: only organic manures 12 t ha-1; F6: control no dose of NPK; F7: farmers used: 120-40-60+ organic manures 12 t ha-1). The experiment is arranged on the farmer's field, a split-plot in a randomized complete block design with three replications. Treatments produced significant results for plant height. Panicle length and grain yield but thousands of grains weight was not significant. Result showed that application of half of recommended 60-40-40 + organic manures 10 t ha-1 produced significantly higher value for grain yield and good for quality improve variety.*

Keywords— ***nutrition N. P. K. productivity. factors that constitute productivity.***

I. INTRODUCTION

Depending on chemical fertilizers as a source of nutrition, besides it tends to reduce soil yields causing a decrease in yield. It also reduces the quality of rice. For example the structure of rice becomes hard due to its high amylose content and low amylopectine (Jian et al., 2004).Some traditional Sabah local varieties have the potential to be grown as they can contribute to higher rice yields and their accommodation rates can be minimized by the adoption of NPK. The Serendah Merah (V3) variety received with F1 has no significant difference between the NPK fertilizer applied. So it can be recommended for farmers, the amount of fertilizer used in F1 treatment (60:30:30 kg ha-1) is the least. So it offers an economic advantage because low fertilizer costs are needed to achieve higher yields and better grain quality. (Mohd et al.,2018). A field experiment was conducted for the effect of different sources of nutrients on NPK uptake by rice at various growth periods. The NPK uptake by rice at various growth periods was significantly increased with the application of 100% NPK in combination with FYM @ 10t ha-1. However, it was on par with that of green manuring together with 100% NPK during both the years of the study (Mohana et al.,2017). Most of the landrace rice land in An Giang belongs to the group of poor sandy soils and uneven distribution of rainfall during the year. In addition to the use of low-yield genotypes (Ishag. 1980). The objective of this study is to improve the yield of landrace rice varieties and find a relationship between the dosages of N. P. K and integrated application of organic manures and inorganic fertilizers was effective for enhancing growth, yield, and the yield components of landrace rice.

II. MATERIALS AND METHODS

2.1. Two varieties HATRI 10, HATRI 475

2.2. Experimental experiments were conducted in Chau Phu An Giang provinces, with silt soil structures. Experimental soils have been cultivating seasonal rice for twenty years and in recent years have been managed in the conservation system for the seasonal rice region. Prior to the experiment the soil layer was collected in each area in layers 0 to 30 cm deep to make up the composite sample. which was used to analyze chemical indicators according to the method of (Raij et al., 2001) and particle size according to (Camargo et al., 2009) - Experimental layout: The experiment is arranged on the farmer's field A split-plot in a randomized complete block design (02 varieties, 7 experiments,3 repetitions, at 01 locations, the area of each laboratory is 25 m2).

Experimental layout method

No	Treament : (F)= (N-P-K)
1	F1 = 80-40-40 + organic manures 10 t ha-1
2	F2= 60-40-40 + organic manures 10 t ha-1
3	F3= 40-40-40 + organic manures 10 t ha-1
4	F4= 20-40-40 + organic manures 10 t ha-1
5	F5= only organic manures 10 t ha-1
6	F6= 0-0-0+ 0
7	F7= farmers (120-40-60 + organic manures 12 t ha-1)

About fertilization: only use innocuous fertilizers to assess the effect of nutrients on rice crops. experiments do not use compost and other fertilizers. Single forms of in innocuous stools are used as follows: urea (46% N). phosphate supe (16% P2O5. 20% CaO) and potassium chloride (60% K2O).

Agro-morphology Analysis

HATRI 10 varieties were planted in the field at Chau Phu . During the wet season from 2023. Seeds were sown in the raised seedbeds. and 15-day old seedlings were transplanted at one seedling per hill. Hills were established at distances of 15 x 20cm. The standard cultural management practices for rice were followed (Bui. 1986).

Quality traits

A total of HATRI 10 varieties were evaluated (Table 1) and the following quantitative traits were considered: Panicle length (cm): length of panicle at maturity measured from the base of the plant to the tip of the panicle (taken from 10 random selected primary panicles per accession per replication). Panicles per plant (number): the total number of panicles per plant (from 10 random selected primary panicles per accession per replication). 1000-grain weight (g): weight of 1000 welldeveloped grains at 14% moisture content (from 5 random selected primary panicles per accession per replication). Filled grains (number): obtained from counts of total number of filled grains per panicle (from 5 random selected primary panicles per accession per replication). Unfilled grains (number): obtained from counts of total number of unfilled grains per panicle (from 5 random selected primary panicles per accession per replication). Yield obtained from the harvested plants in each replication. Harvested grains were threshed, cleaned, drie, and weighed for each accession per replication. Moisture content per plot was determined immediately after weighing using a moisture meter. Yield = weight of harvested grain (g)/number of hills harvested x number of possible hills x MF (of the harvested grain).

Cooking and eating properties

Milled grains underwent assessment of physical traits (grain dimensions. proportion of head rice in milled rice, and chalkiness) and then a test portion of each sample was ground into fine flour (100-mesh) using a Udy Cyclone Sample Mill (model 3010–30. Fort Collins. CO). Reverse osmosis (RO) water and reagent-grade chemicals were used for the chemical analyses.

+ **Amylose content**: The AAC of isolated rice starch was analysed by using the iodine reagent method [AACC International.1999]. Briefly,exactly 25mg rice flour was gelatinized overnight in 2ml of 1.0N NaOH in a water bath set at 50°C. The solution was boiled in the water bath for 10 min and then cooled to room temperature. The cooled solution was extracted three times with 5ml of butanl: petroleum ether (1:3) to remove the lipid. After which 1.5ml of 0.4N KI was added to the solution and mixed. The AC was determined in duplicating with an ART-3 Automatic Titrator, according to the manufacturer's instruction (Hirama Laboratories. Japan) in which 1.57mM KIO_3 was titrated at a speed of 2.5µl per s to the starch solution. The titration terminal was automatically detected with a sensitivity setting of 3, and the used volume of KIO_3 was transformed into amylose content. Standard amylose solutions were prepared as checks by dissolving pure amylose and amylopectin in distilled water (Tan YF et al., 1999).

+Gelatinisation temperature

GT was determined using the alkali digestion test [Little RR et al 1958]. A duplicate set of six whole-milled kernels without cracks was selected and placed in a plastic box (5×5×2.5cm). 10mL of 1.7% (0.3035M) KOH solution was added. The samples were arranged to provide enough space between kernels to allow for spreading. The boxes were covered and incubated for 23h in a 30°C oven. The starchy

endosperm was rated visually based on a seven-point numerical spreading scale as a standard evaluation system for rice [IRRI .2013]. According to the ASV score. GT of rice grains can be classified into four groups: high (1–2), high-intermediate (3), intermediate (4–5), and low (6–7) [IRRI.2013].

+Gel consistency

Gel consistency was determined as previously described [IRRI.2013]. Rice flour (100mg) was mixed with ethyl alcohol (0.2mL) containing 0.025% thymol blue and 0.2M potassium hydroxide (2mL) and heated in a boiling water bath for 8 minutes. After heating, the sample tubes were allowed to cool in an ice-water bath and immediately laid horizontally on the table. Gel consistency was measured by the length of the cold rice paste in the culture tube held horizontally for one hour, Hard, medium, and soft gel standards such KhaoDawmali 105 are respectively included in every set.

Milling recovery

Brown rice samples of 100 g from each treatment plot were milled in a McGill-type miller no. 2 with the 685 g added weight on the pressure cover for 30 sec, followed by 30 sec without the added weight. Total milled rice weight was determined. Head rice yield was determined by sizing milled rice with a Satake testing rice grader TRG 05A using a 4.75-mm mesh indentation, weighing the brokens and whole grain fractions. Total and head milled rice yields were calculated as percent of rough rice. Head rice yield in kg/ha was calculated from rough rice yields determined at harvest of each experiment from a 5-m 2 area within each plot.

Data Analysis

Analysis of variance.

The agro-morphological data collected were initially analyzed through analysis of variance to verify genetic variation in the traits measured. The few traits with insignificant genetic variation, based on the F-test, were not considered for further analyses.

III. RESULT AND DISCUSSION

3.1. *Experimental soil properties*: The production of landrace rice grains is extremely important thanks to the structure of the soil. The soil must have a bright, light texture with good drainage system and moderately low amount of organic matter. The results of land analysis at Chau Phu locations showed that the maximum humidity reserves fluctuated from 40.8% to 41.0% for Chau Phu in order. Organic C content is not high (0.92% and 0.86%). This suggests that organic matter is not so high suitable for growing landrace rice because the soil is often porous, allowing root remove and lodging. Bright soil color reduces the color of the shell. Ensures the attractiveness of rice grains and catches the eye with the market. The soil drains well, providing air inside the soil for the root system to grow. The percentage of lightning particles is very low (1.2-2.02%) (Table 1). Mild - neutral soil (pHKCl 6.01-6.25).

Table 1: Some properties of the tested soil (0–30 cm depth) before sowing

Property	**Value assessment**	
	Before	**Ater Havested**
Component distribution (%)		
Sand	66,4	65,78
Silt	32,5	31,20
Clay	3,1	2,02
Soil texture	Sandy loam	Sandy loam
Saturation percent (S,P%)	41,0	40,8
pH (soil)	6,09	6,35
E,C (dS m^{-1}, at 25 °C)	0,42	0,55
Soil physical and chemical analysis		
Total N (%)	0,089	0,093
Available N (ppm)	28,0	47,0
P (ppm)	7,40	11,20
K (ppm)	137,6	148,5

Exchangeable cation (meq/L)		
Ca^{++}	0,90	0,98
Mg^{++}	0,38	0,29
Na^{+}	0,08	0,19
K^{+}	0,25	0,39
Organic carbon (ml/lit) -C (%)	0,92	0,86

pH_{KCl}	6,10	6,17
Các bon hữu cơ (OC - %)	0,98	1,28
N tổng số (%)	0,213	1,456
P_2O_5 tổng số (%)	0,74	0,98
K_2O total (%)	0,58	1,16
Lân dễ tiêu (mg P_2O_5/100 g đất)	5,36	7,22
Kali dễ tiêu (mg K_2O/100 g đất)	19,22	28,9
CEC (lđl/100 g đất	2,01	2,67
Mg (%)	1,09	1,02
Cát (%)	12,7	12,7
Limôn (%)	20,5	20,5
Sét (%)	2,6	2,6

3.2. Effects of fertilizers on plant height, filling and unfilling of HATRI 10 and HATRI 475 rice.

3.2.1. Analysis of the impact of fertilizers on the componts of yield composition of rice plants This analysis is based on factors: productivity and productivity composition in Chau Phu . An Giang .

Table 2. Effects of fertilizer on the development of HATRI 10 and HATRI 475

Factors (F)	HATRI 10			HATRI 475		
	Plant height (cm)	Filled grains / panicle (number)	% unfilling	Plant hight (cm)	Filled grains / panicle (number)	% unfilling
Chau Phu , An Giang						
F1= 80-40-40 + organic manures 10 t ha-1	102.7	112.5	15.2	108.2	128.3b	20.1
F2= 60-40-40 + organic manures 10 t ha-1	104.6	120.4	13.7	106.6	129.2a	15.6
F3= 40-40-40 + organic manures 10 t ha-1	112.2	118.3	18.2	103.6	119.4c	12.8
F4= 20-40-40 + organic manures 10 t ha-1	111.1	128.4	16.7	102.5	119.6d	22.4
F5= only organic manures 10 t ha-1	110.5	132.6	20.4	131.3	118.6e	20.1
F6= 0-0-0+ 0	108.3	61.5	25.7	127.5	103.7f	25.4

F7= Famers (120-40-60 + organic manures r 12 t ha-1	114.6	117.1	19.5	108.3	118.5b	16.5

3.2.2. Effects of fertilizers on yield for rice .

Treatments produced significantly different effect on all measured parameters: panicle length and grain yield, thousand grains weight at 5% level of significance . The panicle length of HATRI 10 fluctuates from 27.3-26.2cm. In the thousand grains weight there is no significance for the all treatments except not fertilization (F6) for lower weight inHATRI 10. For HATRI 475 the treatments for thousand grains weight not significantly different effect two varieties . In terms of recorded productivity like HATRI 10 for the highest productivity in the F2 test. This is recorded on HATRI 475 (F2) for a yield of 9.3tons / h.a). fertilizers application (60 -40-40 kg/ha+ organic manures 10 t ha-1) increased grain yield both HATRI 475 and HATRI 10 at Chau Phu .

Table 3. Effects of fertilizers on yield and yield components in rice

Factors (F)	HATRI 10			HATRI 475		
	panicle length (cm)	1000-grain weight (g)	yield(ton/ha)	panicle length (cm)	1000-grain weight (g)	yield(ton/ha)
F1= 80-40-40 + organic manures 10 t ha-1	27.5a	25.7a	9.2a	25.2a	24.5a	9.1a
F2= 60-40-40 + organic manures 10 t ha-1	27.3a	25.6a	9.7a	25.2a	24.5a	9.3a
F3= 40-40-40 + organic manures 10 t ha-1	27.3a	25.4a	9.2a	25.5a	24.9a	9.3a
F4= 20-40-40 + organic manures 10 t ha-1	27.3a	25.8a	9.6a	25.6a	24.9a	9.2a
F5= only organic manures 10 t ha-1	27.1a	25.6a	8.5b	25.6a	24.3a	8.9b
F6= 0-0-0+ 0	26.2b	25.4a	6.9c	25.6a	24.6a	6.5c
F7= Famers (120-40-60 + organic manures r 12 t ha-1	27.4a	25.7a	9.2a	25.5a	24.5a	8.2b

3.2.3. The effected of fertilizers on rice qualities (Cooking and eating properties) of landrace rice

Analyzing the amylose content of HATRI 10 varieties recorded fluctuations in fertilizer levels that have changed statistically. Amylose levels increased slightly when nitrogen levels were increased. In the full fertilizer treatment (F1) the average amylose (%) content is calculated for HATRI 10 (20.6). Similar to the experimental fertilization of F7 (amylose content is 21.7%). Other tests showed that lower amylose levels ranged from19.4% to 20.7%. For HATRI 475 varieties in the high amylose(22.7%) test is the F7 (fertilizer according to farmers). Thus, the amylose content has changed due to changes in the amount of fertilizer. Next Gel consistency (GC) also recorded fluctuations on both two varieties. In particular, in gelatinisation temperature (GT) there is no change in the tests for both varieties (table 4). This is also noted on the HATRI 475 . The GT popularity alone has not changed al of treatments.

Table 4. Effected of fertilizers on cooking and eating properties of improved rice

Factors (F)	HATRI 10			HATRI 475		
	Amylose content (%)	Gel consistency l(mm)	Gelatinisation temperature	Amylose content (%)	Gel consistency l(mm)	Gelatinisation temperature
F1= 80-40-40 + organic manures 10 t ha-1	20.6a	69.2a	3	22.3a	65.5c	3
F2= 60-40-40 + organic manures 10 t ha-1	20.8b	69.5a	3	22.5b	66.7b	3
F3= 40-40-40 + organic manures 10 t ha-1	20.7b	69.4a	3	22.2b	66.4b	3
F4= 20-40-40 + organic manures 10 t ha-1	20.6b	69.3a	3	22.6c	67.5a	3
F5= only organic manures 10 t ha-1	20.2b	69.2a	3	22.5c	67.2a	3
F6= 0-0-0+ 0	19.4c	69.5a	3	22.2c	66.2b	3
F7= Famers (120-40-60 + organic manures r 12 t ha-1	21.9a	69.2c	3	22.5a	65.6c	3

2.4. The effected of fertilizers on the milled qualities of rice

Analyzing the rate of milling on rice varieties with different levels of fertilizer recorded in terms of the ratio of head rice, brown rice and the ratio of white rice both varieties HATRI 10 and HATRI 475 on two points of statistical significance. Analysis of brown rice ratios showed that the F2 treatment gave a high percentage of head rice on both varieties (HATRI 10) and 53.5% on (HATRI 475). The treatment had the lowest percentage of head rice in the F7 (49.7%). The same of HATRI 475 (49.2%). HATRI 10 had much higher head rice at treatment F2 (60-40-40 + organic manures 10 t ha-1). (Table 5)

Table 5. Effect of fertilizers on milled rice content for rice

Factors (F)	HATRI 10			HATRI 475		
	Brown rice (%)	White rice (%)	Head rice (%)	Brown rice (%)	White rice (%)	Head rice (%)
F1= 80-40-40 + organic manures 10 t ha-1	81.5c	76.4d	50.8d	82.4a	76.4b	51.2b
F2= 60-40-40 + organic manures 10 t ha-1	82.6b	76.4a	55.7a	80.6c	77.1 a	53.5a
F3= 40-40-40 + organic manures 10 t ha-1	81.3c	76.5e	54.b	81.6b	75.1a	50.4c
F4= 20-40-40 + organic manures 10 t ha-1	84.4a	74.6c	53.5c	82.7a	76.5b	50.7c

F5= only organic manures 10 t ha-1	82.4b	72.5e	53.3c	81.6b	76.5b	50.6c
F6= 0-0-0+ 0	82.5b	73.4d	53.2c	80.3c	76.2b	50.5c
F7= Famers (120-40-60 + organic manures r 12 t ha-1	80.7d	75.2b	49.7e	81.2b	74.5c	49.2e

3.3. Discussion

The nitrogen -deficient tree will be elongated in Chau Phu experiments for both HATRI 10 and HATRI 475 varieties in the treatment F 6. The HATRI 475 variety had a higher plant height, compared to the HATRI 10 variety. This is in the same with Dobermann and Fairhust's (2000) comments.The application of nitrogen fertilizer can increase the height of the plant, the number of panicles.According to (Spargo et al., 2013). "the desired pH range of 6.0 to 7.0 of most crops but acidity reduces the availability of nitrogen. Phosphorus and potassium. P deficiency of this nutrient can lead to a decline in plant growth; weak root system, and seed quality, low yield. Phosphorus plays an important role in the development of roots, promoting early flowering and ripening and resistance to disease and drought. In table 2 with treatment 5 and 6 lack of phosphorus the plant height is the same with other treatment but the yield is very low table 3. Phosphorus deficiency can delay the maturation of rice crops and increase sensitivity to rice disease (Fageria et al., 2003). Potassium-deficient plants cannot use nitrogen and water more efficiently and are more susceptible to disease." Low to moderate soils require fairly reasonable management (Belachew and Abera. 2010). Furthermore. The proper application of potassium is closely related to the dependence of cell walls, bundles and growth intensity of the trunk, which enhances resistance to the tree against reclining beans (Kong et al., 2014). Rice plants that are deficient in potassium will often have high cases when the disease enters which can lead to the incidence of the disease. Therefore, this study was conducted to assess the effect of different levels of NPK fertilizer on the growth and productivity of landace rice varieties. Soil organic matter is the local biodegradation that affects soil structure and porosity. The rate of penetration of water, humidity, the diversity and biological activity of soil organisms and the availability of nutrients (Bot and Benitez 2005). Soil structure affects soil fertility and how air and water move through the soil (Macie. 2013). The results revealed no interaction effects of NPK fertilizers and rice varieties on the physiological characteristics, lodging incidence characteristics and yield component. There were significant different observed on the plant height, panicle number, percentage of filled grains and 1,000 grains weight of different rice varieties. Different levels of NPK exerted significant effect on yield and component yield such as 1,000 grains weight and grain yield. This can happen because compost has high nutrients. The tallest plant height is affected by a combination of compost and a fertilizer recommendation N. P. K but does not differ significantly when compared to other experiments except by combining compost and fertilizer n. P. K. at 80 N consciousness (F1). The increase in the height of landrace rice may be related to the full availability of water in the test area during the test period. However, Tri Ton and Tinh Bien are mainly based on heavenly water, so the disruption of water sources affects the development of rice crops. In this experiment at Chau Phu with HATRI 10 and HATRI 475 had a slight increase in amylose levels in the F7 test. Which was consistent with previous reports (El-Kadyet al.,1999) reporting that the application of nitrogen fertilizer slightly increased amylose content.

Fertilization depending on the rice variety with the level of 120 N / ha significantly increased the proportion of whole rice decreased in the F7. The yield is also reduced due to the landrace and the leaves are more likely to fall when applying high nitrogen fertilizer. These productivity trends also to explain that limping alone cannot serve to reach the maximum potential of acidic soils. Thus suggesting that depleted soils N and K. Which clearly affect crop performance as were observed when these modifications (fertilizer P) were applied in combination with manure (Farag and Zahran. 2014). Organic sources along with chemical fertilizers have improved the productivity and quality of improved varieties on the F1 test also recorded in Table 4 . Therefore, it can be inferted that potassium manure along with K released from straw, increases the availability of this nutrient in complexes and in soil solutions, allowing for better absorption of nutrients as evidenced by the nutritional status of the crop. In many physiological and metabolic processes, including photosynthesis, osmosis, nutrient transport, carbohydrate transport and storage, nitrogen absorption and protein and starch synthesis (Hawkesford et al.. 2012; Raza et al.. 2014).Given the importance of nitrogen fertilization for the yield in grains from rice crops, it is necessary to know the best dose for each variety as well as its effect on productivity components and other agrocological

parameters such as cycle yield, plant height and yield composition of the plant. Increasing the rate of nitrogen fertilizer can increase productivity but reduce particle quality on the F7 test. On the other hand, there are many factors that play a huge role in the quality of rice. The quality of cooked rice and its taste, which is important to consumers. The most important factor that can affect the quality of cooked rice is the amylose (AC) content, which is part of the starch. Other factors such as gel consistency (GC) and gelatinization temperature (GT). In general, the AC in rice grains will determine the softness and hardness of the grain after the cooking process. GC is the mucus ratio during cooking. In fact. GT is the water temperature of starch particles at an irreversible expansion (Zamani and Alizade. 2007). Dong et al. (2007) showed that nitrogen intake had a profound effect on the quality of cooking and the nutritious value of rice, with an increase in GC but a decrease in AC. Young Lee (2006) in this study concluded that there was a negative correlation between the amount of nitrogen and amylase in rice on Table 4 and the rate of milling quality also decreased table 5. Dong et al. (2007) showed that nitrogen in take had a profound effect on the quality of cooking and the nutritious value of rice, with an increase in GC but a decrease in AC. Young Lee (2006) in this study concluded that there was a negative correlation between nitrogen and amylase levels in grains.

IV. CONCLUSION

Integrated application of organic manures and inorganic fertilizers was effective for enhancing growth, yield, and the yield components of HATRI 10 and HATRI 475 . The increase in the rate and dosage of N. P and K from the F1 treatment has significantly increased plant height. Panicles per plant (number. 1000-grain weight (g). Filled grains / panicle). The interaction between genotypes and fertilization of nitrogen, phosphate and potassium had a significant effect on all agricultural and crop yield indicators at both test sites. The genotype of the HATRI 10 gives the value of the above indicators higher than that of the HATRI 475 . The increase/decrease in fertilizer intake has had a significant and statistically significant effect ($p \leq 0.05$) on the yield and quality of l rice grains in both all treatments the exception of 1000-grain weight. HATRI 10 and HATRI 475 received with F2 had significant different between NPK fertilizer applied.Therefore it can be recommended to farmers. The amount of fertilizer used in treatment F2 (60:40:40 kg ha-1+ organic manures 10 t ha-1) is the least. Thus, it gives an economical advantage as low fertilizer cost is required to achieve higher yield and better grain quality.

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