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EFFECTS OF ORGANO-MINERAL FERTILIZERS ON GROWTH AND YIELD OF FOUR UPLAND RICE CULTIVARS IN TWO LOCATIONS IN TARABA STATE, NIGERIA

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ABSTRACT
Field experiments were conducted to evaluate the effects of different rates of organo-mineral fertilizers on the growth and yield of selected rice cultivars at two locations: the Teaching and Research Farm of Taraba State University, Jalingo, and Karim Lamido area of Taraba State, North-East Nigeria, during the 2024 cropping season. The experiment used a factorial (2×4×4) arrangement in a Randomised Complete Block Design (RCBD) with three replications. Treatments comprised four upland rice varieties (Faro 44, Faro 58, Faro 59, and local CP) and four fertilizer regimes: 20 t/ha cow dung (organic, OF), 300 kg/ha N.P.K 20:10:10 (inorganic, IF), a 50% cow dung + 50% N.P.K mixture (MX), and an unfertilized control (CT), resulting in 16 treatment combinations. Each plot measured 3 m × 1.5 m with 20 stands, and seedlings were transplanted at 30 cm × 30 cm spacing. Data were collected on tiller number, leaf area, 1000-seed weight, and grain yield. Results showed location significantly ($P<0.05$) influenced tiller number and yield: Karim Lamido recorded higher tiller numbers (2.7–10.7) and 26.9% greater 1000-seed weight than Jalingo. The highest grain yield (14.19 t/ha) was obtained with 20 t/ha cow dung at Karim Lamido, followed by the 50% mixture (12.26 t/ha), both significantly outperforming the control (8.11 t/ha). Similar yield trends were observed in Jalingo. Overall, the 20 t/ha organic fertilizer and 50% mixture produced comparable yields at both sites. Therefore, applying a 50% organic and 50% inorganic fertilizer blend is recommended to enhance rice yield in the study areas.

Keywords: Organo-mineral fertilizers, Rice cultivars, Yield, Upland rice, Taraba State, Nigeria

INTRODUCTION
Rice (*Oryza sativa L.*) is one of the most important staple foods worldwide and a major source of calories for more than half of the global population (FAO, 2021). In Nigeria, rice has become an increasingly significant staple food, with demand growing rapidly due to population increase and urbanization (USAID, 2022). Nigeria remains the largest rice producer in West Africa, accounting for about 45% of the region's output, yet it still depends heavily on imports to meet local consumption needs (Adeyemi *et al.,* 2023).
Globally, over 90% of rice cultivation occurs in Asia, with China and India leading production (IRRI, 2021). In Nigeria, despite large production potential, yield gaps persist due to declining soil fertility, poor input use, and unsustainable farming practices (Nwite *et al.,* 2020).
Improving soil fertility is vital to sustainable rice production. Organic fertilizers — derived from plant and animal residues — are known to enhance soil structure, aeration, moisture retention, and nutrient availability (Kumar *et al.,* 2021). Materials such as composted rice husk, poultry manure, and cow dung have shown potential to boost upland rice yields sustainably (Olawuyi *et al.,* 2022). Integrated nutrient management, combining organic and inorganic fertilizers, is increasingly recommended to maintain soil health while supplying immediate nutrients for crop growth (Chandrashekhar *et al.,* 2020).
Inorganic fertilizers are valued for their quick nutrient release, providing essential elements like nitrogen, phosphorus, and potassium, which are vital for rapid plant development and higher yields (IFDC, 2021). However, excessive reliance on chemical fertilizers can degrade soil health, pollute water resources, and reduce long-term productivity (FAO, 2021).
In tropical regions such as Nigeria, soil nutrient depletion caused by erosion, leaching, and continuous cropping remains a major constraint to sustainable rice production (Nwite & Okolo, 2020). High costs and poor access to chemical fertilizers further limit their use among smallholder farmers (Adeyemi *et al.,* 2023).
Combining organic and inorganic fertilizers can help address these challenges, enhancing nutrient availability while improving soil properties and ensuring sustainable productivity (Chandrashekhar *et al.,* 2020). This study therefore investigates the effect of different fertilizer regimes — organic, inorganic, and organo-mineral combinations — on the growth and yield of selected rice cultivars at two locations in Taraba State, Nigeria.

MATERIALS AND METHODS
Experimental Site
Field experiment was conducted during 2024 growing season across two locations, in North-eastern Nigeria, at the Teaching and Research Farm, Taraba State University and Karim Lamido LGA, Taraba State. The study area was characterized by the northern guinea savannah, and lies between latitude 6°30′ and 9°30′ N of the equator and between longitude 9°00′ and 12°00′ E of the Greenwich Meridian. The soil types of the study areas are moderately deep to deep, shallow, and well-drained to poorly drain; with loamy sand to sandy loam surface over sandy clay loam to sandy clay subsoil (Kefas, 2016). The area is tropical with distinct wet and dry seasons. The wet season lasts for 7 months while the dry season lasts for 5 months with a mean annual rainfall which ranges from 800 mm in the northern part of the state to over 2000 mm in the southern part (Adebayo, 2012). The rainy season usually commences from April to end October with high rainy days in the months of July, August and September. Dry season commences toward the end of October which started by incoming hamattan and lasted for four (4) months that is from late November to February. Late April was sunny time with high temperature ranges from 32^0-41^0C (Jonathan

et al., 2018). Precipitation is lowest in January with an average of 0 mm while in August, the most precipitation falls with an average of 217 mm. The mean annual temperature is 34^0C and varies in mean monthly values between 28.4^0C in the coolest month of December and 37^0C in the hottest month of March (NIMET, 2009). The major occupation of the people of Taraba state is agriculture, and other primary activities like fishing, pottery, cloth weaving, dyeing, mat making, woodcarving, embroidery and black smiting Jonathan *et al.,* 2018.

Experimental Materials
Rice cultivars were collected from The National Cereal Research Institute (NCRI), Badeggi Bida, Niger State Nigeria and Jalingo main market. The cow dung was fresh, collected within 24 hours of excretion to ensure minimal nutrient loss and microbial degradation. The cow dung was produced by healthy, mature cattle aged between **3** and **5** years maintained at the Teaching and Research Farm, Taraba State University, Jalingo, faculty of Agriculture, Livestock Farm. The cattle were primarily fed on a diet of natural pasture grasses such as *Andropogon gayanus, Panicum* maximum, and supplemented with leguminous herbs like Stylosanthes guianensis and NPK obtained in Jalingo main market.

Experimental Design and Treatments
The experiments were designed as factorial (2x4x4) in Randomized Complete Block Design (RCBD) replicated three times. The experiment consisted of four Varieties of upland rice (Faro 44, Faro 58, Faro 59 and local CP) with four fertilizer regimes (organic fertilizers (cow-dung 10 t/ha), inorganic (NPK 20-10-10 at 300kg/ha) and mixed fertilizers (50% of cow dung 5 t/ha+ 50% of NPK 20-10-10 at 150kg/ha) and also control (0kg/ha) giving a total of 16 treatment combinations. The size of each experimental plot was 3 by 1.5m (4.5m^2/plot). Wooden pegs were used to separate each replicate by 2m gap while between plots was 1m. The inter-row and intra-row spaces were 30cm by 30cm respectively. A total experimental area was 39m x 13m (509m^2) given a total of 111111.11stands/ha.

Cultural practices
Nursery Establishment: The seedbeds for nursery plots measures 2m x 2m was carefully prepared during cropping season on 12 June, 2024 in Jalingo and on 18 June, 2024 in Karim Lamido respectively and the seeds was broadcasted.
Land Preparation: land preparation at the experimental field was done on 24 June, 2024 which included ploughed and harrowed using simple farm tools. Sunken beds were made using hand held hoes. The land was ploughed, subsequently harrowed, and then divide into three replicate. Each replicate was sub divided into plots 3m by 1.5m.
Manure Incorporation: Cow dung was incorporated to the experimental field at two weeks before transplanting.
Transplanting: Rice seedling were transplanted at 3weeks after emergence, on 3 July 2024 in Jalingo and on 10 July 2024 in Karim Lamido respectively at a spacing of 30cm x 30cm and 2 seedlings per holes was used giving a total number of 111111.11stands/ha.
Weed Control: Manual weeding was carry out on 17 July, 2024, in Jalingo and on 24 July, 2024 in Karim Lamido respectively at two weeks after transplanting and on 28 August, 2024 in Jalingo and on 21 August, 2024 in Karim Lamido at six weeks after transplanting using hand pulling method and hand held hoes.
Application of Mineral Fertilizer: Mineral fertilizer (NPK 20:10:10) was applied at two and eight weeks after transplanting in respect to treatment combinations. The fertilizer was applied in split dose at 2weeks and 8weeks after planting respectively. First dose was applied on 17 July, 2024 in Jalingo and on 25 July, 2024 in Karim Lamido at two weeks after transplanting respectively and the second dose was applied on 28 August 2024 in Jalingo and 25 September, 2024 in Karim Lamido at eight weeks after transplanting at panicle initiation stages respectively.

Data Collection
Data were collected on the following parameter; Number of tillers per plant: This was obtained by direct counting of the **5** selected tags tillers present in each sample plant at 2, 4, 6 and 8, 10 and 12weeks after transplanting, Leaf area: This was obtained by using the formula. Leaf area = leangth x breadth x number of leaf x constant (0.82) (Easlon & Bloom, 2014), Grain yield weight per plant: This was obtained by weighing the grain seed per plant after threshing, cleaning and sun drying using a weighing balance, 1000-seed weight (g): This was obtained by counting 1000 seed (after threshing, cleaning and sun drying) for the individual plant in each plot and then weighing them with the help of an electronic weighing balance, Grain yield per plot: This was obtained by weighing the total seed yield per treatment after threshing, cleaning and sun drying using a weighing balance.

Data Analysis
The Data collected were subjected to analysis of variance (ANOVA). Genstat were used to determine the significance of the F- test and the treatment means were separated using Duncan's Multiple Range Test (DMRT) at 5% probability level.

RESULTS AND DISCUSSION

Combined effects of Varieties and Fertilizer on Number of Tiller from the Two Experimental Sites
The results of the Combined Effects of Varieties and Fertilizer on number of tiller at 2 - 12 WAT from the two experimental sites is presented in Table 1. The results showed that treatment had significantly ($P<0.05$) highest effect on number of tiller at 4, 8 and 12WAT in the two locations. At Karim Lamido RV3 recorded the highest number of tillers (4.77) while RV1 recorded (3.85) the lowest also at Jalingo RV2 recorded (3.48) while RV1 recorded (2.27) at 4WAT, In Karim Lamido RV3 recorded the highest number of tillers (8.13) while RV2 recorded (7.10) as lowest value and also in Jalingo RV2 recorded (5.32) while RV1 recorded (3.48) at 8WAT, Karim Lamido RV3 recorded the highest number of tillers (11.76) while RV1 recorded (9.26) and also at Jalingo RV2 recorded (7.55) while RV1 recorded (4.58) at 12WAT respectively.
Both Karim Lamido and Jalingo organic fertilizer (cow dung) were consistently recorded the highest number of tillers (3.95-18.83) and (2.52- 10.98) while remaining treatment gave a lower value of number of tiller and the least number was observed in control plots. Results obtained from the analysis of variance showed that there are highly significant (P<0.05**.** At Karim Lamido showed that there was no significant ($P>0.05$) difference among all the varieties in respect to number of tillers, also at Jalingo RV2 recorded highest value (7.55) then RV1 recorded lowest (4.58) at 12WAT respectively. The observation in this study agrees with reference fan *et al*., 2005 report that four rice varieties responded similarly in terms of growth, dry matter and grain yield under similar nutrient conditions.

Table 1: Combined Effect of Varieties and Fertilizer on Number of Tiller at 2 -12 WAT From the two Experimental Sites

Location	Jalingo 2WAT	Karim Lamido	Combine	Jalingo 4WAT	Karim Lamido	Combine	Jalingo 6WAT	Karim Lamido	Combine
Varieties									
RV1	1.65a	2.73a	2.19a	2.27b	4.20a	3.24a	3.18a	5.83a	4.51a
RV2	2.12a	2.43a	2.27a	3.48a	3.85a	3.67a	4.32a	5.63a	4.97a
RV3	1.65a	3.00a	2.32a	2.38ab	4.77a	3.57a	3.49a	6.27a	4.88a
RV4	1.77a	2.73a	2.25a	2.78ab	4.27a	3.53a	4.08a	5.78a	4.93a
S.E ±	0.110	0.116	0.027	0.263	0.135	0.092	0.278	0.188	0.107
Fertilizer									
CT	1.33b	1.45d	1.39c	1.50c	1.77c	1.63c	1.64c	2.13c	2.14c
IF	1.52b	2.22c	1.86c	2.25bc	3.20b	2.73b	2.86bc	4.03b	3.45b
OF	2.52a	3.95a	3.28a	4.14a	6.27a	5.20a	5.87a	8.90a	7.38a
MX	1.82b	3.22b	2.52b	3.03b	5.85a	4.44a	4.20b	8.45a	6.32a
S.E ±	0.260	0.548	0.400	0.564	1.075	0.810	0.818	1.662	1.221
VXF	*		*	*	*	*	*	*	*
	8WAT			**10WAT**			**12WAT**		
RV1	3.48b	7.48a	5.48a	4.04b	8.76a	6.41a	4.58b	9.26a	6.92b
RV2	5.32a	7.10a	6.20a	6.30a	8.75a	7.57a	7.25a	10.75a	9.09ab
RV3	3.89ab	8.13a	6.12a	4.70ab	9.93a	7.36a	6.00ab	11.76a	8.88ab
RV4	5.30a	7.61a	6.46a	6.36a	9.45a	7.89a	7.55a	10.95a	9.25a
S.E ±	0.475	0.213	0.206	0.577	0.287	0.317	0.677	0.520	0.536
Fertilizer									
CT	1.78c	2.36c	2.67c	1.80c	5.77c	3.29c	2.03c	7.18c	3.61c
IF	3.04c	5.06b	4.05b	3.72c	10.75b	6.73b	4.13c	12.60b	7.37b
OF	7.72a	11.72a	9.72a	9.35a	14.53a	11.94a	10.98a	16.83a	13.91a
MX	5.45b	11.18a	8.832a	6.65b	13.85a	10.24a	8.24b	16.11a	12.18a
S.E ±	1.315	2.302	1.788	1.645	3.352	2.933	2.012	3.413	2.697
VXF	*	*	*	*	*	*	*	*	*

Means with same letters are not significantly different from each other according to DMRT at p=0.05 Where RV1=Faro 44, RV2= Faro 58, RV3= Faro 59 , RV4= local variety , CT=Control, IF= Inorganic Fertilizer, OF=Organic Fertilizer, MX=Mixed(Organic And Inorganic Fertilizer), WAT=weeks after transplanting, *= significant, NS=no significant

Combined Effect of Varieties and Fertilizer type on Leave Area from the two Experimental Sites

The result of the Combined Effect of Varieties and Fertilizer on leaf area at 2-12WAT from the two experimental sites is presented in Table 2. Varieties effects showed significantly (P<0.05) influence in the leaf area at 2 and 4WAT in both locations. Karim lamido RV4 recorded the higher leaf area, (7.76) while Jalingo RV3 recorded (6.88) at 2WAT Then at 4WAT Karim lamido RV4 recorded higher leaf area (14.32) while Jalingo RV3 observed (12.57) respectively.

The results showed that treatment had significantly (P<0.05) both Karim lamido and Jalingo organic fertilizer (OF) consistently recorded highest leaf area at Karim lamido the value of organic fertilizer (OF) was observed (7.31-66.78) while at Jalingo recorded (7.12- 62.88) at 2-12WAT while the remaining treatment gave a lower value of leaf area and the least value was observed in control plots. There was increase in number of tiller with increasing type of fertilization in both locations. Fertilizer significantly influenced number of tiller, organic fertilizer (OF) consistently recorded highest than other fertilizer treatment at all sampling point at the two locations. This trend is in consonance with the report of Khalid *et al.,* 2003 who studied the effect of different levels of NPK fertilizer on the yield and quality of rice reported that different types of NPK fertilizer significantly influenced rice. The leaf area was significantly (P<0.05) varied among the treatments at both locations. Varieties effects showed significant (P<0.05) differences in the leaf area at 2 and 4WAT in both locations. At Karim lamido RV4 recorded the higher leaf area, (7.76) while Jalingo RV3 recorded (6.88) at 2WAT. Then at 4WAT Karim Lamido RV4 also recorded higher leaf area (14.32) while Jalingo RV3 observed (12.57) respectively. However, this trend is in consonance with the findings of Singh, *et al*., 2021 that said different rice varieties responded differently on growth.

Table 2: Combined Effect of Varieties and Fertilizer on leave area at 2 - 12WAT from the two experimental sites

Location	Jalingo 2WAT	Karim Lamido	Combine	Jalingo 4WAT	Karim Lamido	Combine	Jalingo 6WAT	Karim Lamido	Combine
Varieties									
RV1	6.19b	6.31b	6.25b	12.00a	12.59b	12.30ab	20.45a	19.94a	20.19a
RV2	6.53ab	6.57ab	6.55ab	12.27b	12.42b	12.35ab	19.02a	20.76a	19.89a
RV3	6.88a	6.88a	6.88a	12.40b	14.32a	13.38a	19.47a	21.81a	20.64a
RV4	6.68a	7.76a	6.72a	12.57a	11.82b	12.19b	19.35a	19.72a	19.54a
S.E +	0.144	0.125	0.134	0.301	0.417	0.276	0.379	0.474	0.300
Fertilizer									
CT	6.13b	6.13c	6.14c	10.39c	10.61c	10.50c	14.95d	16.66c	15.81d
IF	6.56b	6.41bc	6.48b	10.86c	11.74c	11.31c	17.79c	18.79c	18.28c
OF	7.12a	7.31a	7.21a	15.36a	15.85a	15.61a	24.71a	25.69a	25.20a
MX	6.47b	6.68b	6.58b	12.66b	12.94b	122.80b	20.84b	21.10b	20.97b
S.E +	0.204	0.250	0.224	1.124	1.127	1.121	2.091	1.938	2.011
VXF	*	*	*	*	*	*	*	*	*
RV1	28.92a	29.08a	29.00a	39.89a	39.36a	39.61a	50.10a	52.64a	51.42a
RV2	27.35a	30.33a	28.84a	38.90a	41.72a	40.31a	49.19a	53.41a	51.29a
RV3	26.69a	30.31a	28.66a	38.38a	39.40a	37.57a	48.94a	56.00a	52.79a
RV4	29.06a	28.71a	28.88a	37.02a	39.36a	38.19a	47.19a	54.74a	50.97a
S.E +	0.586	0.213	0.567	1.000	0.287	0.629	0.606	0.520	0.842
Fertilizer									
CT	18.44c	25.09c	22.07d	10.39c	33.03d	29.48d	32.37d	42.56d	37.93d
IF	25.35b	26.49c	25.95c	10.86c	37.30c	36.08c	44.42c	50.32c	47.50c
OF	37.15a	36.08a	36.62a	15.36a	48.86a	49.04a	62.88a	66.78a	64.84a
MX	29.41b	30.76b	30.09b	12.66b	40.64b	40.27b	52.50b	57.14b	54.82b
S.E +	3.909	2.473	3.111	5.010	3.352	4.095	6.447	5.143	5.692
VXF	*	*	*	*	*	*	*	*	*

Means with same letters are not significantly different from each other according to DMRT at p=0.05 Where RV1=Faro 44, RV2= Faro 58, RV3= Faro 59, RV4= local variety, CT=Control, IF= Inorganic Fertilizer, OF=Organic Fertilizer, MX=Mixed (Organic And Inorganic Fertilizer), WAT=weeks after transplanting, *= significant, NS=no significant

Combined Effect of Varieties and Fertilizer on Grain yield weight per plant, 1000 Seeds weight and grain yield weight per plots from the two experimental sites

The result of the Combined Effect of Varieties and Fertilizer on Grain yield weight per plant, 1000 seeds weight and grain yield weight per plots from the two experimental sites is presented in Table 3. The pooled data showed that, in Jalingo RV4 recorded higher Grain yield weight per plant GYWP (38.32g) while Karim lamido RV3, recorded lower values (35.31g) respectively. The fertilizer result showed that there is significant influence among all the treatment and organic fertilizer consistently recorded higher Grain yield weight per plant GYWP than inorganic and mixed across the sampling point.

The pooled data showed that there is significant effect among all the treatment acrossed the locations in 1000g seed weight (1000SW), at Karim Lamido RV4 recorded (27.74g) while at Jalingo RV1 recorded (21.93g). The fertilizer result showed that there is significant influences among all the treatment and organic fertilizer consistently recorded higher 1000g seed weight (1000SW) than inorganic and mixed a crossed the sampling point.

Rice grain yield were also significantly different among the rice varieties in both locations, the pooled data showed that there is significant effect among the treatment acrossed the locations. In Karim Lamido RV4 recorded higher grain yield per plots GYPP (1629.8g) while Jalingo RV4, recorded lower values (1550.5g) respectively. The fertilizer result showed that there is significant difference among all the treatment and organic fertilizer recorded higher grain weight per plot GYPP than inorganic and mixed across the sampling point.

The fertilizer results showed significant differences among all treatments, with organic fertilizer recording higher grain yield per plot (GYPP) than inorganic and mixed fertilizers across all sampling points. Recent studies have confirmed that combining organic manure, such as farmyard manure, with inorganic nitrogen fertilizer significantly increases rice grain yield (Iqbal *et al.,* 2022; Singh *et al.,* 2021). The increase in grain yield is attributed to improved growth parameters such as productive tillers per hill and panicle development (Abbas *et al.,* 2023). Significant variation in rice grain yield under different fertilizer packages has also been reported by Ali et al. (2021). The increase in grain yield components may result from enhanced soil moisture and nutrient availability, which improve nitrogen and micronutrient uptake, leading to better dry matter accumulation and translocation from source to sink (Ramasamy *et al.,* 2024). Similar results have been found in recent studies focusing on the combined use of organic and inorganic fertilizers for sustainable rice production under varying agro-ecological conditions (Iqbal *et al.,* 2022; *Abbas et al.,* 2023). The pooled data showed that in Jalingo, RV4 recorded the highest grain yield weight per plant (GYWP) at 38.32 g, while Karim Lamido's RV3 recorded lower values (35.31 g). In 1000-seed weight (1000SW), Karim Lamido's RV4 recorded 27.74 g, while Jalingo's RV1 recorded 21.93 g. This trend aligns with recent findings that different rice varieties respond differently in growth and yield when exposed to varying fertilizer regimes (Singh et al., 2021).

Table 3: Combined Effect of Varieties and Fertilizer on Grain Yield Weight Per Plant, 1000g Seeds Weight and Grain Yield Weight Per Plots from the Two Experimental sites

Location	GYWP (g) Jalingo	Karim Lamido	Combine	1000W(g) Jalingo	Karim Lamido	Combine	GYWP (g) Jalingo	Karim Lamido	Combine
Varieties									
RV1	28.93b	30.47b	29.70c	21.93a	26.16d	24.58a	368.3b	498.1b	433.6b
RV2	31.53b	30.60b	31.06c	21.38a	26.68c	24.00a	475.8b	494.1b	484.9b
RV3	30.86b	35.31a	33.09b	21.33a	27.25b	23.80a	1453.3a	1365.2a	1409.3a
RV4	33.32a	34.43a	36.37a	21.35a	27.78a	24.58a	1550.5a	1629.8a	1590.1a
S.E ±	1.298	1.264	1.448	0.689	0.349	0.167	162.08	293.98	302.72
Fertilizer									
CT	27.90b	30.20c	30.05b	17.93b	26.50b	22.21b	629.6c	797.7b	713.6b
IF	33.27ab	32.40b	32.84a	22.17a	27.05a	24.61ab	813.4bc	1019.3ab	916.6b
OF	34.27ab	33.70a	33.84a	22.66a	27.30a	24.98a	1393.3a	1104.2a	1143.7a
MX	33.50ab	33.51b	33.50a	22.21a	27.03a	24.62ab	1011.7ab	1276.9a	1144.3a
S.E ±	1.550	0.286	0.861	1.109	0.168	0.636	163.57	103.73	103.60
VXF	*	*	*	*	*	*	*	*	*

Means with same letters are not significantly different from each other according to DMRT at p=0.05 RV1=Faro 44, RV2= Faro 58, RV3= Faro 59 , RV4= local variety ,CT=Control, IF= Inorganic Fertilizer, OF=Organic Fertilizer, MX=Mixed(Organic And Inorganic Fertilizer), VXF= Variety verse fertilizer = significant, GYWP= Grain yield weight per plant,1000SW=1000 seed weight per plot , GYWP= grain yield weight per plot , VXF= variety verse fertilizer

CONCLUSION

This study evaluated the effects of organo-mineral fertilizer on the growth and yield performance of four rice cultivars at two locations in Taraba State, Nigeria. The findings demonstrated that applying organic and mixed fertilizers significantly enhanced rice growth parameters and grain yield compared to using inorganic fertilizers alone. Notably, combining 10 t/ha of organic fertilizer with 50% of the recommended inorganic fertilizer rate produced yields comparable to the full inorganic application, while 10 t/ha of organic fertilizer alone often outperformed some solely inorganic treatments. Among the study sites, Karim Lamido recorded superior results, especially for cultivar FARO 59, which showed remarkable response to the organic treatments. In Jalingo, cultivar CP performed better under similar fertilization regimes. Overall, this study highlights the value of integrating organic inputs with reduced inorganic fertilizer rates, alongside appropriate cultivar selection and location-specific management, to sustainably improve rice productivity under varying ecological conditions in Taraba State.

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