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EVALUATION OF FOUR RICE (*Oryza sativa* L.) VARIETIES UNDER DRY SEASON PRODUCTION IN JEGA, KEBBI STATE- NIGERIA

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ABSTRACT

Field experiments were carried out in a flood plain in Jega, close to Kebbi State University of Science and Technology Research Farm during the dry season of 2016 and 2017. Four rice varieties (FARO 44, 52, 60 and 61) were evaluated and the experiment was laid out in a Randomized Complete Block Design (RCBD) replicated three times. Data on days to 50% heading, 1000 grain weight, percentage unfilled grain, total dry matter and Yield/ha were collected from all the rice varieties and subjected to general linear model of SAS. Results obtained shows that FARO 44 significantly had higher yield/ha in 2016 compared to the other three varieties, while in 2017 and combined, FARO 44 and 61 were statistically similar, though FARO 44 out yielded FARO 61. The combined effect of 1000 grain weight shows that FARO 44 was significantly higher compared to the other three varieties evaluated under the same management condition. Based on this study, it can be concluded that FARO 44 has better yield/Ha and 1000 grain weight compared to the other three varieties.

Keywords: Rice varieties; Yield evaluation; Jega

INTRODUCTION

Rice (*Oryza sativa* L) is one of the oldest and most important cereal food crops grown in the world belonging to the family Graminea and can be grown in all the agro-ecological zones of Nigeria (Olaleye *et al.*, 2008). Rainfed lowland systems account for 50%; rain fed upland rice production accounts for approximately 25% of the harvested area and irrigated lowland systems is seriously gaining ground in Nigeria rice production system (Ukwunga and Abo, 2013). Rice grows on different types of soils ranging from sandy loams to heavy clay soils provided there is adequate supply of water. Water requirements ranges from 380 to 850mm per annum and optimum temperature of 20-35^{o}C is required (Africa Rice Centre, 2007).

Rice is the world's second most widely grown cereals crop after wheat and presently more than half of the world`s population depends on it as a staple food. Out of approximately 3.7 million metric tons produced in 2018, meeting about 50% of its local demand. Production is mostly by small scale farmers who plants low yielding seeds and employed old planting methods and consumption tends to increase to 6.7 million metric tons in 2018; due to increasing humanitarian feeding of refugees caused by resurging Boko Haram (BH) attacks, pastoralist-farmers clashes and Federal Government insistence on halting rice importation as all these tends to encourage domestic rice production. With the recent programme on Agricultural Transformation Agenda and the current Green Alternative and the Central Bank of Nigeria (CBN) anchored borrowers' Scheme, launched in late 2015, every rice farmer was interested in how to boost production, using every available means, with the adoption of good agronomic practices the choice of rice varieties suitable for cultivation.

With the considerable high cost of fueling for irrigation during the dry season rice production, right from nursery establishment to the crop physiological maturity; the need to make a choice among some registered, released and improved varieties that are more often cultivated by farmers in this ecology becomes very important, as to see which varieties will give the highest yield in comparison to the other varieties considering the same water management option and good agronomic practices from nursery up to harvesting.

This is because different released varieties are cultivated at different areas not considering the appropriate management to adopt, hence the need to select some more prominent varieties and cultivate under the same management, as this will allow farmers to make choice in terms of yield harvested and thus, profit maximization.

MATERIALS AND METHODS

The Study Area

The experiment was carried out in a flood plain farm in Jega, close to Kebbi State University of Science and Technology (KSUSTA) Research Farm located in Jega on latitude N12^{0}12,140 and longitude E004^{0}22.082, during the dry seasons of 2016 and 2017. Jega is in the Sudan Savannah Ecological zone. The climate of the area is characterized with an average rainfall of about 500-650mm per annum, relative humidity ranges from 15-41% and 50-65% during the dry and rainy seasons, respectively; temperature averaged between 14-30^{0}C during the cold dry season and 24-41^{0}C during the rainy season, the soil of the area has been characterized as sandy loam (Sanda *et al.,* 2017).

Experimental Design and Field Trial

The treatment evaluated consisted of four common improved rice varieties (FARO 44, 52, 60 and 61), which were laid down in a randomized complete block design (RCBD) replicated three times. The entire field was wetted, then sprayed with glyphosate at the rate of 2.0 Kg a.i ha^{-1} in order to control already emerged weeds and the previous year ratoon prior to land preparation. A separate nursery was established for all the four varieties concerned around the edge of the field. The nurseries were established on 7/2/16 and 13/2/17, respectively, thereafter, the land was ploughed, puddled and leveled after 14 days. The bonds of beds were raised (4 × 4 m) manually with hoe before transplanting of the seedlings. The seedlings were transplanted on 10/3/16 and 18/3/17, respectively using transplanting rob at inter and intra row spacing of 20 × 20 cm apart, using one seedling per stand, giving a total plant population of 400 plants /16m^{2}and a net plot of 3 × 3 m was observed during evaluation. Immediately after transplanting, the entire plot was flooded with water for three days and was also sprayed with pendimethalin at the rate of 1.2 a.i Kg ha-^{1}. One week after transplanting, all missing stands were gap filled and basal application of NPK 15:15:15 was applied at the rate of 40Kg/ha, thereafter, nitrogen fertilizer (Urea) was applied in two split doses at 3 and 6 weeks after transplanting (WAT) at the rate of 30Kg/ha each. The application of fertilizer was done by broadcasting. Prior to fertilizer application, weeding was done at 3 and 6 WAT, and hand pulling continues in the field as the need arises.

Data Collection and Analysis

Yield parameters were collected on: Days to 50% heading, 1000 grain weight, Percentage unfilled grain, total dry matter and yield/ha. Data collected were subjected to Analysis of Variance using General Linear Model Procedure (GLM) of the Statistical Analysis System (SAS) Institute Inc, 1990.

RESULTS AND DISCUSSION

The influence of varieties on 1000 grain weight is presented in Table 1. FARO 44 shows significant increase in 1000 grain weight in both 2016 and 2017 compared to FARO 60 and 61, which are statistically similar to FARO 44 and FARO 52 being the least, combining the two years data, FARO 44 is statistically higher than the other varieties. This may be attributed to the good root system establishment of FARO 44, which allows for efficient translocation of assimilates that resulted in higher grain weight compared to the other three varieties.

Table 1: Varietal influenced in 1000 grain weight (g) in 2016 and 2017

Variety	2016	2017	Combined
FARO 44	1.64^{a}	1.63^{a}	1.64^{a}
FARO 52	1.57^{b}	1.58^{b}	1.58^{b}
FARO 60	1.61^{ab}	1.63^{a}	1.62^{b}
FARO 61	1.61^{ab}	1.60^{ab}	1.61^{b}
SE±	0.014	0.014	0.014

Means followed by the same letter(s) within a treatment group are not significantly different at 0.05 level of probability using DMRT

There is no significant difference in percentage unfilled grain among all the varieties (Table 2). Significant difference in days to 50% heading occurs both in 2016, 2017 and combined (Table 3) with FARO 52 recording significantly ($P<0.05$) higher values compared to the other three varieties which are all statistically similar. The significant difference in days to 50% heading of FARO 52 could be attributed to the longer duration of its maturity period, ranging from 130-135 days (Ukwunga and Abo, 2013).

Table 2: Varietal influenced in percentage unfilled grain (%) in 2016 and 2017

Variety	2016	2017	Combined
FARO 44	10.67	12.67	11.67
FARO 52	11.33	13.33	12.33
FARO 60	11.32	13.32	12.32
FARO 61	10.66	12.66	11.66
SE±	0.84	0.84	0.84

Means followed by the same letter(s) within a treatment group are not significantly different at 0.05 level of probability using DMRT

Table 3: Varietal influenced to days to 50% heading in 2016 and 2017

Variety	2016	2017	Combined
FARO 44	82.0^{b}	80.0^{b}	81.0^{b}
FARO 52	97.0^{a}	98.0^{a}	97.5^{a}
FARO 60	80.0^{b}	77.0^{b}	78.5^{b}
FARO 61	80.0^{b}	78.0^{b}	79.0^{b}
SE±	1.17	1.17	1.17

Means followed by the same letter(s) within a treatment group are not significantly different at 0.05 level of probability using DMRT

The total dry matter (Table 4) among the four varieties shows that FARO 61 and 60 had the highest total dry matter in both 2016, 2017 and combined, followed by FARO 52 and FARO 44 being the least. Considering the varietal influence on yield/Ha of each variety (Table 5), FARO 44 and 61 shows significantly higher yields in both 2017 and combined compared to the other two varieties, that is FARO 52 and 60 which happen to be statistically not significant in both 2016, 2017 and combined. The variation in yields among the four varieties may be as a result of the genetic make-up of the individual varieties and adaptation to the environmental condition, which made FARO 44 outstanding compared to the other three varieties. These results were in agreement with the findings of (Nwilene *et al.,* 2016) which shows that under good management, FARO 44, 60 and 61 will yield between 4-6tons/Ha. Ojo *et al.* observed higher yield/ha in FARO 44 compared to FARO 52, 60 and 61.

Similarly, the findings of Ukwunga and Abo (2013) stated that irrigated low land systems have the highest yield potentials of 6-8t/ha due to better water management control. They also stated that rice double cropping is often feasible in the irrigated systems but its development in Nigeria has been restricted by lack of adequate machinery to prepare the land and harvest the crop on time.

Table 4: Varietal influenced to total dry matter (g) in 2016 and 2017

Variety	2016	2017	Combined
FARO 44	37.92^{c}	37.79^{c}	37.86^{c}
FARO 52	41.74^{b}	41.06^{b}	41.40^{b}
FARO 60	44.17^{a}	42.88^{a}	43.53^{a}
FARO 61	44.88^{a}	42.55^{a}	43.72^{a}
SE±	0.48	0.48	0.48

Means followed by the same letter(s) within a treatment group are not significantly different at 0.05 level of probability using DMRT

Table 5: Varietal influenced to yield per hectare (Kg/Ha) in 2016 and 2017

Variety	2016	2017	Combined
FARO 44	6320.92^{a}	6013.03^{a}	6166.98^{a}
FARO 52	6162.17^{b}	5923.82^{b}	6043.10^{b}
FARO 60	6102.62^{b}	5960.79^{b}	6031.71^{b}
FARO 61	6177.35^{b}	6005.26^{a}	6091.31^{ab}
SE±	34.39	34.39	34.39

Means followed by the same letter(s) within a treatment group are not significantly different at 0.05 level of probability using DMRT

CONCLUSION

The results obtained from the experiment shows that FARO 44 had the highest yield/ha in 2016 compared to the other three varieties under the same management condition, while in 2017 and combined, FARO 44 and 61 were statistically similar, though FARO 44 out yielded FARO 61. While FARO 52 and 60 were all statistically similar in both 2017 and combined. Also, the combined effect of 1000 grain weight shows that FARO 44 was significantly higher than the other varieties. Therefore, the cultivation of FARO 44 will result to more yield and high milling percentage as a result of its grain weight; hence increase the profit margin of the farmers in this area.

REFERENCES

Africa Rice Center (2007). Africa Rice Trends: Overview of Recent Developments in the Sub Saharan African Rice Sector. *Africa Rice Center Briefs, Africa Rice Center (Africa Rice),* Cotonou, Benin, 8pp.

Nwilene, F.E., A.A. Shaibu, O.E. Oyetunji, O.B. Oladejo and A. Shittu (2016). *Rice Seed Quality Maintenance and Varietal Recognition*. Africa Rice centre (Africa Rice) Handbook, Ibadan, 2016

Olaleye, A.O., Akinbola, G.E., Marake, G.E., Molete, S.F. and Mapheshoane, B. (2008). Soil in suitability evaluation for irrigated lowland rice culture in South-Western Nigeria: Management implications for sustainability. *Comm. Soil Sci. Plant Anal*., 39:2920-2938.

Ojo, P.O., E. A Manasseh**,** S.E. Abimiku, E.J. Zedafamor, H.M. Ubandoma, O.K. Ishiak and M.A. Yakub (2018). Influence of maxicrop on Agronomical attributes and yield of four rice varieties in Kebbi, North-West Nigeria. *Journal of Biology, Agriculture and Healthcare*, 8(18): 2018

Sanda, A.B., Ahmed, I.B., Musa. A.A, and Calvin, A.G. (2017). Influence of mulch and ridge-tie on soil moisture retention and early growth of maize at Jega, Kebbi State, Nigeria. *International Journal of Environmental and Agricultural Research*, 3(7):

SAS Institute Inc. (1990). SAS/STAT User`s guide (Version 6, 4th edition) Cary; NC, USA: SAS Institute Inc. United States Department of Agriculture. (USDA 2018). Global Agricultural Information Network, Nigeria grain and feed annual report 2018. By Uche Nzeka.

Ukwungu, M.N. and Abo, M.F. (2013). Improved rice varieties and adaptable technologies for high earning capacity of farmers: Proceedings of rice-Africa, 2nd International conference on Rice for food, market and development, Abuja. Pg 22-31.