



Evaluation of Weed Management Practices of ... Sunday, Z. J., Et. al. (2025)

EVALUATION OF WEED MANAGEMENT PRACTICES OF UPLAND RICE IN SOUTHERN GUINEA SAVANNA AREA OF NIGERIA

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Abstract

Field experiment was conducted on a farmer's field in 2024 rainy seasons at Badeggi, Nigeria to study the comparative effects of different weed management on growth and yield performance of upland rice in the Southern guinea savanna. The treatments consisted of four early maturing upland rice varieties (NERICA 1, 2, 4, 7) and four weed management practices. The parameters measured were plant height (cm), number of tillers and grain yield (kg ha⁻¹). Treatment means were separated using the least significant difference (LSD) at $P \leq 0.05$. The result on plant height at 9 WAS indicated that NERICA 4 produced the tallest plants while the application of PE Butachlor + POE Orizoplus gave the tallest plant at 9 WAS. Result of number of tillers (m²) indicated that at harvest the variety NERICA 4 produced the highest number of tillers (m²) among the other rice varieties. The result on grain yield (kg ha⁻¹) among the varieties indicated that NERICA 7 had the highest grain yield of 1534.7 kg ha⁻¹ while on weed management the application of PE Butachlor + POE Orizo plus gave the highest grain yield of 1373.49 kg ha⁻¹ while weedy check gave the lowest yield of 1178.1 kg ha⁻¹. Based on this study, it is concluded, that the application of PE Butachlor + POE Orizoplus produced the highest grain yield. It is recommended that farmers in this agro-ecological zone of Nigeria should adopt the variety NERICA 1 and the application of PE Butachlor + POE Orizoplus for suppressed weed growth and development, enhanced growth, and yield of upland rice.

Keywords: NERICA, Badeggi, Orizoplus

Introduction

Rice (*Oryza sativa* L.) is a crop of global importance in West Africa accounting for 64.2 % and 61.9 % of the total rice production and consumption in Sub Sahara Africa, respectively (Norhidayati *et al.*, 2015). In Nigeria, it is a major staple food widely consumed in all the geopolitical zones and socioeconomic classes International Institute of Tropical Agriculture (IITA, 2020). In West Africa Nigeria is the highest producer of the crop with an average of 8 million metric tons. As of 2019, Nigeria ranked the 14th largest producer in the world with China being the top producing country (Thrive Agric, 2020). As of 2019 Africa had a total production volume of 14.6 million out of which Nigeria produced about 55 % and Egypt produced about 30 % (Thrive Agric, 2020). In Nigeria the demand for rice is equally growing faster with the consumption broadening across all socio-economic classes, including the poor, such that rice is no longer seen as a luxury food (Bamidele *et al.*, 2010). This soaring rise in rice demand and consumption in Nigeria dates back to mid-1970s. A combination of various factors has been reported to have been responsible for this increase. Among the proffered reasons is urbanization which appears to be the most important cause of the shift in consumers' preference for rice in Nigeria (Akpokoje *et al.*, 2001; Akpokoje *et al.*, 2002). Other factors include, increase in population growth, increase in income level and associated changes in family



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occupational structures (Osiname, 2002). Although, the demand for rice in preference to other cereals has increased in recent years, production is still on a relatively small scale (Akande, 2001; PCU 2001; Olaleye *et al.*, 2008). A study conducted by Ismaila *et al.*, 2013 unveil that weeds are at present the most important biotic constraints affecting increased rice production in the world. He further explain that the major impediment in the cultivation of rice is heavy weeds infestation particularly in upland ecology, by competing with the crop to such extent that it could get smothered. This is why the use of herbicide in rice production becomes a necessity. This study is to evaluate weed management practices on NERICA rice varieties.

Materials and Methods

Description of Experimental Site

The experiment was carried out in a farmer's field, near National Cereals Research Institute (NCRI), Badeggi (Lat. 9° 45N, Long. 6° 07E; 70.5 m above sea level), located in the Southern Guinea savanna of Nigeria. The field trial was conducted during the rainy seasons of 2024. GPS machine was used to determine the exact location of the experimental site

Soil Sampling and Analysis

Soil samples were collected diagonally from five spots using alderman auger before sowing and mixed to form one composite sample and analyzed for some physical and chemical properties particularly organic N, total N, soil pH, available phosphorus and textural classes using routine chemical analysis as described by Carter (1993). The hydrometer method was used to determine the particle size distribution (Abideen *et al.*, 2020). The pH of the soil samples was determined using electronic pH meter (PCE- 228) in water –soil solution(1:1), while the organic carbon content of the soil were determined using Walkley and Black method and then multiply by 1.724 to calculate soil organic matter content (Ajon and Anjembe, 2018) . Total nitrogen and phosphorus were determined by micro-kjeldhal digestion –distillation methods (Abideen *et al.*, 2020) and electro photometer method (Ajon and Anjembe 2018). The exchangeable cation was extracted using 1M ammonium acetate solution. Ca and Mg were analyzed from the extract by EDTA titration method, while K and Na were done by flame photometer (AAS, MEDTECH) (Abideen *et al.*, 2020).

Treatments and Experimental Design

The treatments were laid out in a spilt plot design of four early maturing upland rice varieties: NERICA 1, 2, 4, 7 and four weed management practices: weedy check, pre emergence (PE) application of butachlor at 2.0 kg a.i ha⁻¹ followed by hoe weeding (HW) weeks after sowing (WAS), 2 HW at 3 and 6 WAS, post emergence (POE) propanil ha⁻¹ plus 2,4-D at ha⁻¹ (Orizo Plus, Proficol Calle, Baranquilla, Colombia) at the rate of 3.5 kg a.i. ha⁻¹ at 6 WAS and arranged as a split plot in a randomized complete block design and replicated three times . The main plot treatments were the combination weed management practices and sub-plot treatments was the upland rice varieties. Gross plot size was 3 m x 4 m (12 m²) consisting of 15 rows of 4 m long each, while net plot size was 1.5 m x 4 m (6 m²) consisting of 5 rows of 4 m long. An alley of 1.0 m was left between the treatments and replications.

Data Analysis

Data collected from the study was subjected to analysis of variance (ANOVA) using Statistical Analysis System (SAS) package version 9.0 (2002). Treatment means were separated using the least significant difference (LSD) at P≤ 0.05.

Results and Discussions

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Plant Height

Results on plant height is shown in table 1. Plant height at 3 WAS indicated that NERICA 1 produced the tallest plants of 28.9 cm while NERICA 2 produced the shortest plants of 25.8 cm. application of PE Butachlor + POE orizoplus at 3 WAS produced the tallest plants of 27.6 cm while weedy check at 3 WAS produced the shortest plants. At 6 WAS NERICA 7 produced tallest plants while NERICA 2 produced the shortest plants. On weed management application of PE Butachlor + 1 HW produced the tallest plants of 63.9 cm. Weed management practices at 6 WAS, weedy check and PE Butachlor + POE Orizoplus had similar results which were recorded as the treatment that produced the shortest plants 61.6 cm. At 9 WAS NERICA 4 recorded the tallest plants (106.1 cm) while NERICA 2 produced the shortest plants (96.1cm). on weed management, PE Butachlor + POE orizoplus produced the tallest plants (104.5 cm) while application of weedy check produced the shortest plants 93.1 cm. The variation in plant height among the rice varieties could be due to the varieties showing differences in genetic traits and differences in response to environmental conditions.

Table 1: Evaluation of Weed Management Practices on Plant Height of Upland Rice in the Southern Guinea Savanna in 2024 rainy season

Treatment	3 WAS	6 WAS	9 WAS
Varieties (V)			
NERICA 1	28.9	62.0	99.2
NERICA 2	25.6	61.5	96.1
NERICA 4	25.8	62.0	106.1
NERICA 7	26.4	64.2	97.9
LSD (0.05)	1.86	4.84	6.75
Weed management (M)			
Weedy check	26.0	61.6	93.1
2 HW at (3 + 6 WAS)	26.9	62.7	99.3
PE Butachlor + 1HW	26.2	63.9	102.4
PE Butachlor + POE Orizoplus	27.6	61.6	104.5
LSD (0.05)	1.86	4.84	6.75

Number of Tillers (m²)

The result on the evaluation of weed management practices on number of tillers of upland rice in the Southern Guinea Savanna is shown in table 2. At 3 WAS results indicated that NERICA 1, NERICA 4 and NERICA 7 all had similar values for the number of tillers (18.0) thereby producing the highest number of tillers while NERICA 2 produced the least number of tillers of 7.0. results on weed management shows that 2 HW at (3 + 6 WAS), PE Butachlor + 1 HW, PE Butalchor + POE orizoplus had similar values and produced the highest number of tillers (8.0) while weedy check produced the least number of tillers. At 6 WAS all the varieties shared similar results on the number of tillers of 9.0 while the application of PE Butachlor with 1 HW gave the highest number of tillers while weedy check gave the least number of tillers of 8.0. Results on 9 WAS indicated that NERICA 4 produced the most number of tillers 21.0 while NERICA 2 produced the least number of tillers. Results on weed management indicated that weedy check produced the least number of tillers while all other weed management treatment shared the same value which produced the highest number of tillers 17.0 Higher tiller production is a major characteristic of NERICA 4. The result is in conformity with

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the findings of Ghanem *et al.* (1994) who also observed significant differences in number of fertile tiller per unit area among different varieties.

Table 2: Evaluation of Weed Management Practices on Number of tillers of Upland Rice in the Southern Guinea Savanna in 2024 rainy season

Treatment	3 WAS	6 WAS	9 WAS
Varieties (V)			
NERICA 1	8.0	9.0	18.0
NERICA 2	7.0	9.0	11.0
NERICA 4	8.0	9.0	21.0
NERICA 7	8.0	9.0	18.0
LSD (0.05)	0.96	1.20	1.58
Weed management (M)			
Weedy check	7.0	8.0	16.0
2 HW at (3 + 6 WAS)	8.0	9.0	17.0
PE Butachlor + 1HW	8.0	10.0	17.0
PE Butachlor + POE	8.0	9.0	17.0
Orizoplus			
LSD (0.05)	0.96	1.20	1.58

HW = Hoe weeding

Grain Yield

Result on grain yield is shown on table 3. Variety NERICA 1 produced the highest grain yield of 1534.7 kg ha⁻¹ while NERICA 4 has the lowest grain yield of 969.7 kg ha⁻¹. Result on weed management has shown that the application of PE Butachlor + POE Orizoplus gave the highest grain yield of 1367.56 kg ha⁻¹ while weedy check gave the lowest yield of 1178.12 kg ha⁻¹. The variation in grain yield among the varieties is a function of interaction among yield components that were affected differently by the growing conditions and crop management practices. Similar results were reported by Tahir *et al* (1995) who also observed significant differences in the grain yield among different varieties.

Table 3: Evaluation of Weed Management Practices on Grain yield (kg ha⁻¹) of Upland Rice in the Southern Guinea Savanna in 2024 rainy season

Treatment	Grain yield (kg ha ⁻¹)
Varieties (V)	
NERICA 1	1534.7
NERICA 2	1273.1
NERICA 4	969.7
NERICA 7	1439.8
LSD (0.05)	174.83
Weed management (M)	
Weedy check	1178.12
2 HW at (3 + 6 WAS)	1298.18
PE Butachlor + 1HW	1367.56
PE Butachlor + POE Orizoplus	1373.49
LSD (0.05)	174.83

HW = Hoe weeding



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Conclusion and Recommendation

From this study it can be concluded that the variety NERICA 1 gave the highest grain yield per hectare and the application of pre-emergence (PE) application of Butachlor at 2.0 kg a.i + POE orizoplus gave the highest grain yield. The above conclusion is therefore recommended for farmers and further field experiment can be conducted in another agro-ecological zones of Nigeria.

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