Exploring the Morphological Diversity of Selected Abakaliki Local Rice Cultivars: A Study of Key Physical Traits and Variations

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ABSTRACT

Abakaliki rice is unique compared to other rice grown in different parts of Nigeria, unfortunately, rice yield per hectare is low because smallholder farmers rely on local rice cultivars with low yield potentials, Therefore, identification of high-yielding locally adapted rice varieties in combination with high grain quality is the most effective strategy in increasing rice production in Ebonyi State. Hence, forty rice cultivars collected from different villages and local government areas in Ebonyi State were cultivated in a complete randomized block design in three replications to evaluate the morphological characteristics of the Abakaliki local rice cultivars using the standard rice evaluation method. The results showed that Nwangbashianya had the highest grain length with a mean value of 1.03mm followed by Akuje and Iron with the same mean value of 1.00 mm,. Mars had the maximum plant length with a mean value of 174.67cm, and maximum performance for 1000 grain per weight with a mean value of 4.13kg. The results also revealed varied number of primary panicles for which Iron recorded the highest mean value of 43.67. The maximum number of primary and secondary tillers were observed in Faro 15 and Offia with mean values of 6.33 and 4.00 respectively. Concurrent selection based on these best-performing cultivars with exceptional traits could lead to the development of high-yielding rice varieties in Ebonyi State.

INTRODUCTION

Rice production's success hinges on various yield determination components, necessitating a holistic approach to parental selection beyond final yield alone (Kumbhar *et al.*, 2013). Besides its caloric content, rice boasts high nutritional value, being rich in fiber, vitamins, and minerals while low in cholesterol and sodium, making it an essential energy source. Despite regional consumption disparities, global rice utilization has outpaced production in recent years (FAO, 2017). Therefore, efforts to bolster rice production are critical to meet market demands driven by population growth and future food security concerns.

Ebonyi State stands out as a major rice producer in Nigeria, witnessing remarkable production growth in recent years. The region's conducive environment has led to the emergence of diverse rice varieties adapted to specific local conditions, often named after the towns where they are cultivated (Garris *et al.*, 2005). However, achieving maximum yield remains a challenge due to factors like poor production practices, environmental stresses, and genetic variability. Studying the agronomic traits of Abakaliki rice germplasm is crucial for selecting appropriate breeding procedures, paving the way for the development of high-yielding varieties suited to local farmers' needs. Different morphological traits contribute uniquely to rice production, serving as indispensable tools for selecting varieties based on agronomical, morphological, genetic, or physiological characteristics (Yuan, et al., 2021). Identifying promising morphological traits associated with quality and yield is vital for rice production in Ebonyi State and varietal development programs (Ashrafuzzaman *et al*., 2009). This study primarily focuses on evaluating the morphological characteristics of Abakaliki rice cultivars sourced from various local government areas of Ebonyi

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State to determine the yield-related traits to achieve optimum rice production in the area. Ultimately, such initiatives will bolster food security, enhance farmers' livelihoods, and sustain the rice industry in Ebonyi State and beyond.

MATERIALS AND METHODS

A total of forty rice cultivars were collected from different Local Government Areas of Ebonyi State (Abakaliki, Ikwo Ohaukwu, Ezza, and Izzi). The actual identity of the locally named cultivars and their sources of collection are shown below. The rice cultivars were all planted on the field under the same cultural practices.

Table 1: Identity of Locally Named Cultivars and Their Sources of Collection

S/N	Cultivars/Samples	Source of Collection	Species
1	FARO 44	Ohaukwu	Oryza sativa
2	Mars	Ikwo	Oryza sativa
3	Miri-miri	Ikwo	Oryza sativa
4	306	Onueke	Oryza sativa
5	Chinyere	Onueke	Oryza sativa
6	FARO 18	Ezzangbo	Oryza sativa
7	Miri-miri	Ezza	Oryza sativa
8	Government	Ikwo	Oryza sativa
9	306	Ohaukwu	Oryza sativa
10	FARO 14	Ikwo	Oryza sativa
11	CP	Ikwo	Oryza sativa
12	Iron 2	Onueke	Oryza sativa
13	Chinyere	Ikwo	Oryza sativa
14	Ogologo Mgbada	Abakaliki	Oryza sativa
15	R8	Ikwo	Oryza sativa
16	Atom 2	Ikwo	Oryza sativa
17	306	Ikwo	Oryza sativa
18	Iron	Ezza	Oryza sativa
19	Kpurukpuru	Abaomege	Oryza sativa

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20	kpurukpuru	Ikwo	Oryza sativa
21	Onmeajiaji	Ezza	Oryza sativa
22	Mars/CP	Izzi	Oryza sativa
23	China	Ikwo	Oryza sativa
24	Iron	Ikwo	Oryza sativa
25	Atom 3	Ikwo	Oryza sativa
26	Mars	Ezza	Oryza sativa
27	FARO 44	Izzi	Oryza sativa
28	Offia	Onueke	Oryza sativa
29	Iron	Abaomege	Oryza sativa
30	306	Izzi	Oryza sativa
31	FARO 15	Ohaukwu	Oryza sativa
32	Akuje	Abaomege	Oryza sativa
33	306	Ezza	Oryza sativa
34	Atom 1	Ikwo	Oryza sativa
35	Iron	Abaomege	Oryza sativa
36	Adaigbo	Ikwo	Oryza sativa
37	Nwadugo	Ikwo	Oryza sativa
38	Nwangbasianya	Abakaliki	Oryza sativa
39	R8	Abakaliki	Oryza sativa
40	FARO 55	Ohaukwu	Oryza sativa

Experimental Field Design and Layout

Seedlings were raised on different mapped-out nursery beds and covered with dried grasses to prevent birds from picking the grains till germination. After 30 days the rice was transplanted. The experimental field was cleared, ploughed, and harrowed manually, and demarcated in a complete randomized block design. A basal dose of N-P-K fertilizer (20:10:10) at the rate of 200 kg/ha was applied at 15 days after transplanting. Subsequently, urea was top-dressed at 100 kg/ha at 30 days after transplanting. Weeding was carried out manually at 21 days after transplanting. A second weeding session was conducted during panicle initiation, occurring approximately 42 days after transplanting.

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Data collection and measurement

Several yield-related agronomical characters were measured after 60days of transplanting which include tiller number (i.e. primary and secondary), plant height, length and width of flag leaf, days to maturity, panicle length, primary and secondary branching of panicles, spikelet vigor and fertility, spikelet exertion, 1000 grain weight, length and width of paddy, were evaluated based on standard evaluation system rice (Kundu *et al.*, 2008).

Statistical analysis

The primary data collected from the above quantitative traits were analyzed by the analysis of variance (ANOVA) procedure using SPSS 20.0. Differences were declared statistically significant at $P<0.05$. Where significant differences were detected, the means were separated by the least Significant differences (LSD) at 5% probability level.

RESULTS

Morphological data revealed significant variations among rice cultivars. Primary tillers ranged from 2.33 to 9.33, with FARO 15 and 306 recording the highest mean values of 9.33 and 7.00, respectively, while Atom 3 and China exhibited the lowest mean values of 2.33 and 2.67. Secondary tillers ranged from 0.67 to 4.00, with Offia leading at 4.00, followed by 306 at 3.67, and CP and Nwadugo recording the lowest at 0.67. Plant height varied from 39.00cm to 174.67cm, with Mars being the highest at 174.67cm while Iron and Nwadugo were the lowest with 39.00cm and 63.33cm, respectively. Primary panicles ranged from 6.00 to 43.67, with Iron leading at 43.67 and Nwadugo being the lowest mean value of 6.00. Secondary panicles varied from 14.33 to 38.33, with R8 and Kpurukpuru topping at 38.33 and 37.00, respectively. Panicle length ranged from 14.03cm to 31.67cm, with Kpurukpuru) recording the longest at 31.67cm and Nwadugo at the shortest with 14.03cm. Spikelet vigor per plant ranged from 0.33 to 2.00, with Mars leading at 2.00 and several cultivars at the lowest with 0.33. Grain length varied from 0.57mm to 1.03mm, with Nwangbasianya at 1.03mm and Kpurukpuru at the lowest with 0.57mm. Grain width ranged from 1.97mm to 4.13mm, with Mars leading at 4.13mm and Nwadugo at the lowest with 1.97mm. 1000-grain weight varied from 1.97g to 4.13g, with Mars at 4.13g and Nwadugo at the lowest with 1.97g. Spikelet fertility per plant ranged from 1.83 to 66.57, with Offia leading at 66.57 and Faro 55 at the lowest with 1.83. Flag leaf length ranged from 0.90cm to 1.70cm, with Kpurukpuru recording the longest at 1.70cm and Nwadugo at the shortest with 0.90cm.

Table 2: Mean Performance of 40 Rice Varieties in Primary and Secondary Tiller Count, Plant Height, Primary and Secondary Panicle Numbers, and Spikelet Vigor

S/N	CULTIVARS	NPT	NST	PL (cm)	NPP	NSP	PANL (cm)	SPK V
1	FARO 44 (Ohaukwu)	5.00±2.65 abc	2.00±2.00 abc	109.00±18.33 abcd	7.00±7.00 a	31.33±17.01 abcd	23.07±10.10 abcd	0.67±0.58 ab
2	Mars (Ndufu Ikwo)	4.33±1.53 abc	2.00±1.00 abc	174.67±21.50 d	11.00±2.00 a	23.33±4.73 abcd	26.07±4.20 abcd	2.00±0.00 b

3	Miri-miri (Ikwo)	4.00±1.73 abc	1.00±1.00 ab	142.67±28.75 bcd	11.00±3.61 a	26.33±3.79 abcd	25.40±1.44 abcd	1.33±0.58 ab
4	306 (Onueke)	7.00±3.00 cd	3.67±1.16 bc	78.33±36.14 abc	15.67±9.87 a	26.33±5.51 abcd	24.50±2.33 abcd	1.00±0.00 ab
5	Chinyere (Onueke)	5.33±1.16 abc	1.67±1.53 abc	115.33±9.45 abcd	6.67±5.77 a	25.33±12.50 abcd	26.70±1.54 abcd	1.33±1.15 ab
6	FARO 18 (Ezzangbo)	6.00±1.00 abcd	3.00±0.00 abc	152.67±13.05 cd	12.67±1.16 a	22.00±7.00 abcd	24.17±1.04 abcd	0.67±0.58 ab
7	Miri-miri (Ezza)	3.67±3.22 abc	1.33±1.16 abc	85.00±74.51 abc	9.00±1.73 a	30.67±13.65 abcd	26.67±7.01 abcd	1.67±0.58 ab
8	Governmen t (Ikwo)	3.67±0.58 abc	1.67±1.53 abc	129.33±9.29 bcd	9.67±2.52 a	21.33±8.15 abcd	20.50±6.50 abcd	1.67±0.58 ab
9	306 (Ohaukwu)	4.00±1.00 abc	1.67±1.53 abc	129.00±22.11 bcd	10.00±0.00 a	34.00±9.54 bcd	17.17±15.46 abc	0.67±1.15 ab
10	FARO 14 (Ikwo)	3.33±0.58 abc	1.00±1.00 ab	131.67±9.24 bcd	11.33±1.53 a	18.67±7.77 abcd	25.70±1.54 abcd	1.00±1.00 ab
11	CP (Ikwo)	3.67±1.16 abc	0.67±1.16 a	125.67±12.10 abcd	11.33±1.53 a	16.67±4.93 ab	23.50±2.02 abcd	1.67±0.58 ab
12	Iron 2 (Onueke)	4.00±1.00 abc	2.67±3.06 abc	128.00±2.65 bcd	11.67±0.58 a	31.67±14.43 abcd	24.07±4.67 abcd	1.00±1.00 ab
13	Chinyere (Ikwo)	3.00±1.00 abc	1.67±2.08 abc	119.67±8.74 abcd	12.33±0.58 a	27.33±4.73 abcd	25.83±5.06 abcd	1.67±0.58 ab
14	Ogologo Mgbada	4.67±1.53 abc	2.33±0.58 abc	123.67±32.04 abc	12.00±1.73 a	30.00±11.36 abcd	24.13±5.43 abcd	1.00±0.00 ab
15	R8 (Ikwo)	4.00±2.00 abc	2.00±1.00 abc	135.67±21.36 bcd	9.33±1.53 a	14.33±3.06 a	26.17±2.47 abcd	1.67±0.58 ab
16	Atom 2	6.67±0.58 bcd	3.00±1.00 abc	80.33±70.22 abc	10.00±1.73 a	26.00±4.58 abcd	23.93±0.90 abcd	1.00±1.00 ab
17	306 (Ikwo)	6.00±4.00 abcd	3.33±1.16 abc	123.33±3.22 abc	11.67±1.53 a	28.33±7.10 abcd	26.17±2.47 abcd	1.33±0.58 ab
18	Iron Ezza	4.00±0.00 abc	2.33±0.58 abc	130.67±13.20 abcd	13.33±0.58 a	36.33±4.73 cd	25.17±6.71 abcd	1.00±0.00 ab
19	Kpurukpuru abaomege	6.33±1.16 abcd	3.00±1.00 abc	116.33±43.59 abcd	7.67±7.51 a	17.33±15.82 ab	17.63±16.43 abcd	0.67±0.58 ab

20	kpurukpuru Ikwo	5.00±1.73 abc	2.33±0.58 abc	146.00±17.06 bcd	13.33±1.53 a	37.00±6.56 cd	31.67±1.04 d	1.00±0.00 ab
21	Onmeajiaji Ezza	6.00±1.00 abcd	2.67±0.58 abc	111.00±39.36 abcd	8.00±4.00 a	21.67±7.02 abcd	23.07±2.31 abcd	0.67±0.58 ab
22	Marc/CP (Izzi)	3.00±1.00 abc	2.33±1.16 abc	94.00±46.12 abcd	9.33±1.53 a	26.00±8.72 abcd	24.17±3.62 abcd	1.00±1.00 ab
23	China (Ikwo)	2.67±1.53 ab	1.67±0.58 abc	107.00±30.51 abcd	8.67±2.52 a	25.67±9.29 abcd	26.73±5.69 abcd	0.67±0.58 ab
24	Iron (Ikwo)	5.33±4.04 abc	1.33±1.16 abc	128.33±20.26 bcd	7.67±4.51 a	33.00±9.64 abcd	28.67±1.26 abcd	0.33±0.58 a
25	Atom 3	2.33±0.58 a	2.67±0.58 abc	105.00±12.17 abcd	9.67±1.53 a	25.00±6.56 abcd	27.13±3.07 abcd	0.67±0.58 ab
26	Mars (Ezza)	4.00±2.00 abc	3.33±0.58 abc	141.33±42.00 bcd	10.00±2.00 a	31.00±1.00 abcd	27.80±0.17 abcd	1.00±1.00 ab
27	FARO 44 (Izzi)	5.67±3.22 abcd	2.33±2.08 abc	103.67±18.23 abcd	9.00±3.61 a	24.33±8.62 abcd	24.67±1.53 abcd	0.67±0.58 ab
28	Offia (Onueke)	4.00±1.00 abc	4.00±3.46 c	91.67±80.89 abcd	9.33±4.04 a	24.67±11.24 abcd	15.67±13.65 ab	1.00±0.00 ab
29	Iron (Abaomege)	3.33±1.16 abc	2.33±0.58 abc	39.00±67.55 a	10.00±1.73 a	31.00±11.79 abcd	26.57±2.63 abcd	0.33±0.58 a
30	306 (Izzi)	4.33±0.58 abc	1.33±0.58 abc	75.00±65.11 abc	11.67±0.58 a	27.00±6.25 abcd	17.33±15.01 abc	0.67±0.58 ab
31	FARO 15 (Ohaukwu)	9.33±6.11 d	1.67±1.53 abc	69.67±61.24 abc	10.00±2.65 a	32.00±5.29 abcd	25.17±3.75 abcd	0.67±0.58 ab
32	Akuje (Abaomege)	5.33±1.53 abc	1.00±1.73 ab	97.33±88.51 abcd	11.00±1.73 a	29.00±9.54 abcd	26.73±2.97 abcd	0.67±0.58 ab
33	306 (Ezza)	5.00±2.65 abc	1.67±0.58 abc	84.67±17.79 abc	11.00±2.65 a	27.00±4.58 abcd	25.33±3.21 abcd	0.57±0.51 a
34	Atom 1	5.33±1.53 abc	3.00±1.73 abc	87.33±76.17 abcd	11.33±4.93 a	31.00±3.61 abcd	28.33±3.06 abcd	1.33±1.15 ab
35	Iron (Abaomege)	3.33±1.16 abc	2.33±0.58 abc	39.00±67.55 a	43.67±60.04 a	29.67±9.61 abcd	26.47±1.82 abcd	0.33±0.58 a

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36	Adaigbo (Ikwo)	4.67±0.58 abc	1.00±1.73 ab	107.00±17.69 abcd	7.00±6.56 a	31.00±10.00 abcd	17.27±15.43 abc	1.33±1.15 ab
37	Nwadugo (Ikwo)	4.33±1.16 abc	0.67±1.16 a	63.33±69.70 ab	6.00±6.56 a	16.00±17.69 ab	14.03±13.36 a	0.33±0.58 a
38	Nwangbasianya (Aba)	4.33±0.58 abc	1.33±1.16 abc	142.00±31.43 bcd	12.00±1.00 a	34.33±6.66 bcd	26.17±8.08 abcd	1.33±0.58 ab
39	R8 (Abakaliki)	4.67±1.16 abc	2.33±0.58 abc	123.67±73.66 abcd	10.67±1.53 a	38.33±12.50 d	27.30±1.65 abcd	1.67±0.58 ab
40	FARO 55 (Ohaukwu)	5.67±1.16 abcd	2.67±2.52 abc	132.67±20.65 bcd	12.00±1.00 a	26.00±5.00 abcd	30.40±5.28 cd	1.33±0.58 ab

NPT = Number of Primary Tillers, NST = Number of Secondary Tillers, PL = Plant Length, NPP = Number of Primary Panicle,NSP = Number of Secondary Panicle, PanL = Panicle Length t, SPKF= Spikelet Fertility, SKV = Spikelet Vigor,

Table 3 Mean performance of 40 Rice Cultivars in 1000 Grain Weight, Spikelet Fertility, Grain Length, Grain Width, and Panicle threshibility

S/N	(1000G/W)	L G (cm)	W Grain (cm)	Pthresh (%)	1000 (g)	SpikF (%)
1	1.00±3.60 fgh	0.97±0.12 a	1.00±3.60 a	0.20±0.35 a	3.60±0.10 fgh	9.80±0.20 bc
2	4.13±0.06 h	0.93±0.23 a	4.13±0.06 a	0.73±0.25 a	4.13±0.05 h	19.87±0.15 de
3	2.60±0.10 bc	0.83±0.06 a	2.60±0.10 a	0.63±0.12 a	2.60±0.10 bc	4.87±0.15 ab
4	2.70±0.10 bcd	0.83±0.06 a	2.70±0.10 a	0.68±0.10 a	2.70±0.10 bcd	29.87±0.12 fg
5	2.70±0.10 bcd	0.97±0.06 a	2.70±0.10 a	0.47±0.45 a	2.70±0.10 bcd	8.87±0.15 b
6	3.83±0.15 gh	0.63±0.55 a	3.83±0.15 a	0.33±0.29 a	3.83±0.15 gh	9.80±0.20 bc
7	2.80±0.10 bcd	0.93±0.06 a	2.80±0.10 a	0.25±0.25 a	2.80±0.10 bcd	4.77±0.21 ab
8	3.50±0.20 efg	0.93±0.06 a	3.50±0.20 a	0.33±0.30 a	3.50±0.20 efg	29.83±0.15 fg
9	2.90±0.10 bcd	0.90±0.20 a	2.90±0.10 a	0.37±0.32 a	2.90±0.10 bcd	19.87±0.15 de
10	2.70±0.10 bcd	0.63±0.55 a	2.70±0.10 a	0.42±0.38 a	2.70±0.10 bcd	14.90±0.10 cd
11	3.20±0.10 def	0.93±0.06 a	3.20±0.10 a	0.63±0.15 a	3.20±0.10 def	39.77±0.21 h
12	3.00±0.10 bcde	0.90±0.10 a	3.00±0.10 a	0.42±0.38 a	3.00±0.10 bcde	24.90±0.10 ef

13	2.80±0.10 bcd	0.93±0.06 a	2.80±0.10 b	0.67±0.15 a	2.80±0.10 bcd	9.87±0.12 bc
14	2.90±0.10 bcd	0.97±0.15 a	2.90±0.10 a	0.40±0.17 a	2.90±0.10 bcd	20.93±15.62 e
15	2.87±0.15 bcd	0.83±0.12 a	2.87±0.15 a	3.75±5.46 b	2.87±0.15 bcd	49.83±0.15 i
16	4.10±0.10 h	0.93±0.06 a	4.10±0.10 a	0.30±0.17 a	4.10±0.10 h	29.90±0.10 fg
17	3.10±0.10 cdf	0.83±0.12 a	3.10±0.10 a	0.57±0.23 a	3.10±0.10 cdef	29.87±0.15 fg
18	2.70±0.10 bcd	1.00±0.00 a	2.70±0.10 a	0.70±0.36 a	2.70±0.10 bcd	34.87±0.15 gh
19	2.77±0.06 bcd	0.57±0.51 a	2.77±0.06 a	0.35±0.40 a	2.77±0.05 bcd	24.90±0.10 ef
20	3.10±0.10 cdef	0.97±0.23 a	3.10±0.10 a	0.35±0.13 a	3.10±0.10 cdef	9.90±0.10 bc
21	3.20±0.10 def	0.67±0.58 a	3.20±0.10 a	0.43±0.40 a	3.20±0.10 def	14.83±0.15 cd
22	3.13±0.06 cdef	0.80±0.10 a	3.13±0.06 a	0.40±0.36 a	3.13±0.05 cdef	1.90±0.10 a
23	2.80±0.10 bcd	0.93±0.12 a	2.80±0.10 a	0.27±0.30 a	2.80±0.10 bcd	19.90±0.10 de
24	2.80±0.10 bcd	0.93±0.06 a	2.80±0.10 a	0.13±0.23 a	2.80±0.10 bcd	15.83±0.15 d
25	2.60±0.10 bc	0.97±0.06 a	2.60±0.10 a	0.50±0.50 a	2.60z0.10 bc	24.90±0.10 ef
26	3.50±0.10 efg	0.90±0.10 a	3.50±0.10 a	0.37±0.35 a	3.50±0.10 efg	9.83±0.15 bc
27	3.20±0.10 def	0.80±0.20 a	3.20±0.10 a	0.50±0.50 a	3.20±0.10 def	34.90±0.10 gh
28	3.50±0.10 efg	0.87±0.12 a	3.50±0.10 a	0.50±0.50 a	3.50±0.10 efg	66.57±5.69 j
29	2.70±0.10 bcd	0.87±0.06 a	2.70±0.10 a	0.33±0.57 a	2.70±0.10 bcd	29.77±0.21 fg
30	2.90±0.10 bcd	0.87±0.06 a	2.90±0.10 a	0.17±0.15 a	0.90±0.10 bcd	9.90±0.10 bc
31	2.70±0.10 bcd	0.90±0.10 a	2.70±0.10 a	0.47±0.25 a	2.70±0.10 bcd	49.90±0.10 i
32	2.70±0.10 bcd	1.00±0.10 a	2.70±0.10 a	0.50±0.50 a	2.70±0.10 bcd	34.83±0.15 gh
33	3.90±0.10 gh	0.97±0.21 a	3.90±0.10 a	0.73±0.05 a	3.90±0.10 gh	14.90±0.10 cd
34	3.80±0.10 gh	0.97±0.12 a	3.80±0.10 a	0.83±0.15 a	3.80±0.10 gh	39.83±0.15 h
35	2.50±0.10 b	0.87±0.06 a	2.50±0.10 a	0.33±0.57 a	2.50±0.10 b	24.93±0.06 ef
36	3.50±0.10 efg	0.57±0.49 a	3.50±0.10 a	0.17±0.28 a	3.50±0.10 efg	4.90±0.10 ab
37	1.97±1.70 a	0.63±0.55 a	1.97±1.70 a	0.17±0.28 a	1.97±1.70 a	6.63±5.74 ab
38	2.70±0.10 bcd	1.03±0.06 a	2.70±0.10 a	0.40±0.36 a	2.70±0.10 bcd	9.87±0.15 bc

39	3.90±0.10 gh	0.87±0.06 a	3.90±0.10 a	0.53±0.20 a	3.90±0.10 gh	4.87±0.15 ab
40	2.70±0.10 bcd	0.90±0.00 a	2.70±0.10 a	0.20±0.17 a	2.70±0.10 bcd	1.83±0.15 a

PThresh =Panicle Threshability, **1000g/w** = 1000 Grain Weight, **SPKF**= Spikelet Fertility, **SKV** = Spikelet Vigor, WGrain = Grain Width, **LG** = Grain Leng

DISCUSSION

To enhance potential rice yield, identifying key traits contributing to increased yield is crucial. Grain yield results from complex morphological and physiological processes, making selection based solely on yield ineffective, thereby shifting focus to yield-related traits (Efisue *et al*., 2008) Local farmers in Ebonyi State can utilize these traits for effective selection, aiding in crop yield improvement. From the result of this analysis, Faro 15 and 306 displayed the highest number of primary tillers, while Offia had the most secondary tillers, indicating that there are high-yielding cultivars (Efisue et al., 2008)

Grain weight, determined by the weight of a thousand seeds, is a major determinant of rice yield, hence Mars and Atom 2 which exhibited the highest mean 1000-grain weight, may be a good cultivar in terms of yield. Flag leaf length which contributes to photosynthesis and grain filling, varied among cultivar with Kpurukpuru having the longest, and Nwadugo the shortest Additionally, panicle numbers significantly influenced grain yield, with Iron and 306 displaying higher primary panicle numbers, while R8 and Kpurukpuru had more secondary panicles. This variation in panicle numbers underscores their role in determining rice grain yield, influenced by factors like soil fertility and weather conditions (Mohammad *et al* 2002). Therefore, selecting superior genotypes based solely on overall yield is ineffective. Instead, selection should focus on individual components contributing to grain yield. Local farmers in Ebonyi State can utilize yield-related traits to identify stable and desirable characteristics, thus enhancing crop yield. The agronomical characteristics varied significantly among the 40 evaluated genotypes, suggesting that those traits may be influenced by genes, as well as environmental factors. This variation underscores the importance of considering individual traits in genotype selection for improving rice yield (Assuero, and Tognetti, 2010); Hussain *et al*.,2014).

In conclusion, all the l 40 evaluated genotypes displayed diverse agro-morphological traits relevant to rice production improvement and selection. Notably, Mars emerged as an exceptional genotype, boasting numerous yield-related attributes. Its remarkable traits include the longest plant length, highest 1000-grain weight, and notable spikelet vigor. Farmers and breeders in the studied area can capitalize on these advantageous characteristics for enhanced rice cultivation and rice improvement.

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