

Distribution and Some Morphological Characters of Wild Rice in Nigeria

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Introduction

During the periods of November in 1984 and October in 1985, the writers have been sent in Nigeria for collection of the wild and cultivated rices under the project, "Studies on the Distribution and Ecotypic Differentiation of Wild and Cultivated Rice Species in Africa", supported by a Grant from the Ministry of Education, Science and Culture of the Japanese Government. In these opportunities, wild rices distributed in Nigeria were studied.

On the distribution of wild rice in Nigeria, some reports have already been published¹⁻⁶). Though Nigeria has been considered to be one of the most important distribution areas of wild rice, accumulation of complete data on these aspect is far from being perfect. Taking these facts into account, the present study was made to accomplish the distribution and ecotypic differentiation of wild rice in Nigeria. In the present paper, the habitat and the record of the morphological characters of unhusked grains of wild rice were described.

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Abstract of distribution and habitat of wild *Oryza* species

The localities concerned in these trips are northern and northeastern parts of Nigeria. Geographical distribution of wild rice found were briefly illustrated in Fig. 1. In this figure, route of the trips and the growing areas of the wild rice are given.

Most of the seed samples collected were divided into two parts, one of which was deposited in office of Dr. N. Q. NG, IITA, International Institute of Tropical Agriculture, and another one of which was carried back to Japan and their plant and grain char-

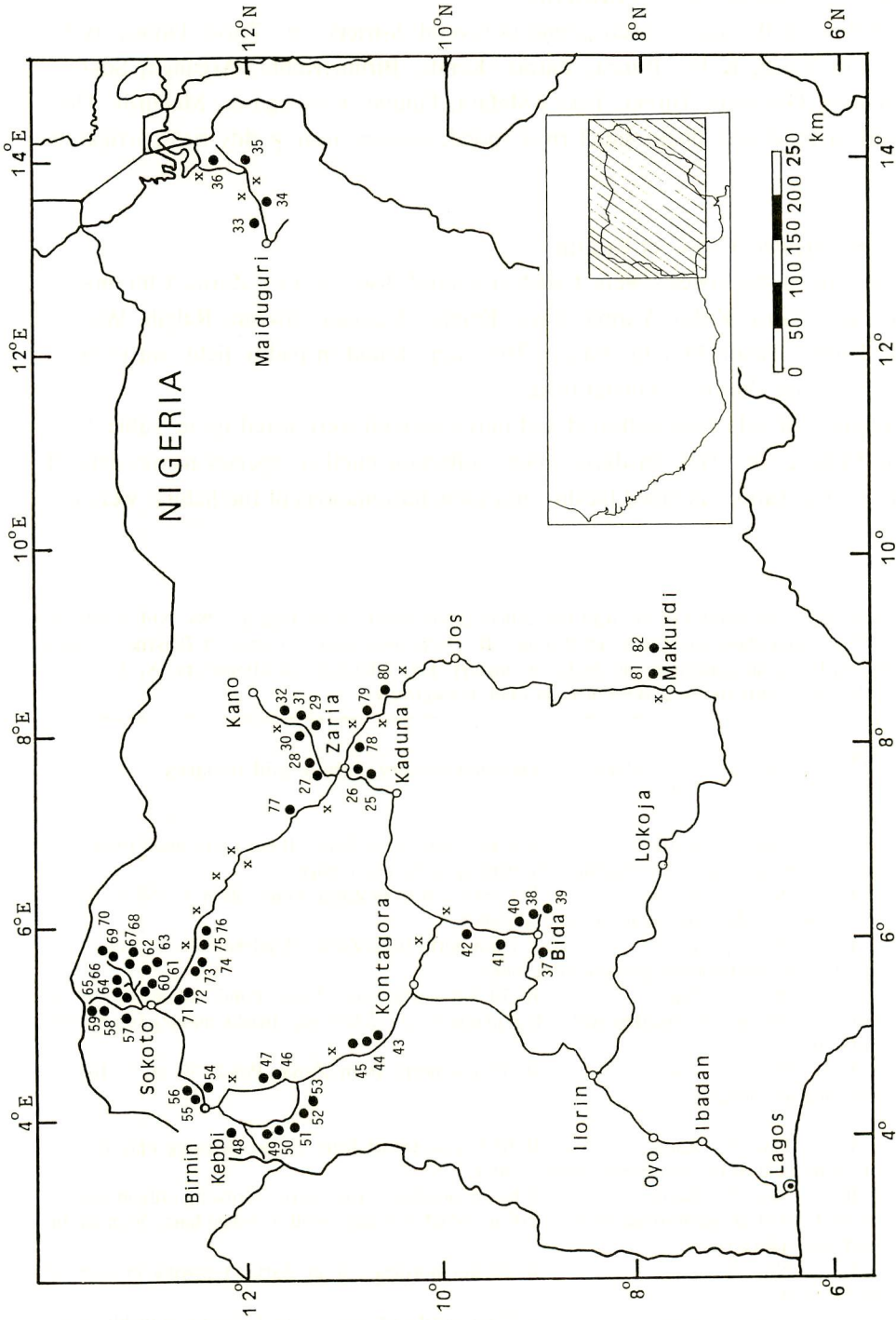


Fig. 1. Map showing several localities where the wild rice in Nigeria were collected and observed. Solid line; route of observation, filled circle; collection area, cross mark; growing area where the samples were observed but not collected, open circle; main town. Code-numbers used in the figure are corresponding to the strain number used in the tables.

acters are now being analysed at Kagoshima University.

I. *Oryza longistaminata* CHEV. et ROEHR.

Populations of the species were found in several districts, *i.e.*, Zaria, Dikwa, Bida, Wushishi, Bin Yauri, Koko, Bunza, Yarma, Kende, Birnin Kebbi, Argungu, Sokoto, Rabah, Wurno, Goronyo, Tureta, Talata Mafara, Funtua, Pambeguwa, Makurdi. They were found in road-side ditch, small river, pond, swamp, near paddy field, irrigation canal.

II. *Oryza breviligulata* CHEV. et ROEHR.

Populations of the species were found in several districts, *i.e.*, Zaria, Chiramawa, Maiduguri, Bin Yauri, Koko, Yarma, Zaga, Kende, Argungu, Sokoto, Rabah, Wurno, Goronyo, Tureta, Talata Mafara, Jengle. They were found in paddy field, waste land, pond, swamp, along the river, upland field.

Distribution of wild rices collected and only observed were listed up in Table 1 (in 1984) and Table 2 (in 1985). In these tables, collection number, species name, date of collection or observation, detailed locality and some informations of the habitat were described.

Table 1. Distribution and habitat of the wild rice collected and observed in Nigeria, 1984. Abbreviations: L; *Oryza longistaminata* CHEV. et ROEHR., B; *Oryza breviligulata* CHEV. et ROEHR., -; only observed and no collection, m; meter or meters, km; kilometer or kilometers, N, E, S, W; north, east, south and west sides of main road, respectively

Col- lected No.	Spe- cies	Date	Place	Detailed locality, habitat and remarks
W25	L	Nov. 7	Zaria	E 7 km south from Zaria. Road cross small river, 5 m width. <i>Leersia</i> sp. growing together. Growing sporadically in edge.
W26	L	Nov. 7	Zaria	E 1 km south from Zaria. Pond, 50 m × 150 m. Growing thickly in edge and thinner in central region.
-	L	Nov. 7	Zaria	E 7 km north from Zaria. Road-side ditch, 5 m × 100 m. Growing sporadically, pre-maturing stage.
W27	L	Nov. 7	Zaria	W 10 km north from Zaria. Pond, 20 m × 200 m. Growing wide areas, together with a few plants of <i>O. glaberrima</i> . Bricks making in one side in the pond.
-	L	Nov. 7	Zaria	W 12 km north from Zaria. Pond, 50 m × 100 m. Growing sporadically.
W28	B	Nov. 7	Zaria	W 63 km northeast from Zaria. Growing only in edge of paddy field of <i>O. glaberrima</i> , 40 m × 80 m.
W29	B	Nov. 7	Zaria	E 63 km northeast from Zaria. Growing only in edge of paddy field of <i>O. glaberrima</i> , 50 m × 200 m, which was separated by waste land, 50 m width, from the main road.
-	L	Nov. 7	Zaria	W 66 km northeast from Zaria. Growing in edge of paddy field.
-	L	Nov. 7	Zaria	E 67 km northeast from Zaria. Growing in paddy field.
-	L	Nov. 7	Zaria	E 71 km northeast from Zaria. Growing in paddy field.
W30	B	Nov. 7	Zaria	W 72 km northeast from Zaria. Paddy field, 50 m ×

- 100 m, *O. glaberrima*. Growing only in northern edge, a few plants.
- W31** **B** Nov. 7 Zaria E 72 km northeast from Zaria. Paddy field, 50 m × 200 m, *O. sativa*, in the whole edges.
- **B** Nov. 7 Zaria W 74 km northeast from Zaria. Paddy field of *O. glaberrima*. Growing sporadically.
- **B** Nov. 7 Zaria W 75 km northeast from Zaria. Paddy field of *O. glaberrima*. Growing thickly.
- **B** Nov. 7 Zaria W 77 km northeast from Zaria. Paddy fields of *O. sativa* and *O. glaberrima*. Growing thickly.
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- **B** Nov. 7 Zaria W 78 km northeast from Zaria. Paddy fields of *O. sativa* and *O. glaberrima*. Growing sporadically.
- **B** Nov. 7 Zaria W 79 km northeast from Zaria. Paddy fields of *O. glaberrima*. Growing sporadically.
- **L** Nov. 7 Chiramawa W 27 km southwest from Chiramawa. Pond, 50 m × 50 m. Growing only a few plants.
- **L** Nov. 7 Chiramawa W 23 km southwest from Chiramawa. Pond, 100 m × 100 m. Growing only a few plants.
- **L** Nov. 7 Chiramawa W 22 km southwest from Chiramawa. Road-side ditch. Growing thickly during about 1 km.
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- **L** Nov. 7 Chiramawa W 18 km southwest from Chiramawa. Swampy area, dia. 200 m. Growing sporadically.
- **L** Nov. 7 Chiramawa W 15 km southwest from Chiramawa. Swampy area, dia. 100 m. Growing sporadically.
- **B** Nov. 7 Chiramawa W 8 km southwest from Chiramawa. Paddy field of *O. glaberrima*. Growing sporadically.
- W32** **B** Nov. 7 Chiramawa E 4 km northeast from Chiramawa. Small pool, 2 m × 5 m, maturing stage, and 5 m × 10 m, pre-maturing stage. Both pools were surrounded by waste lands, growing several savannah's perennial plants. Growing thickly.
- **B** Nov. 7 Chiramawa W 32 km northeast from Chiramawa. Paddy field of *O. glaberrima*. Growing sporadically.
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- **L** Nov. 7 Chiramawa E 32 km northeast from Chiramawa. Swampy area, dia. 200 m. Growing a few plants.
- **L** Nov. 7 Chiramawa E 32 km northeast from Chiramawa. Pond, 50 m × 100 m. Growing together with *Leersia* sp., sporadically.
- W33** **B** Nov. 8 Maiduguri N 27 km northeast from Maiduguri. Paddy field of *O. glaberrima*. Growing sporadically in edge.
- **B** Nov. 8 Maiduguri N 31 km northeast from Maiduguri. Paddy field of *O. glaberrima*. Growing sporadically in edge.
- **B** Nov. 8 Maiduguri N 47 km northeast from Maiduguri. Pond, 10 m × 100 m. Growing in only edge, sporadically.
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- W34** **B** Nov. 8 Maiduguri S 49 km northeast from Maiduguri. Pond, 100 m × 200 m. Growing thickly in the whole edges. Bricks making in north side of the pond.
- **B** Nov. 8 Maiduguri S 50 km northeast from Maiduguri. Pond, 100 m × 100 m. Growing sporadically with *Leersia* sp. together.
- **B** Nov. 8 Maiduguri N 50 km northeast from Maiduguri. Paddy field, *O. glaberrima*. Growing thickly, but pre-maturing stage.
- **L** Nov. 8 Maiduguri S 51 km northeast from Maiduguri. Road-side ditch, 10 m × 1 km. Growing sporadically.
- **L** Nov. 8 Maiduguri S 55 km northeast from Maiduguri. Pond, 20 m × 300 m. Growing sporadically.
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- **L** Nov. 8 Maiduguri S 56 km northeast from Maiduguri. Pond, 100 m × 100 m. Growing thickly, but pre-matured stage.
- **L** Nov. 8 Maiduguri S 57 km northeast from Maiduguri. Pond, 50 m × 100 m. Growing sporadically in only edge.

	-	L	Nov. 8	Dikwa	N 26 km southwest from Dikwa. Pond, 10 m × 300 m. Growing sporadically, together with <i>Leersia</i> sp.
	-	L	Nov. 8	Dikwa	N 20 km southwest from Dikwa. Pond, 10 m × 20 m, near living house.
	-	L	Nov. 8	Dikwa	N 16 km southwest from Dikwa. Road-side ditch. Growing sporadically.

	-	L	Nov. 8	Dikwa	N 15 km southwest from Dikwa. River side, 5 m width. Growing only a few plants.
	-	L	Nov. 8	Dikwa	N 13 km southwest from Dikwa. Road-side ditch, 5 m × 50 m. Growing sporadically. Pre-maturing stage.
	-	L	Nov. 8	Dikwa	S 11 km southwest from Dikwa. Pond, 50 m × 50 m. Growing sporadically in the whole area.
W35	L	Nov. 8	Dikwa	N 7 km northeast from Dikwa. Growing in edge of pond, 100 m × 200 m, relatively many plants. Upland rice, <i>O. sativa</i> , growing in east and north sides of the pond.	
	-	L	Nov. 8	Dikwa	N 24 km northeast from Dikwa. Large pond, 100 m × 3 km. Growing in only road-side edge.

W36	L	Nov. 9	Dikwa	E 4 km north from Dikwa. Pond, connected two parts, 100 m × 200 m and 50 m × 100 m. Growing in the whole of the edge, relatively large amount of plants.	
	-	L	Nov. 9	Dikwa	W 6 km north from Dikwa. Small pool, dia. 10 m. Growing sporadically.
	-	L	Nov. 9	Dikwa	E 7 km north from Dikwa. Pond, 10 m × 100 m. Growing sporadically.
	-	L	Nov. 9	Dikwa	W 24 km north from Dikwa. Pond, 50 m × 200 m. Growing thickly, but pre-maturing stage.
	-	L	Nov. 9	Dikwa	E 31 km north from Dikwa. Pond, 50 m × 50 m. Growing thickly.

	-	L	Nov. 9	Dikwa	E 35 km north from Dikwa. Pond, 50 m × 100 m. Growing thickly in the whole areas.
	-	L	Nov. 9	Dikwa	W 38 km north from Dikwa. Pond, 20 m × 100 m. Growing sporadically.
	-	L	Nov. 9	Dikwa	W 114 km north from Dikwa. 17 km south from Baga. Small pool, dia. 10 m. Growing only in the central region. A few plants.

Table 2. Distribution and habitat of the wild rice collected and observed in Nigeria, 1985. Abbreviations: L; *Oryza longistaminata* CHEV. et ROEHR., B; *Oryza breviligulata* CHEV. et ROEHR., -; only observed and no collection, m; meter or meters, km; kilometer or kilometers, N, E, S, W; north, east, south and west sides of main road, respectively

Col- lected No.	Spe- cies	Date	Place	Detailed locality, habitat and remarks
W37	L	Oct. 1	Bida	S 18 km west from Bida. Edge of pond, Ministry of National Resources Fisheries Section Wuya Fish Farmer, Niger State, 100 m × 600 m areas. But growing in the whole areas of other small ponds.
W38	L	Oct. 1	Bida	N 12 km east from crossroad of Bida, and 1 km east from Cereals Research Station. Only edge of pool, 200 m × 200 m, located on entrance of Rice Research Station.
-	L	Oct. 1	Bida	N 13 km east from crossroad of Bida. Small population in swamp, dia. 100 m.
W39	L	Oct. 1	Bida	N,S 15 km east from crossroad of Bida. Large pond, 100 m × 500 m, growing in the whole edge (N). Edge of paddy fields, <i>O. sativa</i> and <i>O. glaberrima</i> , Foundation Seed Multiplication, FARO; edge of only <i>O. sativa</i> , and in the whole of irrigation canals (S).

- W40** L Oct. 1 Bida E,W 7 km north from Bida. Swampy area, running river in the middle portion. Connected both of the swamps by bridge. 300 m × 500 m each. Growing in edge of swamps and rivers.
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- L Oct. 1 Bida W 18 km north from Bida. Swamp and paddy fields. Growing sporadically in edge of both areas.
- L Oct. 1 Bida E 19 km north from Bida. Road-side ditch, 10 m × 20 m. Growing sporadically.
- L Oct. 1 Bida W 45 km north from Bida. Swamp, dia. 100 m. Growing thickly.
- L Oct. 1 Bida W 50 km north from Bida. Swamp, 100 m × 100 m. Growing sporadically.
- W41** L Oct. 1 Wushishi E,W 15 km south from Wushishi. Swampy areas, jointing old and new roads, 100 m × 200 m (W), 50 m × 150 m triangle (W) and waste land (E). Growing thickly in edge (W), sporadically in the whole (W) and a few plants (E).
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- W42** L Oct. 1 Wushishi W 31 km north from Wushishi. Swamp, 200 m × 300 m. Growing thickly only in east side edge.
- L Oct. 1 Wushishi E 42 km north from Wushishi. Road-side ditch, 10 m × 50 m. Growing only a few plants.
- L Oct. 1 Kontagora N 5 km east from Kontagora. Growing sporadically in edge of paddy field, *O. sativa*.
- W43** L Oct. 2 Bin Yauri E 12 km north from Bin Yauri. Growing sporadically in west side edge and in central region of paddy field, *O. glaberrima*. Cultivating sorghum in east field.
- W44** B Oct. 2 Bin Yauri E 12 km north from Bin Yauri. Growing only 2 plants in edge of paddy field, *O. glaberrima*, allopatrically with **W43**, *O. longistaminata*.
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- L Oct. 2 Bin Yauri E 16 km north from Bin Yauri. Road-side ditch, 5 m × 50 m. Growing sporadically.
- B Oct. 2 Bin Yauri E 19 km north from Bin Yauri. Paddy field, *O. glaberrima*. Only 1 plant.
- W45** L Oct. 2 Bin Yauri E 35 km north from Bin Yauri. Near Yelwa. Pond, 5 m × 10 m, growing a few plants. A joint of old and new roads, neighbouring paddy field of *O. glaberrima*.
- B Oct. 2 Bin Yauri E 35 km north from Bin Yauri. Near Yelwa. Paddy field of *O. glaberrima*, 50 m north of **W45**, *O. longistaminata*. Only post-maturing stage.
- L Oct. 2 Koko E 27 km south from Koko. Swampy area, dia. 50 m, growing *O. longistaminata*, *O. sativa* and *O. glaberrima*.
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- L Oct. 2 Koko E 24 km south from Koko. Swampy area, dia. 50 m, growing *O. longistaminata*, *O. sativa* and *O. glaberrima*.
- L Oct. 2 Koko E 21 km south from Koko. Swampy area, 200 m × 200 m. Growing thickly.
- L Oct. 2 Koko W 14 km south from Koko. Pond, 50 m × 50 m. Growing only in edge.
- B Oct. 2 Koko W 9 km south from Koko. Growing in paddy field, 50 m × 100 m. Sporadically.
- L Oct. 2 Koko E,W 6 km south from Koko. Growing in edge of paddy fields, *O. sativa* and/or *O. glaberrima*.
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- L Oct. 2 Koko E,W 5 km south from Koko. Growing in edge of paddy fields, *O. sativa* and/or *O. glaberrima*.
- L Oct. 2 Koko E 10 km north from Koko. Growing in small pond, 10 m × 50 m, sporadically.
- W46** L Oct. 2 Koko E,W 29 km north from Koko. Growing in river side and small pool, dia. 20 m (E). Growing edge of swampy area, dia. 200 m, separated by waste grass land, 100 m width, from road, and by upland field, cultivating pearl millet (W). Both areas located 2 m lower from the road.
- W47** B Oct. 2 Koko W 29 km north from Koko. Swampy area, dia. 200 m,

- separated by waste grass land, 100 m width, from the road, and by upland field cultivating pearl millet. Growing a few plants, allopatrically with **W46**, *O. longistaminata*.
- **L** Oct. 2 Koko *E,W* 34 km north from Koko. Road-side ditch, 20 m × 50 m (*E*), small pool, dia. 50 m (*W*). Growing sporadically.
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- **L** Oct. 2 Koko *E* 44 km north from Koko. Riverbed, growing sporadically with *O. glaberrima* and *O. breviligulata*.
- **B** Oct. 2 Koko *E* 44 km north from Koko. Riverbed, growing sporadically with *O. glaberrima* and *O. longistaminata*.
- **L** Oct. 2 Jega *E,W* 5 km south from Jega. Riverbed, growing sporadically with *O. glaberrima* and *O. breviligulata*.
- **B** Oct. 2 Jega *E,W* 5 km south from Jega. Riverbed, growing a few plants with *O. glaberrima* and *O. longistaminata*.
- **L** Oct. 2 Jega *N* 9 km west from Jega. Road-side ditch. Growing a few plants.
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- **L** Oct. 3 Birnin Kebbi *E* 5 km south from Birnin Kebbi. Pond, dia. 100 m, red soil. Growing sporadically.
- W48** **L** Oct. 3 Bunza *N,S* 5 km northeast of Bunza. Swamp, very large. Growing thickly in southern edge and along the river, sailing boat of pearl millet (*N*). Large swampy areas. Growing sporadically in the northern edge, using fishing net (*S*).
- W49** **L** Oct. 3 Yarma *W* 13 km south from Yarma. Pond, 100 m × 100 m. Growing sporadically in edge of pond and neighbouring of sorghum field.
- W50** **B** Oct. 3 Yarma *W* 13 km south from Yarma. Pond, 100 m × 100 m. Growing a few plants, neighbouring **W49**, *O. longistaminata*.
- W51** **B** Oct. 3 Zaga *B* 2 km northwest from Zaga. Paddy field, 100 m × 200 m, *O. sativa* and *O. glaberrima*. Growing a few plants in edge. Near police box.
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- W52** **L** Oct. 3 Kende *N,S* In Kende Town. Swamp, very large. Growing sporadically in only edge, and along the river.
- W53** **B** Oct. 3 Kende *S* In Kende Town. Swamp, very large. Growing a few plants. Same habitat of **W52**, *O. longistaminata*, but only along the river.
- **B** Oct. 3 Koko *S* 13 km northwest of Koko. Paddy field of *O. glaberrima*. Growing in the whole areas.
- **L** Oct. 3 Koko *S* 1 km northwest of Koko. Riverbed. Growing sporadically in the whole areas.
- W54** **L** Oct. 4 Birnin Kebbi *E* 30 km northeast of Birnin Kebbi. L-shaped swamp, 1,500 m × 400 m. Growing only edge, shallow water, near river, surrounded by upland field.
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- W55** **L** Oct. 4 Argungu *N,S* 40 km northeast from Argungu, 1 km southwest from Sainyiana. Pond, 100 m × 300 m, growing lotus in the central region. Paddy field of *O. sativa* (*N*). Pond, 100 m × 500 m, having small island in the central region, cultivating *O. sativa* and pearl millet (*S*). Growing thickly and sporadically in the edge. Shallow and relatively deep water level.
- W56** **B** Oct. 4 Argungu *S* 40 km northeast from Argungu, and 1 km southwest from Sainyiana. Pond, 100 m × 500 m, having small island in the central region, cultivating *O. sativa* and pearl millet. Growing sporadically in edge and boundary of pond and upland fields, cultivating sorghum and pearl millet.
- W57** **L** Oct. 4 Sokoto *W* 18 km north from Sokoto. Swamp, 200 m × 100 m. Partially (west side) growing *O. glaberrima*. Growing sporadically in edge. Pool, 10 m × 20 m, surrounded by a barbwire fence. Both of them, surrounded by sorghum and pearl millet fields.
- W58** **L** Oct. 4 Sokoto *E,W* 24 km north from Sokoto. Swampy area and small pool (*W*). Swampy area surrounded by sorghum field in north side, by paddy field of *O. sativa* and *O. glaberrima* in north side, and swamp, 1 km × 200 m (*E*). Growing sporadically.
- W59** **B** Oct. 4 Sokoto *E,W* 15 km north from Sokoto. Swampy area, 10 m × 50 m (*W*). Swampy area surrounded by sorghum field in south side, by paddy fields of *O. sativa* and *O. glaberrima* in north side (*E*). Growing a few plants. Growing allopatrically with **W58**, *O. longistaminata*.

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- W60** L Oct. 5 Rabah W 8 km northwest from Rabah. Upland rice fields, *O. sativa* and *O. glaberrima*, 20 m × 30 m, and 20 m × 50 m, surrounded by sorghum field in north and south sides, and neighbouring with living houses. Growing only in edge.
- W61** B Oct. 5 Rabah W 8 km northwest from Rabah. Upland rice field of *O. sativa* and *O. glaberrima*, 20 m × 50 m, surrounded by sorghum field in south side. Growing sporadically in edge, and allopatrically with **W60**, *O. longistaminata*.
- L Oct. 5 Rabah W 4 km northwest from Rabah. Paddy field of *O. sativa*. Growing sporadically in edge.
- L Oct. 5 Rabah W 3 km northwest from Rabah. Road-side ditch, 5 m × 20 m. Growing only a few plants.
- W62** L Oct. 5 Rabah N,S Just west of Rabah. A joint of old and new roads. In swampy area, 500 m × 2 km, constituted by pond in west side, paddy fields, *O. sativa* and *O. glaberrima* in central and only weedy grasses in east side (S). Growing only a few plants in edge. Pond, 200 m × 500 m, growing lotus in central, paddy field of *O. sativa* and *O. glaberrima*, in central regions, neighbouring by sorghum and beans fields in east and west sides, and deep swamp in north side (N). Growing sporadically in edge.
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- W63** B Oct. 5 Rabah N Just west of Rabah. Pond, 200 m × 500 m, growing lotus in central, paddy fields of *O. sativa* and *O. glaberrima* in central regions, neighbouring by sorghum and beans fields in east and west sides, and deep swamp in north side. Growing sporadically in edge of western half pond.
- W64** L Oct. 5 Wurno S 0.1 km west from Wurno Port. Just facing road of the basin. Waste land, 100 m × 1 km, dominant of *Miscanthus* sp. Growing only a few plants in west and east edges, neighbouring by sorghum fields.
- W65** L Oct. 5 Wurno W 6 km north from Wurno Town. Paddy field, *O. glaberrima* and *O. sativa*, and irrigation canal. Growing only a few plants in their edges.
- W66** B Oct. 5 Wurno W 6 km north from Wurno Town. Paddy field of *O. glaberrima* and *O. sativa*. Growing only a few plants in edge.
- W67** B Oct. 5 Goronyo W 16 km southwest from Goronyo. Dried-up waste land, 100 m × 20 m. Growing sporadically in the whole areas with tall trees.
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- W68** B Oct. 5 Goronyo E 16 km southwest from Goronyo. Dried up waste land, 10 m × 30 m. Growing sporadically in the whole areas. Main road interposed between the two localities of **W67** and **W68**.
- W69** L Oct. 5 Goronyo E,W 8 km southwest from Goronyo. Pond, 10 m × 50 m (W), pond, 1 m × 2 m (E). Growing a few plants.
- W70** B Oct. 5 Goronyo E 8 km southwest from Goronyo. Paddy field of *O. glaberrima*. Growing only in edge, neighbouring small pool of **W69**, *O. longistaminata*.
- B Oct. 5 Goronyo E 6 km southwest from Goronyo. Paddy field of *O. glaberrima*. Growing only a few plants.
- B Oct. 5 Goronyo E 4 km southwest from Goronyo. Paddy field of *O. glaberrima*. Growing only a few plants.
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- W71** L Oct. 6 Tureta S 23 km northwest from a joint of Tureta. Large pond, 100 m × 300 m. Growing a few plants in northwest side. Damaged by fungi severely.
- W72** B Oct. 6 Tureta N,S 23 km northwest from a joint of Tureta. Large pond, 100 m × 200 m (N) and 100 m × 300 m (S). Growing sporadically in edge.
- B Oct. 6 Tureta S 17 km northwest from a joint of Tureta. Road-side ditch, 10 m × 20 m. Growing thickly.
- B Oct. 6 Tureta N,S 11 km northwest from a joint of Tureta. Road-side ditch, 5 m × 10 m (N) and 10 m × 100 m (S). Growing sporadically.
- B Oct. 6 Tureta S 9 km northwest from a joint of Tureta. Waste land, 50 m × 20 m. Growing sporadically.
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- B Oct. 6 Tureta N 6 km northwest from a joint of Tureta. Pond, dia. 10 m. Growing a few plants.
- B Oct. 6 Tureta N 5 km northwest from a joint of Tureta. Paddy field of *O. glaberrima*, dia. 50 m. Growing a few plants.
- W73** L Oct. 6 Talata Mafara S 8 km northwest from Talata Mafara. Pond, 200 m ×

500 m. Water only in central region. Cultivating *O. glaberrima* in edge. Growing in edge. Surrounded by sorghum, beans in east side, shallow water of *O. sativa* in south side, and sorghum in west side.

- W74** **B** Oct. 6 Talata Mafara S 8 km northwest from Talata Mafara. Pond, 200 m × 500 m. Water only in central region. Cultivating *O. glaberrima* in edge. Growing only in east side edge.
- W75** **L** Oct. 6 Talata Mafara S 4 km southeast from Talata Mafara. Paddy field of *O. sativa* and *O. glaberrima*, 100 m × 200 m, surrounded by sorghum and beans fields in east and south sides. Separated by baobab trees from small river in west side. Growing in central region and edge, partially sympatrically with **W76**, *O. breviligulata*.
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- W76** **B** Oct. 6 Talata Mafara S 4 km southeast from Talata Mafara. Paddy fields of *O. sativa* and *O. glaberrima*, 100 m × 200 m, surrounded by sorghum and beans fields in east and south sides. Separated by baobab trees from small river in west side. Growing only in edge, partially sympatrically with **W75**, *O. longistaminata*.
- **B** Oct. 6 Talata Mafara N 7 km southeast from Talata Mafara. Waste land, 10 m × 50 m. Growing a few plants.
 - **B** Oct. 6 Talata Mafara N 8 km southeast from Talata Mafara. Near demonstration plant field of the government. Pool, dia. 50 m, and waste land, 10 m × 50 m. Growing sporadically.
 - **B** Oct. 6 Talata Mafara S 18 km southeast from Talata Mafara. Waste land, 10 m × 20 m. Growing a few plants.
 - **B** Oct. 6 Talata Mafara S 19 km southeast from Talata Mafara. Pool, dia. 2m. Growing a few plants.
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- **B** Oct. 6 Talata Mafara S 20 km southeast from Talata Mafara. Waste land, 2 m × 5 m. Growing thickly.
 - **B** Oct. 6 Malinchi S 12 km northwest from Malinchi. Pool, dia. 10 m, and 20 m × 20 m. Growing with *O. glaberrima* in edge.
 - **B** Oct. 6 Malinchi S 7 km northwest from Malinchi. Paddy fields of *O. glaberrima*, 20 m × 50 m, and 10 m × 10 m. Only in edge.
 - **B** Oct. 6 Malinchi S 6 km northwest from Malinchi. Paddy fields of *O. glaberrima*, 10 m × 30 m. Growing only 3 plants.
 - **B** Oct. 6 Malinchi S 3 km northwest from Malinchi. Waste land, 5 m × 5 m. Only a few plants.
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- **B** Oct. 6 Malinchi S Just entrance of Malinchi. Waste land, 10 m × 10 m. Growing thickly.
 - **B** Oct. 6 Maru S 5 km southeast from Maru. Pool, 20 m × 50 m. Growing in edge.
 - **B** Oct. 6 Maru S 6 km southeast from Maru. Waste land, 20 m × 5 m. Growing sporadically.
 - **B** Oct. 6 Maru S 11 km southeast from Maru. Waste land, 10 m × 20 m. Growing only a few plants.
 - **B** Oct. 6 Maru N 22 km southeast from Maru. Paddy field of *O. glaberrima*. Growing in edge.
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- **B** Oct. 6 Funtua N 14 km northwest from Funtua. Waste land, 20 m × 50 m. Growing in the whole area.
 - **B** Oct. 6 Funtua N 9 km northwest from Funtua. Waste land, dia. 50 m. Growing a few plants.
 - **B** Oct. 6 Funtua S 6 km northwest from Funtua. Paddy fields of *O. glaberrima*. A few plants in only edge.
 - **B** Oct. 6 Funtua N 5 km northwest from Funtua. Waste land, 20 m × 50 m. Growing thickly.
 - **B** Oct. 6 Funtua S Just entrance of Funtua. Waste land near a dumping ground, 10 m × 30 m. Growing sporadically.
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- **B** Oct. 6 Funtua S 15 km southeast from Funtua. Waste land, 20 m × 30 m, fenced thickly. Growing sporadically.

- **L,B** Oct. 6 Funtua S 22 km southeast from Funtua. Waste land, 5 m × 5 m (**B**), stream, 3 m width (**L**). Growing sporadically in the respective edges.
- **B** Oct. 6 Funtua N 23 km southeast from Funtua. Paddy fields of *O. glaberrima*, 10 m × 20 m, and 10 m × 20 m. Growing sporadically in the whole areas.
- **L** Oct. 6 Funtua S 24 km southeast from Funtua. Pond, 20 m × 50 m. Growing in edge of southwest side.
- W77** **L** Oct. 6 Funtua N 72 km southeast from Funtua. Lotus pond, 30 m × 100 m, gourd-shaped. Surrounded by roads in west and south sides, and by sorghum fields in north and east sides. Growing sporadically in edge.
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- **L** Oct. 6 Funtua S 77 km southeast from Funtua. Road-side ditch, 10 m × 20 m. Growing sporadically.
- **B** Oct. 6 Funtua S 78 km southeast from Funtua. Waste land, dia. 100 m. Growing sporadically.
- **L** Oct. 6 Zaria S 83 km northwest from Zaria. River, 10 m width. Growing sporadically in only edge.
- **L** Oct. 6 Zaria N 77 km northwest from Zaria. Large pond, dia. 1 km. Growing only in edge, but thickly.
- **L** Oct. 6 Zaria S 61 km northwest from Zaria. Ponds, 2 plots of 50 m × 100 m. Growing thickly in edge.
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- W78** **L** Oct. 7 Zaria N,S 5 km southeast from Zaria. Road-side ditches, 10 m × 100 m. Growing thickly in separated plots. Sorghum fields neighbouring in north and south sides.
- **L** Oct. 7 Zaria S 6 km southeast from Zaria. Pond, 20 m × 100 m. Growing thickly.
- **L** Oct. 7 Zaria S 7 km southeast from Zaria. Pond, 10 m × 100 m. Growing sporadically.
- **L** Oct. 7 Zaria N,S 10 km southeast from Zaria. Ponds, dia. 200 m. Growing sporadically only in edge.
- **L** Oct. 7 Zaria S 11 km southeast from Zaria. Pond, dia. 100 m. Growing in edge.
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- **L** Oct. 7 Zaria N,S 20 km southeast from Zaria. Swamp, dia. 100 m. Growing sporadically in the whole areas.
- **L** Oct. 7 Zaria N 21 km southeast from Zaria. Road-side ditch, 20 m × 50 m. Growing in the whole areas.
- **L** Oct. 7 Soba N,S 19 km northwest from Soba. Near Agricultural Development Project (ADP). Ponds, dia. 100 m. Growing in the central region.
- **L** Oct. 7 Soba S 14 km northwest from Soba. Stream, 2 m width. Growing in edge.
- **L** Oct. 7 Soba S Just entrance of Soba. Stream, 5 m width. Growing in edge.
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- **L** Oct. 7 Soba S 8 km southeast from Soba. Pond, dia. 50 m. Growing thickly in edge.
- **L** Oct. 7 Raha S 8 km southeast from Raha. Swamp, dia. 100 m. Growing sporadically, but in the whole areas.
- **L** Oct. 7 Raha S 10 km southeast from Raha. Small stream. Growing only in edge.
- **L** Oct. 7 Raha N 15 km southeast from Raha. Road-side ditch, 10 m width. Growing sporadically.
- W79** **L** Oct. 7 Pambeguwa N,S 17 km northwest from a joint of Pambeguwa. Grass land near stream, connecting swamps (*N*). Swamp, irregular shaped, 400 m × 300 m, having lotus pond in their central region (*S*). Growing thickly or sporadically in the respective areas. Surrounded by sorghum fields in south and east sides, millet, cassava fields in west side.
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- W80** **B** Oct. 7 Jengle S 1 km southeast from Jengle. Swamp, 100 m × 200 m. Cultivating *O. glaberrima* in edge. Growing in edge and shallow portion in central region. A

			barbwire fence across the pond.	
–	L	Oct. 8	Makurdi	W Just suburbs of Makurdi. Paddy field of <i>O. glaberrima</i> . Growing in edge.
W81	L	Oct. 8	Makurdi	S 1 km east from entrance of Makurdi. Swamp, 50 m × 100 m, and neighbouring paddy field of <i>O. sativa</i> in east and grass land in west. Interposed road and ditch between them. Growing sporadically.
–	L	Oct. 8	Makurdi	S 5 km east from entrance of Makurdi. Pond, dia. 20 m. Growing sporadically.
–	L	Oct. 8	Makurdi	S 10 km east from entrance of Makurdi. Small stream. Growing in edge.

W82	L	Oct. 8	Makurdi	S 22 km east from entrance of Makurdi. Paddy fields of <i>O. sativa</i> , inserted by stream between them. Very near of Benue River. Growing sporadically only in edge of north side.
–	L	Oct. 8	Makurdi	S 25 km east from entrance of Makurdi. 2 km east of Abinsi. Paddy field of <i>O. sativa</i> , dia. 50 m. Growing in edge.

Some morphological characters of unhusked grains

Thirty-four strains of *O. longistaminata* and 24 strains of *O. breviligulata* were collected on these trips, and they were used for morphological investigations of unhusked grains. However, grains of 1 of the former and 3 of the latter species were wholly immature and inadequate to be used for the measurement. Five to 30 grains were used for the measurement of each strain. Measurements were done in length, width and thickness of grains, and done at the most eminent section of the respective characters. Calculations were done for the ratios of length to width, of length to thickness, and of width to thickness. The whole data referring to the six characters were illustrated by the average value in the whole grains.

The whole strains of both of the species were divided into two groups, *i.e.*, Group A --- strains collected in 1984, and Group B --- strains collected in 1985, in aim of future analyses.

I. *Oryza longistaminata*

1. Lengths

Group A: The results are given in Table 3. Lengths for the individual grain level ranged from 11.75 mm (strain No.36) to 7.75 mm (No.27). In the strain level, the longest (10.19 mm) was obtained in No.36. It was noticeable that No.36 showed very large value. The shortest (8.44 mm) was noted in No.26. It was also noticeable that No.26 showed very small value. Average and its standard deviations through the whole strains were found to be 9.30 ± 0.81 . In the standard deviations of each strain, *i.e.*, showing intra-population's variations, the largest (0.70) was obtained in No.35. The smallest (0.24) was noted in No.26. Average and its standard deviations in the whole strains were found to be 0.56 ± 0.19 .

Group B: Lengths for the individual grain level ranged from 10.30 mm (No.75) to 7.15 mm (No.46). In the strain level, the longest (9.79 mm) was obtained in No.75, followed by No.69 (9.73 mm) and No.73 (8.59 mm). The shortest (7.99 mm) was noted in

Table 3. Six morphological characters of unhusked grains; *O. longistaminata*, W25 ~ W36 in 1984 and W37 ~ W82 in 1985 illustrated in this table

Strain No.	Length (mm)	Width (mm)	Thickness (mm)	L/W	L/T	W/T
25	—	—	—	—	—	—
26	8.44±0.24	2.58±0.11	1.77±0.08	3.27±0.17	4.79±0.22	1.46±0.07
27	8.56±0.69	2.51±0.13	1.71±0.07	3.44±0.43	5.03±0.54	1.47±0.08
35	10.02±0.70	2.99±0.17	1.87±0.12	3.35±0.23	5.37±0.37	1.61±0.10
36	10.19±0.60	3.15±0.18	1.94±0.17	3.24±0.23	5.27±0.47	1.63±0.10
37	9.53±0.33	2.58±0.05	1.78±0.04	3.70±0.17	5.36±0.28	1.45±0.03
38	8.32±0.24	2.31±0.12	1.56±0.10	3.61±0.17	5.35±0.21	1.48±0.07
39	8.76±0.26	2.69±0.10	1.66±0.06	3.26±0.10	5.28±0.23	1.62±0.06
40	8.12±0.18	2.23±0.02	1.72±0.05	3.64±0.09	4.73±0.20	1.30±0.05
41	8.45±0.22	2.52±0.17	1.60±0.06	3.37±0.24	5.28±0.12	1.58±0.12
42	8.19±0.19	2.39±0.09	1.75±0.07	3.43±0.07	4.69±0.22	1.37±0.09
43	7.99±0.15	2.38±0.08	1.73±0.11	3.36±0.13	4.64±0.36	1.38±0.12
45	8.25±0.29	2.51±0.11	1.76±0.07	3.29±0.17	4.69±0.18	1.43±0.07
46	7.99±0.76	2.44±0.12	1.48±0.09	3.28±0.29	5.43±0.70	1.66±0.17
48	8.98±0.39	2.66±0.07	1.76±0.07	3.38±0.16	5.11±0.22	1.51±0.06
49	8.22±0.19	2.33±0.09	1.75±0.05	3.53±0.14	4.70±0.19	1.33±0.08
52	8.64±0.25	2.70±0.06	1.52±0.12	3.20±0.13	5.71±0.43	1.79±0.18
54	9.72±0.21	2.48±0.04	1.52±0.09	3.92±0.13	6.42±0.41	1.64±0.11
55	8.13±0.26	2.55±0.14	1.73±0.05	3.19±0.13	4.70±0.04	1.47±0.05
57	8.41±0.04	2.60±0.07	1.75±0.03	3.24±0.09	4.81±0.09	1.49±0.04
58	8.24±0.22	2.33±0.08	1.76±0.06	3.54±0.16	4.69±0.14	1.33±0.06
60	8.32±0.33	2.37±0.08	1.72±0.04	3.51±0.15	4.84±0.12	1.38±0.06
62	8.51±0.46	2.34±0.07	1.62±0.06	3.64±0.24	5.27±0.42	1.45±0.06
64	8.46±0.10	2.25±0.13	1.67±0.05	3.77±0.22	5.07±0.21	1.35±0.10
65	9.01±0.38	2.53±0.05	1.72±0.02	3.57±0.20	5.24±0.29	1.47±0.03
69	9.73±0.20	2.51±0.04	1.68±0.07	3.88±0.12	5.80±0.18	1.50±0.07
71	8.12±0.15	2.46±0.16	1.65±0.08	3.31±0.16	4.94±0.33	1.50±0.15
73	8.59±0.20	2.30±0.06	1.59±0.04	3.74±0.09	5.41±0.20	1.45±0.04
75	9.79±0.30	2.44±0.14	1.67±0.05	4.03±0.26	5.87±0.20	1.46±0.05
77	9.58±0.23	2.18±0.07	1.62±0.05	4.40±0.16	5.92±0.16	1.35±0.02
78	9.43±0.25	2.34±0.09	1.62±0.05	4.04±0.19	5.38±0.19	1.45±0.07
79	8.37±0.22	2.74±0.02	1.77±0.02	3.06±0.07	4.73±0.13	1.55±0.02
81	9.51±0.21	2.40±0.06	1.69±0.05	3.96±0.09	5.63±0.21	1.42±0.03
82	8.67±0.14	2.34±0.08	1.67±0.04	3.71±0.19	5.19±0.12	1.40±0.07

Nos.43 and 46, followed by Nos.40 and 71 (8.12 mm). Average and its standard deviations through the whole strains were found to be 8.69 ± 0.58 . In the standard deviations of each strain, the largest (0.76) was obtained in No.46, followed by No.62 (0.46) and No.48 (0.39). The smallest (0.04) was noted in No.57, followed by No.64 (0.10) and No.82 (0.14). Average and its standard deviations in the whole strains were found to be 0.25 ± 0.13 .

Whole: Average and its standard deviations through the whole strains of both of the groups (= 33) were found to be 8.77 ± 0.64 . Standard deviations of each strain were found to be 0.29 ± 0.17 .

2. Widths

Group A: Widths for the individual grain level ranged from 3.60 mm (No.36), which was the same as in case of the length, to 2.25 mm (No.27), which was also the same as in case of the length. In the strain level, the widest (3.15 mm) was obtained in No.36, which was the same as in case of the length. The narrowest (2.51 mm) was noted in No.27. Average and its standard deviations through the whole strains were found to be 2.81 ± 0.27 . In the standard deviations of each strain, the largest (0.18) was obtained in No.36. The smallest (0.11) was noted in No.26, which was the same as in case of the length. Average and its standard deviations in the whole strains were found to be 0.15 ± 0.03 .

Group B: Widths for the individual grain level ranged from 2.80 mm (Nos.39 and 52) to 2.05 mm (No.77). In the strain level, the widest (2.74 mm) was obtained in No.79, followed by No.52 (2.70 mm) and No.39 (2.69 mm). The narrowest (2.18 mm) was noted in No.77, followed by No.40 (2.23 mm) and No.64 (2.25 mm). Average and its standard deviations through the whole strains were found to be 2.45 ± 0.14 . In the standard deviations of each strain, the largest (0.17) was obtained in No.41, followed by No.71 (0.16) and Nos.55 and 75 (0.14). The smallest (0.02) was noted in Nos.40 and 79, followed by Nos.54 and 69 (0.04). Average and its standard deviations in the whole strains were found to be 0.09 ± 0.04 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 2.49 ± 0.20 . Standard deviations of each strain were found to be 0.09 ± 0.04 .

3. Thicknesses

Group A: Thicknesses for the individual grain level ranged from 2.55 mm (No.36), which was the same as in cases of the length and width, to 1.60 mm (Nos.26 and 27). In the strain level, the thickest (1.94 mm) was obtained in No.36, which was the same as in cases of the length and width. The thinnest (1.71 mm) was noted in No.27, which was the same as in case of the width. Average and its standard deviations through the whole strains were found to be 1.82 ± 0.09 . In the standard deviations of each strain, the largest (0.17) was obtained in No.36, which was the same as in case of width. The smallest (0.07) was noted in No.27. Average and its standard deviations in the whole strains were found to be 0.11 ± 0.04 .

Group B: Thicknesses for the individual grain level ranged from 1.85 mm (Nos.37, 42, 43, 45, 48 and 58) to 1.35 mm (No.52). In the strain level, the thickest (1.78 mm) was obtained in No.37, followed by No.79 (1.77 mm) and Nos.45, 48 and 58 (1.76 mm). The thinnest (1.48 mm) was noted in No.46, followed by Nos.52 and 54 (1.52 mm). Average and its standard deviations through the whole strains were found to be 1.67 ± 0.08 . In the standard deviations of each strain, the largest (0.12) was obtained in No.52, followed by No.43 (0.11) and No.38 (No.10). The smallest (0.02) was noted in Nos.65 and 79, followed by No.57 (0.03). Average and its standard deviations in the whole strains were found to be 0.06 ± 0.03 .

Whole: Average and its standard deviations through the whole strains of both of the

groups were found to be 1.69 ± 0.10 . Standard deviations of each strain were found to be 0.06 ± 0.03 .

4. Ratios of length to width

Group A: Ratios of length to width (abbreviated as L/W) for the individual grain level ranged from 3.93 (No.35) to 2.83 (No.36). In strain level, the largest (3.44) was obtained in No.27. The smallest (3.24) was noted in No.36. Average and its standard deviations through the whole strains were found to be 3.33 ± 0.08 . In the standard deviations of each strain, the largest (0.43) was obtained in No.27. The smallest (0.17) was noted in No.26, which was the same as in cases of the length and width. Average and its standard deviations in the whole strains were found to be 0.27 ± 0.10 .

Group B: L/W for the individual grain level ranged from 4.66 (No.77) to 2.86 (No.46), which was the same as in case of the length. In the strain level, the largest (4.40) was obtained in No.77, followed by No.78 (4.04) and No.75 (4.03). The smallest (3.06) was noted in No.79, followed by No.55 (3.19) and No.52 (3.20). Average and its standard deviations through the whole strains were found to be 3.57 ± 0.31 . In the standard deviations of each strain, the largest (0.29) was obtained in No.46, which was the same as in case of the length, followed by No.75 (0.26) and Nos.41 and 62 (0.24). The smallest (0.07) was noted in Nos.42 and 79, followed by Nos.57 and 81 (0.09). Average and its standard deviations in the whole strains were found to be 0.16 ± 0.06 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 3.54 ± 0.30 . Standard deviations of each strain were found to be 0.18 ± 0.07 .

5. Ratios of length to thickness

Group A: L/T for the individual grain level ranged from 6.41 (No.36), which was the same as in cases of the length, width and thickness, to 4.29 (No.36), which was the same as in case of the L/W. In the strain level, the largest (5.37) was obtained in No.35. The smallest (4.79) was noted in No.26, which was the same as in case of the length. Average and its standard deviations through the whole strains were found to be 5.12 ± 0.23 . In the standard deviations of each strain, the largest (0.54) was obtained in No.27, which was the same as in case of the L/W. The smallest (0.22) was noted in No.26, which was the same as in cases of the length, width and L/W. Average and its standard deviations in the whole strains were found to be 0.40 ± 0.12 .

Group B: L/T for the individual grain level ranged from 6.73 (No.54) to 4.22 (No.43). In the strain level, the largest (6.42) was obtained in No.54, followed by No.77 (5.92) and No.75 (5.87). The smallest (4.64) was noted in No.43, followed by Nos.42, 45 and 58 (4.69). Average and its standard deviations through the whole strains were found to be 5.22 ± 0.46 . In the standard deviations of each strain, the largest (0.70) was obtained in No.46, which was the same as in case of the length, followed by No.52 (0.43) and No.62 (0.42). The smallest (0.04) was noted in No.55, followed by No.57 (0.09) and Nos.41, 60 and 82 (0.12). Average and its standard deviations in the whole strains were found to be 0.23 ± 0.13 .

Whole: Average and its standard deviations through the whole strains of both of the

groups were found to be 5.21 ± 0.44 . Standard deviations of each strain were found to be 0.25 ± 0.14 .

6. Ratios of width to thickness

Group A: W/T for the individual grain level ranged from 1.79 (Nos.35 and 36) to 1.32 (No.27), which was the same as in cases of the length and width. In the strain level, the largest (1.63) was obtained in No.36, which was the same as in cases of the length, width and thickness. The smallest (1.46) was noted in No.26, which was the same as in cases of length and L/T. Average and its standard deviations through the whole strains were found to be 1.54 ± 0.08 . In the standard deviations of each strain, the largest (0.10) was obtained in No.36, which was the same as in cases of the length, width and thickness. The smallest (0.07) was noted in No.26, which was the same as in cases of the length, width, L/W and L/T. Average and its standard deviations in the whole strains were found to be 0.09 ± 0.01 .

Group B: W/T for the individual grain level ranged from 2.07 (No.52) to 1.20 (No.64). In the strain level, the largest (1.79) was obtained in No.52, followed by No.46 (1.66) and No.54 (1.64). The smallest (1.30) was noted in No.40, followed by Nos.49 and 58 (1.33). Average and its standard deviations through the whole strains were found to be 1.47 ± 0.11 . In the standard deviations of each strain, the largest (0.17) was obtained in No.46, which was the same as in cases of the length, L/W and L/T, followed by No.71 (0.15) and No.43 (0.12). The smallest (0.02) was noted in Nos.77 and 79, followed by Nos.37, 65 and 81 (0.03). Average and its standard deviations in the whole strains were found to be 0.07 ± 0.04 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 1.48 ± 0.11 . Standard deviations of each strain were found to be 0.08 ± 0.04 .

II. *Oryza breviligulata*

1. Lengths

Group A: The results are given in Table 4. Lengths for the individual grain level ranged from 10.50 mm (strain No.31) to 7.80 mm (No.29). In the strain level, the longest (9.60 mm) was obtained in No.31. It was noticeable that No.31 showed very large value. The shortest (9.03 mm) was noted in No.30. Average and its standard deviations through the whole strains were found to be 9.25 ± 0.23 . In the standard deviations of each strain, the largest (0.62) was obtained in No.29. The smallest (0.37) was noted in No.30. Average and its standard deviations in the whole strains were found to be 0.46 ± 0.10 .

Group B: Lengths for the individual grain level ranged from 11.30 mm (No.50) to 8.40 mm (No.47). In the strain level, the longest (10.69 mm) was obtained in No.50, followed by No.63 (10.34 mm) and No.68 (10.17 mm). The shortest (8.59 mm) was noted in No.47, followed by No.72 (8.76 mm) and No.53 (8.84 mm). Average and its standard deviations through the whole strains were found to be 9.44 ± 0.57 . In the standard deviations of each strain, the largest (0.39) was obtained in No.56, followed by No.61 (0.36) and No.44 (0.35). The smallest (0.13) was noted in No.67, followed by Nos.47 and 80

Table 4. Six morphological characters of unhusked grains; *O. breviligulata*, W28~W34 in 1984 and W44~W80 in 1985 illustrated in this table

Strain No.	Length (mm)	Width (mm)	Thickness (mm)	L/W	L/T	W/T
28	9.31±0.46	3.27±0.20	2.26±0.12	2.86±0.14	4.13±0.24	1.45±0.12
29	9.07±0.62	3.05±0.14	2.05±0.06	2.97±0.15	4.44±0.33	1.50±0.09
30	9.03±0.37	3.20±0.09	2.13±0.07	2.83±0.13	4.24±0.19	1.50±0.06
31	9.60±0.40	3.02±0.13	2.05±0.06	3.19±0.11	4.70±0.20	1.48±0.07
32	-	-	-	-	-	-
33	-	-	-	-	-	-
34	-	-	-	-	-	-

44	9.04±0.35	3.44±0.12	2.07±0.04	2.63±0.06	4.37±0.22	1.66±0.09
47	8.59±0.16	3.36±0.06	1.98±0.07	2.56±0.08	4.34±0.09	1.70±0.07
50	10.69±0.34	2.69±0.04	1.82±0.04	3.97±0.12	5.88±0.20	1.48±0.04
51	9.25±0.18	3.34±0.04	1.73±0.06	2.77±0.07	5.35±0.19	1.93±0.08
53	8.84±0.15	3.30±0.09	2.00±0.06	2.68±0.08	4.42±0.10	1.65±0.06
56	9.34±0.39	3.47±0.13	1.97±0.07	2.69±0.05	4.75±0.22	1.76±0.05
59	9.60±0.21	2.92±0.09	1.95±0.03	3.29±0.08	4.93±0.15	1.50±0.05
61	9.30±0.36	3.45±0.07	2.06±0.04	2.70±0.07	4.52±0.23	1.68±0.05
63	10.34±0.17	3.28±0.08	1.98±0.02	3.15±0.06	5.22±0.13	1.66±0.04
66	10.01±0.24	3.26±0.07	1.91±0.06	3.07±0.13	5.24±0.10	1.71±0.08
67	8.96±0.13	2.49±0.09	1.66±0.09	3.60±0.16	5.41±0.26	1.51±0.13
68	10.17±0.19	2.79±0.07	1.80±0.05	3.65±0.04	5.65±0.11	1.55±0.02
70	9.68±0.19	2.67±0.04	1.77±0.04	3.63±0.04	5.47±0.22	1.51±0.05
72	8.76±0.23	2.80±0.10	1.72±0.04	3.13±0.06	5.10±0.15	1.63±0.06
74	9.46±0.22	3.33±0.10	2.04±0.02	2.84±0.13	4.64±0.07	1.63±0.05
76	9.25±0.20	3.28±0.05	1.97±0.07	2.82±0.09	4.70±0.11	1.67±0.07
80	9.09±0.16	3.48±0.10	2.23±0.08	2.65±0.12	4.08±0.16	1.54±0.07

(0.16). Average and its standard deviations in the whole strains were found to be 0.23 ± 0.08 .

Whole: Average and its standard deviations through the whole strains of both of the groups (= 21) were found to be 9.40 ± 0.53 . Standard deviations of each strain were found to be 0.27 ± 0.12 .

2. Widths

Group A: Widths for the individual grain level ranged from 3.70 mm (No.28) to 2.70 mm (No.31). In the strain level, the widest (3.27 mm) was obtained in No.28. The narrowest (3.02 mm) was noted in No.31. Average and its standard deviations through the whole strains were found to be 3.14 ± 0.10 . In the standard deviations of each strain, the largest (0.20) was obtained in No.28. The smallest (0.09) was noted in No.30, which was the same as in case of the length. Average and its standard deviations in the whole strains were found to be 0.14 ± 0.04 .

Group B: Widths for the individual grain level ranged from 3.70 mm (No.56) to 2.35 mm (No.67). In the strain level, the widest (3.47 mm) was obtained in No.56, followed by No.61 (3.45 mm) and No.44 (3.44 mm). The narrowest (2.49 mm) was noted in No.67, followed by No.70 (2.67 mm) and No.50 (2.69 mm). Average and its standard deviations through the whole strains were found to be 3.14 ± 0.32 . In the standard devia-

tions of each strain, the largest (0.13) was obtained in No.56, which was the same as in case of the length, followed by No.44 (0.12). The smallest (0.04) was noted in Nos.50, 51 and 70. Average and its standard deviations in the whole strains were found to be 0.08 ± 0.03 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 3.14 ± 0.29 . Standard deviations of each strain were found to be 0.09 ± 0.04 .

3. Thicknesses

Group A: Thicknesses for the individual grain level ranged from 2.50 mm (No.28), which was the same as in case of the width, to 1.95 mm (Nos.29 and 31). In the strain level, the thickest (2.26 mm) was obtained in No.28, which was the same as in case of the width. The thinnest (1.05 mm) was noted in Nos.29 and 31. Average and its standard deviations through the whole strains were found to be 2.12 ± 0.09 . In the standard deviations of each strain, the largest (0.12) was obtained in No.28, which was the same as in case of the width. The smallest (0.06) was noted in Nos.29 and 31. Average and its standard deviations in the whole strains were found to be 0.08 ± 0.03 .

Group B: Thicknesses for the individual grain level ranged from 2.35 mm (No.80) to 1.55 mm (No.67), which was the same as in case of the width. In the strain level, the thickest (2.23 mm) was obtained in No.80, followed by No.44 (2.07 mm) and No.61 (2.06 mm). The thinnest (1.66 mm) was noted in No.67, which was the same as in case of the width, followed by No.72 (1.72 mm) and No.51 (1.73 mm). Average and its standard deviations through the whole strains were found to be 1.92 ± 0.15 . In the standard deviations of each strain, the largest (0.09) was obtained in No.67, followed by No.80 (0.08). The smallest (0.02) was noted in Nos.63 and 74, followed by No.59 (0.03). Average and its standard deviations in the whole strains were found to be 0.05 ± 0.02 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 1.96 ± 0.16 . Standard deviations of each strain were found to be 0.06 ± 0.02 .

4. Ratios of length to width

Group A: Ratios of length to width (abbreviated as L/W) for the individual grain level ranged from 3.43 (No.31), which was the same as in case of the length, to 2.59 (No.28). In the strain level, the largest (3.19) was obtained in No.31, which was the same as in case of the length. The smallest (2.83) was noted in No.30, which was the same as in case of the length. Average and its standard deviations through the whole strains were found to be 2.96 ± 0.14 . In the standard deviations of each strain, the largest (0.15) was obtained in No.29, which was the same as in case of the length. The smallest (0.11) was noted in No.31. Average and its standard deviations in the whole strains were found to be 0.13 ± 0.02 .

Group B: L/W for the individual grain level ranged from 3.83 (No.67) to 2.50 (No.47), which was the same as in case of the length. In the strain level, the largest (3.97) was obtained in No.50, which was the same as in case of the length, followed by No.68 (3.65) and No.70 (3.63). The smallest (2.56) was noted in No.47, which was the

same as in case of the length, followed by No.44 (2.63) and No.80 (2.65). Average and its standard deviations through the whole strains were found to be 3.05 ± 0.42 . In the standard deviations of each strain, the largest (0.16) was obtained in No.67, which was the same as in case of the thickness, followed by Nos.66 and 74 (0.13). The smallest (0.04) was noted in Nos.68 and 70, followed by No.56 (0.05). Average and its standard deviations in the whole strains were found to be 0.09 ± 0.03 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 3.03 ± 0.39 . Standard deviations of each strain were found to be 0.09 ± 0.04 .

5. Ratios of length to thickness

Group A: L/T for the individual grain level ranged from 5.05 (No.31), which was the same as in cases of the length and L/W, to 3.77 (No.28), which was the same as in case of the L/W. In the strain level, the largest (4.70) was obtained in No.31, which was the same as in cases of the length and L/W. The smallest (4.13) was noted in No.28. Average and its standard deviations through the whole strains were found to be 4.38 ± 0.22 . In the standard deviations of each strain, the largest (0.33) was obtained in No.29, which was the same as in cases of the length and L/W. The smallest (0.19) was noted in No.30, which was the same as in cases of the length and width. Average and its standard deviations in the whole strains were found to be 0.24 ± 0.06 .

Group B: L/T for the individual grain level ranged from 6.11 (No.50), which was the same as in case of the length, to 3.85 (No.80). In the strain level, the largest (5.88) was obtained in No.50, which was the same as in cases of the length and L/W, followed by No.68 (5.65) and No.67 (5.41). The smallest (4.08) was noted in No.80, followed by No.47 (4.34) and No.44 (4.37). Average and its standard deviations through the whole strains were found to be 4.95 ± 0.50 . In the standard deviations of each strain, the largest (0.26) was obtained in No.67, which was the same as in cases of thickness and L/W, followed by No.61 (0.23) and Nos.44, 56 and 70 (0.22). The smallest (0.07) was noted in No.74, followed by No.47 (0.09) and Nos.53 and 66 (0.10). Average and its standard deviations in the whole strains were found to be 0.16 ± 0.06 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 4.84 ± 0.51 . Standard deviations of each strain were found to be 0.18 ± 0.07 .

6. Ratios of width to thickness

Group A: W/T for the individual grain level ranged from 1.68 (No.28), which was the same as in cases of the width and thickness, to 1.22 (No.28), which was the same as in cases of the L/W and L/T. In the strain level, the largest (1.50) was obtained in Nos.29 and 30. The smallest (1.45) was noted in No.28, which was the same as in case of the L/T. Average and its standard deviations through the whole strains were found to be 1.48 ± 0.02 . In the standard deviations of each strain, the largest (0.12) was obtained in No.28, which was the same as in cases of the width and thickness. The smallest (0.06) was noted in No.30, which was the same as in cases of the length, width and L/T. Average and its standard deviations in the whole strains were found to be 0.09 ± 0.02 .

Group B: W/T for the individual grain level ranged from 2.03 (No.51) to 1.31 (No.67), which was the same as in cases of the width and thickness. In the strain level, the largest (1.93) was obtained in No.51, followed by No.56 (1.76) and No.66 (1.71). The smallest (1.50) was noted in No.59, followed by Nos.67 and 70 (1.51). Average and its standard deviations through the whole strains were found to be 1.62 ± 0.13 . In the standard deviations of each strain, the largest (0.13) was obtained in No.67, which was the same as in cases of thickness, L/W and L/T, followed by No.44 (0.09) and Nos.51 and 66 (0.08). The smallest (0.02) was noted in No.68, which was the same as in case of the L/W, followed by Nos.50 and 63 (0.04). Average and its standard deviations in the whole strains were found to be 0.06 ± 0.03 .

Whole: Average and its standard deviations through the whole strains of both of the groups were found to be 1.59 ± 0.13 . Standard deviations of each strain were found to be 0.06 ± 0.03 .

Summary

During the trips of November in 1984 and of October in 1985 in Nigeria, 58 strains of wild rice, *i.e.*, 34 of *Oryza longistaminata* CHEV. et ROEHR. and 24 strains of *Oryza breviligulata* CHEV. et ROEHR., were collected and many populations of them were observed. Their localities and habitats were reported in detail. Locality names are as follows; Zaria, Dikwa, Bida, Wushishi, Bin Yauri, Koko, Bunza, Yarma, Kende, Birnin Kebbi, Argungu, Sokoto, Rabah, Wurno, Goronyo, Tureta, Talata Mafara, Funtua, Pambeguwa, Makurdi, Chiramawa, Maiduguri, Zaga, Jengle.

Strains of both species were divided into two groups, *i.e.*, Group A --- strains collected in 1984, Group B --- strains collected in 1985. In case of *O. longistaminata*, lengths were found to be 9.30 mm, 8.69 mm and 8.77 mm in Group A, Group B and through the whole in average values, respectively. Widths were found to be 2.81 mm, 2.45 mm and 2.49 mm in the same order, respectively. Thicknesses were found to be 1.82 mm, 1.67 mm and 1.69 mm in the same order, respectively. Ratios of length to width were found to be 3.33, 3.57 and 3.54 in the same order, respectively. Ratios of length to thickness were found to be 5.12, 5.22 and 5.21 in the same order, respectively. Ratios of width to thickness were found to be 1.54, 1.47 and 1.48 in the same order, respectively. It may be noticeable that population of No.36, collected in pond near Dikwa, showed the large values in length, width and thickness.

In case of *O. breviligulata*, lengths were found to be 9.25 mm, 9.44 mm and 9.40 mm in the same order, respectively. Widths were found to be 3.14 mm, 3.14 mm and 3.14 mm in the same order, respectively. Thicknesses were found to be 2.12 mm, 1.92 mm and 1.96 mm in the same order, respectively. Ratios of length to width were found to be 2.96, 3.05 and 3.03 in the same order, respectively. Ratios of length to thickness were found to be 4.38, 4.95 and 4.84 in the same order, respectively. Ratios of width to thickness were found to be 1.48, 1.62 and 1.59 in the same order, respectively. It may be

noticeable that population of No.50, collected in pond near Yarma, showed the large values in length, ratios of length to width and of length to thickness.

In the analyses of the data obtained in the field survey, morphological and genetical characters, ecotypic and varietal differentiations may be discussed in the future.

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