

## Distribution and Some Morphological Characters of Wild Rice in Kenya

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### Introduction

During the periods in November in 1984 and from August to September in 1985, the writers have been sent to Kenya for a 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 Kenya were studied.

On the distribution of wild rice in Tanzania, some reports have already been published<sup>1,2)</sup>. Though Kenya has been considered to be one of the most important distribution areas of the 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 Kenya. In the present paper, the habitat and the record of the morphological characters of unhusked grains of wild rice were described. Judging from the route maps and seed characters measured, the localities collected and observed during these trips were thought to be insufficient and different from the whole Kenya.

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### Abstract of distribution and habitat of wild *Oryza* species

The localities concerned in these trips were southeastern part and western part of Kenya. Geographical distribution of wild rice found were briefly illustrated in Fig. 1. In

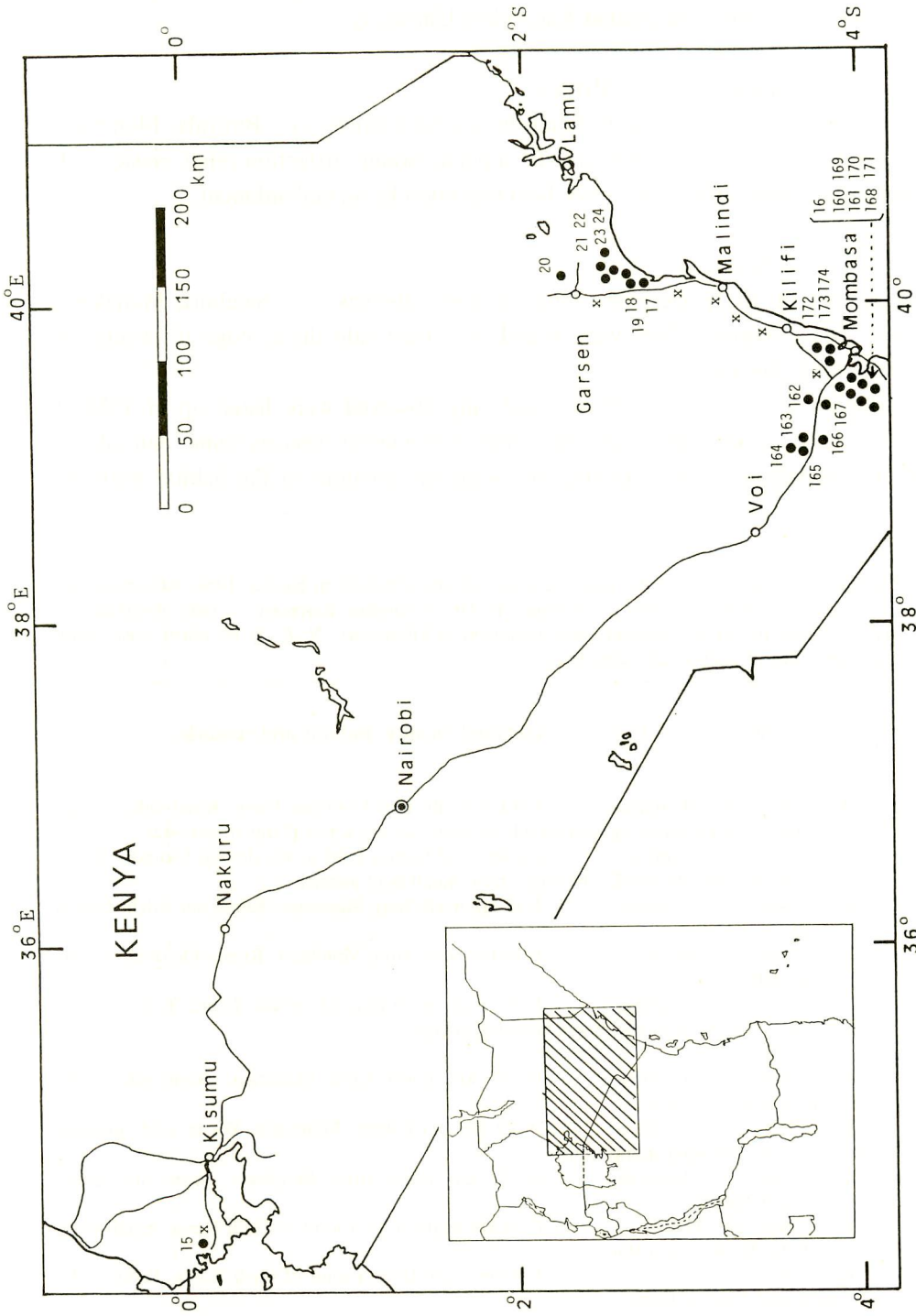


Fig. 1. Map showing several localities where the wild rice in Nigeria were collected and observed. Solid line; route of observation, filled circle; collection area, cross mark; growing area where the samples were observed but not collected, open circle; main town. Code-numbers used in the figure are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

this figure, route of the trip and the growing areas of the wild rice are given.

Most of the seed samples collected were carried back to Japan and their plant and grain characters are being analysed at Kagoshima University.

### I. *Oryza longistaminata* CHEV. et ROEHR.

Populations of the species were found in several districts. *i.e.*, Bunyala, Mombasa, Ngao, Saironi. They had a creeping growth in pond, swamp, irrigation canal, waste land. They were sometimes adjacent to a rice field separated by an embankment.

### II. *Oryza punctata* KOTSCHY

Populations of the species were found in many districts, *i.e.*, Samburi, Mariakani, Mombasa, Ngao, Saironi. They were found in a road-side ditch, edge of swamp or pond, waste land, low bush.

Distribution of wild rices collected and only observed were listed up in Table 1 (1984) and Table 2 (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 Kenya, 1984. Abbreviations: L; *Oryza longistaminata* CHEV. et ROEHR., P; *Oryza punctata* KOTSCHY, -; 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
W160	P	Nov. 14	Mombasa	E 9 km south from Mombasa Ferry. Road-side swampy area, 50 m × 150 m. Growing sporadically in west side and a few plants in east side.
W161	P	Nov. 14	Mombasa	S 2 km west from a joint to Kwale and Ukunda. Waste land, dia. 50 m, partially shaded by large trees. Small pool jointed.
-	P	Nov. 15	Mombasa	E 11 km north from Mombasa. Road-side ditch. Only a few plants.
-	P	Nov. 15	Mombasa	E 14 km north from Mombasa. Road-side ditch. Growing sporadically.
-	L	Nov. 15	Mombasa	E,W 15 km north from Mombasa. Pond, 50 m × 100 m and 100 m × 100 m, over the fence. Growing in edge.
-	P	Nov. 15	Mombasa	W 17 km north from Mombasa. Road-side ditch. Growing only a few plants.
-	L	Nov. 15	Mombasa	W 19 km north from Mombasa. Waste land, growing <i>Miscanthus</i> sp. Growing sporadically.
-	L	Nov. 15	Mombasa	W 20 km north from Mombasa. Road-side ditch. Growing sporadically.
-	L	Nov. 15	Gedi	E 14 km south from a joint of Gedi Ruins. Small pool, 5 m × 20 m. Rock in east side.
-	L	Nov. 15	Gedi	E 8 km south from a joint of Gedi Ruins. Paddy field, <i>O. sativa</i> , and burning fields.
-	L	Nov. 15	Gedi	E 6 km south from a joint of Gedi Ruins. Edge of paddy field, <i>O. sativa</i> .
-	P	Nov. 16	Mageras	E 4 km north from Mageras. Waste land, bottom be-

tween road and living house. Galingale dominant. Growing sporadically.

<b>W162</b>	<b>P</b>	Nov. 16	Mariakani	<i>N,S</i> 5 km east from Mariakani. Near railway. Waste lands, 20 m × 200 m ( <i>S</i> ), 10 m × 50 m ( <i>N</i> ). Growing thickly in edge.
-	<b>P</b>	Nov. 16	Mariakani	<i>S</i> 4 km east from Mariakani. Small pool, dia. 20 m. Growing a few plants.
-	<b>P</b>	Nov. 16	Mariakani	<i>S</i> 1 km east from Mariakani. Small pool, dia. 20 m. Growing a few plants.
-	<b>P</b>	Nov. 16	Mariakani	<i>S</i> 7 km west from Mariakani. Growing in edge of small stream, curved quickly.
-	<b>P</b>	Nov. 16	Mariakani	<i>N</i> 10 km west from Mariakani. Swamp, 100 m × 100 m, but relatively dry status. Growing only a few plants.
<b>W163</b>	<b>P</b>	Nov. 16	Mariakani	<i>N,S</i> 11 km west from Mariakani. Dried waste lands, 10 m × 100 m ( <i>S</i> ), 3 m × 10 m ( <i>N</i> ). Growing sporadically in the whole areas.
<b>W164</b>	<b>P</b>	Nov. 16	Samburi	<i>N,S</i> Just west entrance of Samburi. Dried waste land, 10 m × 30 m ( <i>N</i> ), pool, indefinite form about dia. 100 m ( <i>S</i> ), partially covered by bush trees. Growing sporadically in edge.

Table 2. Distribution and habitat of the wild rice collected and observed in Kenya, 1985. Abbreviations: **L**; *Oryza longistaminata* CHEV. et ROEHR., **P**; *Oryza punctata* KOTSCHY, -; only observed and no collection, m; meter or metres, 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
-	<b>L</b>	Sep. 16	Bunyala	<i>E</i> 2 km from office of Bunyala Irrigation Schemes. In irrigation canal. Growing sporadically.
<b>W15</b>	<b>L</b>	Sep. 16	Bunyala	- Bunyala Irrigation Schemes. In irrigation canal, 5 m width. Growing sporadically.
<b>W165</b>	<b>P</b>	Sep. 20	Samburi	<i>N,S</i> Just west entrance of Samburi. Dried waste lands, 10 m × 30 m ( <i>N</i> ), pool, indefinite form about dia. 100 m and dia. 5 m ( <i>S</i> ), partially covered by low bush. Growing sporadically in edge, but crowded in small concave.
<b>W166</b>	<b>P</b>	Sep. 20	Mariakani	<i>N,S</i> 11 km west from Mariakani. Dried waste lands, 10 m × 100 m and 10 m × 10 m ( <i>S</i> ); 3 m × 10 m ( <i>N</i> ). Paddy field and near pond, 50 m × 10 m ( <i>N</i> ). Growing sporadically in the whole areas.
-	<b>P</b>	Sep. 20	Mariakani	<i>N</i> 10 km west from Mariakani. Swamp, 100 m × 100 m, but relatively dry feature. Growing a few plants.
-	<b>P</b>	Sep. 20	Mariakani	<i>S</i> 7 km west from Mariakani. Growing in edge of small stream, curved quickly.
-	<b>P</b>	Sep. 20	Mariakani	<i>S</i> 1 km east from Mariakani. Small pool, dia. 20 m. Growing a few plants.
-	<b>P</b>	Sep. 20	Mariakani	<i>S</i> 4 km east from Mariakani. Small pool, dia. 20 m. Growing a few plants.
<b>W167</b>	<b>P</b>	Sep. 20	Mariakani	<i>N,S</i> 5 km east from Mariakani. Near railway. Waste lands, 20 m × 200 m and dia. 5 m ( <i>S</i> ), 10 m × 50 m ( <i>N</i> ), having small stream. Growing sporadically in edge ( <i>S</i> ) and in central region ( <i>N</i> ).
-	<b>P</b>	Sep. 20	Mageras	<i>E</i> 4 km north from Mageras. Waste land, bottom road and living house. Growing sporadically.
<b>W168</b>	<b>P</b>	Sep. 20	Mombasa	<i>E</i> 9 km south from Mombasa Ferry. Road-side swampy area, 50 m × m. Growing sporadically in central area.
<b>W169</b>	<b>P</b>	Sep. 20	Mombasa	<i>S</i> 2 km west from a joint of Kwale and Ukunda. Waste land, dia. 50 m, partially shaded by large trees. Small pool jointed. Near cashewnut farm. Growing sporadically.
<b>W16</b>	<b>L</b>	Sep. 20	Mombasa	<i>S</i> 7 km west from a joint of Kwale and Ukunda. Paddy

- field, recently established by the government. Growing in edge.
- W170** P Sep. 20 Mombasa S 7 km west from a joint of Kwale and Ukunda. Paddy field, recently established by the government. Growing in edge and in small stream, but allopatrically with **W16**.
- W171** P Sep. 20 Mombasa N 11 km west from a joint of Kwale and Ukunda. Between Waa Secondary School and Matuga Girls High School. Paddy field located in small-valley. Lower position of irrigation canal and edge of an embankment. Growing sporadically.
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- P Sep. 21 Mombasa E 11 km north from Mombasa. Road-side ditch. Only a few plants.
- P Sep. 21 Mombasa E 14 km north from Mombasa. Road-side ditch. Growing sporadically.
- L Sep. 21 Mombasa E,W 15 km north from Mombasa. Pond, 50 m × 100 m, over the fence. Growing in edge.
- P Sep. 21 Mombasa W 17 km north from Mombasa. Road-side ditch. Growing only a few plants.
- L Sep. 21 Mombasa W 19 km north from Mombasa. Waste land, *Miscanthus* sp. dominant. Growing sporadically.
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- L Sep. 21 Mombasa W 20 km north from Mombasa. Road-side ditch. Growing sporadically.
- L Sep. 21 Mombasa E 33 km north from Mombasa. Road-side ditch. Growing a few plants.
- L Sep. 21 Kilifi W 8 km north from Kilifi. Waste land. Growing only a few plants.
- L Sep. 21 Kilifi W 21 to 22 km north from Kilifi. Road-side ditch near primary school. Growing sporadically.
- L Sep. 21 Kilifi E,W 31 km north from Kilifi. Swampy area, dia. 50 m. Growing a few plants.
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- L Sep. 21 Kilifi E,W 32 km north from Kilifi. Dried up waste land. Growing sporadically.
- L Sep. 21 Gedi E 14 km south from a joint of Gedi Ruins. Small pond, 5 m × 20 m. Rock in east side. Growing sporadically.
- L Sep. 21 Gedi E 8 km south from a joint of Gedi Ruins. Paddy field of *O. sativa* and burning fields, cultivating many kinds of upland crops. Growing sporadically in edge.
- L Sep. 21 Gedi E 6 km south from a joint of Gedi Ruins. Growing in edge of paddy fields of *O. sativa*.
- L Sep. 21 Malindi E 22 km north from Malindi. Paddy field. Growing a few plants.
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- L Sep. 21 Malindi W 27 km north from Malindi. Road-side ditch. Growing sporadically.
- L Sep. 21 Minjila E 6 km south from Minjila. Small stream. Growing a few plants.
- W17** L Sep. 22 Ngao N,S 8 km east from a joint of Garsen and Minjila, and 5 km west from Ngao. Swamp, 500 m × 1,000 m, water in central area and jointed Lake Shakababo in north side (N). Swampy area, dia. 50 m × 500 m (S). Growing in edge. Post matured stage.
- W18** L Sep. 22 Ngao N In Ngao Village. On an embankment of paddy rice and *Poa*. Growing a few plants.
- W19** L Sep. 22 Ngao N Over the Tana River. Waste land under the tree, 20 m × 20 m; and edge of paddy field, 10 m × 20 m also partially covered by large trees. Growing only a few plants.
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- W20** L Sep. 23 Saironi N In Village. Road-side ditch, temporary irrigation canal, 3 m × 20 m. Growing only a few plants.
- W21** L Sep. 23 Ngao W Just south side of Golbanti. Post-harvested paddy field. Growing *Ipomoea* sp. Relatively low region. Growing thickly.

<b>W22</b>	<b>L</b>	Sep. 23	Ngao	<i>W</i> Just south side of Golbanti. Post-harvested paddy field. Further west side of <b>W21</b> . Nearly the same habitat of them.
<b>W23</b>	<b>L</b>	Sep. 23	Ngao	<i>E</i> ca. 2 km south of Golbanti. Waste land, relatively lower region, adjacent to paddy field. Growing sporadically.
<b>W24</b>	<b>L</b>	Sep. 23	Ngao	<i>E</i> ca. 4 km south of Golbanti. Gradual slopping upland field, banana, maize. Adjacent paddy field. Growing only a few plants.
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<b>W172</b>	<b>P</b>	Sep. 25	Mariakani	<i>E</i> 2 km north of Mbongo. Waste land. Growing sporadically. Adjacent seasonal river, small bridge.
<b>W173</b>	<b>P</b>	Sep. 25	Mariakani	<i>W</i> 2 km north of Mbongo. Waste land. Growing thickly. Adjacent seasonal river, connected with <b>W172</b> by bridge.
<b>W174</b>	<b>P</b>	Sep. 25	Mariakani	<i>W</i> 2 km north of Mbongo. Waste land. Growing sporadically. Adjacent seasonal river, connected with <b>W172</b> by bridge, and separated by tall trees from <b>W173</b> .

### Some morphological characters of unhusked grains

Ten strains of *Oryza longistaminata* and 15 strains of *Oryza punctata* were collected in these trips, and they were used for morphological investigations of unhusked grains. However, grains of 3 strains were wholly immature and inadequate to be used for the measurements. Ten 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 values in the whole grains.

#### I. *Oryza longistaminata*

The results are given in Table 3. Lengths for the individual grain level ranged from 9.60 mm (strain No.18) to 8.05 mm (No.24). In the strain level, the longest (8.84 mm) was obtained in No.18, followed by No.23 (8.70 mm). The shortest (8.32 mm) was noted in No.24, followed by No.20 (8.41 mm). Average and its standard deviations in the whole strains were found to be  $8.59 \pm 0.17$ . In the standard deviations of each strain, *i.e.*, showing intra-population's variations, the largest (0.50) was obtained in No.18, followed by No.23 (0.35). The smallest (0.07) was noted in No.21, followed by No.24 (0.19). Average and its standard deviations in the whole strains were found to be  $0.26 \pm 0.13$ .

Widths for the individual grain level ranged from 2.95 mm (No.21) to 2.35 mm (No.20). In the strain level, the widest (2.79 mm) was obtained in No.21, followed by No.23 (2.70 mm). The narrowest (2.50 mm) was noted in No.20, followed by No.24 (2.57 mm). Average and its standard deviations in the whole strains were found to be  $2.63 \pm 0.09$ . In the standard deviations of each strain, the largest (0.10) was obtained in Nos.18, 20, 21 and 23. The smallest (0.02) was noted in No.24. Average and its standard deviations in the whole strains were found to be  $0.09 \pm 0.03$ .

Thicknesses for the individual grain level ranged from 1.80 mm (Nos.18, 22 and 23) to 1.40 mm (No.19). In the strain level, the thickest (1.73 mm) was obtained in No.23,

Table 3. Six morphological characters of unhusked grains; *O. longistaminata* (W15~W24) and *O. punctata* (W160~W164 in 1984 and W165~W174 in 1985)

Strain No.	Length (mm)	Width (mm)	Thickness (mm)	L/W	L/T	W/T
15	-	-	-	-	-	-
16	-	-	-	-	-	-
17	-	-	-	-	-	-
18	8.84±0.50	2.61±0.10	1.71±0.05	3.39±0.12	5.17±0.26	1.53±0.04
19	8.65±0.25	2.67±0.09	1.43±0.02	3.24±0.08	6.04±0.28	1.86±0.08
20	8.41±0.20	2.50±0.10	1.65±0.03	3.37±0.18	5.01±0.21	1.52±0.07
21	8.52±0.07	2.79±0.10	1.66±0.04	3.06±0.13	5.14±0.15	1.68±0.05
22	8.68±0.25	2.59±0.09	1.72±0.04	3.36±0.16	5.05±0.15	1.51±0.08
23	8.70±0.35	2.70±0.10	1.73±0.06	3.23±0.21	5.04±0.31	1.56±0.04
24	8.32±0.19	2.57±0.02	1.62±0.02	3.24±0.06	5.15±0.10	1.59±0.01
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160	6.22±0.44	2.35±0.17	1.53±0.10	2.65±0.14	4.09±0.28	1.54±0.10
161	5.77±0.23	2.48±0.12	1.48±0.22	2.34±0.16	3.99±0.56	1.71±0.24
162	6.46±0.49	2.48±0.14	1.53±0.16	2.62±0.25	4.25±0.44	1.63±0.12
163	7.01±0.60	2.48±0.13	1.57±0.08	2.83±0.28	4.47±0.40	1.58±0.06
164	6.47±0.43	2.53±0.17	1.49±0.06	2.58±0.28	4.33±0.27	1.70±0.14
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165	6.82±0.52	2.38±0.18	1.57±0.13	2.88±0.30	4.38±0.51	1.53±0.19
166	6.09±0.38	2.45±0.11	1.59±0.12	2.49±0.16	3.86±0.46	1.55±0.15
167	6.32±0.57	2.35±0.07	1.50±0.16	2.69±0.27	4.27±0.56	1.59±0.21
168	5.51±0.33	2.24±0.11	1.48±0.17	2.47±0.18	3.79±0.57	1.53±0.19
169	5.69±0.23	2.41±0.17	1.41±0.18	2.37±0.19	4.11±0.49	1.74±0.22
170	5.57±0.30	2.53±0.15	1.56±0.08	2.20±0.08	3.58±0.10	1.63±0.07
171	5.67±0.46	2.45±0.11	1.55±0.09	2.32±0.16	3.67±0.33	1.59±0.12
172	6.06±0.49	2.32±0.10	1.50±0.13	2.62±0.27	4.07±0.42	1.56±0.16
173	7.31±0.29	2.46±0.07	1.58±0.15	2.98±0.13	4.67±0.59	1.57±0.17
174	7.15±0.66	2.41±0.07	1.55±0.09	2.97±0.27	4.65±0.67	1.56±0.10

followed by No.22 (1.72 mm). The thinnest (1.43 mm) was noted in No.19, followed by No.24 (1.62 mm). Average and its standard deviations in the whole strains were found to be  $1.65 \pm 0.10$ . In the standard deviations of each strain, the largest (0.06) was obtained in No.23, followed by No.18 (0.05). The smallest (0.02) was noted in Nos.19 and 24. Average and its standard deviations in the whole strains were found to be  $0.04 \pm 0.01$ .

Ratios of length to width (abbreviated as L/W) for the individual grain level ranged from 3.61 (No.22) to 2.85 (No.21). In the strain level, the largest (3.39) was obtained in No.18, which was the same as in case of the length, followed by No.20 (3.37). The smallest (3.06) was noted in No.21, followed by No.23 (3.23). Average and its standard deviations in the whole strains were found to be  $3.27 \pm 0.11$ . In the standard deviations of each strain, the largest (0.21) was obtained in No.23, which was the same as in case of the thickness, followed by No.20 (0.18). The smallest (0.06) was noted in No.24, which was the same as in case of the width, followed by No.19 (0.08). Average and its standard deviations in the whole strains were found to be  $0.13 \pm 0.05$ .

Ratios of length to thickness (L/T) for the individual grain level ranged from 6.43

(No.19) to 4.67 (No.23). In the strain level, the largest (6.04) was obtained in No.19, followed by No.18 (5.17). The smallest (5.01) was noted in No.20, which was the same as in case of the width, followed by No.23 (5.04). Average and its standard deviations in the whole strains were found to be  $5.23 \pm 0.34$ . In the standard deviations of each strain, the largest (0.31) was obtained in No.23, which was the same as in cases of the thickness and L/W, followed by No.19 (0.28). The smallest (0.10) was noted in No.24, which was the same as in cases of the width and L/W, followed by Nos.21 and 22 (0.15). Average and its standard deviations in the whole strains were found to be  $0.21 \pm 0.07$ .

Ratios of width to thickness (W/T) for the individual grain level ranged from 1.96 (No.19), which was the same as in case of the L/T, to 1.36 (No.27). In the strain level, the largest (1.86) was obtained in No.19, which was the same as in case of the L/T, followed by No.21 (1.68). The smallest (1.51) was noted in No.22, followed No.20 (1.52). Average and its standard deviations in whole strains were found to be  $1.61 \pm 0.12$ . In the standard deviations of each strain, the largest (0.08) was obtained in Nos.19 and 22. The smallest (0.01) was noted in No.24, which was the same as in cases of the width, L/W and L/T, followed by Nos.18 and 23 (0.04). Average and its standard deviations in the whole strains were found to be  $0.05 \pm 0.02$ .

## II. *Oryza punctata*

Fifteen strains have different meanings in view of physiological or meteorological characters, *i.e.*, collected in 1984 and 1985, and should be separately considered also in morphological studies. Accordingly, they are divided into two groups in the present experimental series, *i.e.*, Group A --- collected in 1984 (strain Nos.160~164), Group B --- collected in 1985 (strain Nos.165~174).

### I. Lengths

*Group A:* The results are given also in Table 3. Lengths for the individual grain level ranged from 7.90 mm (No.163) to 5.35 mm (No.161). In the strain level, the longest (7.01 mm) was obtained in No.163, followed by No.164 (6.47 mm). It was noticeable that No.163 showed very large value. The shortest (5.77 mm) was noted in No.161, followed by No.160 (6.22 mm). It was noticeable that No.161 showed very small value. Average and its standard deviations through the whole strains were found to be  $6.38 \pm 0.40$ . In the standard deviations of each strain, *i.e.*, showing intra-population's variations, the largest (0.60) was obtained in No.163, followed by No.162 (0.49). The smallest (0.23) was noted in No.161, followed by No.164 (0.43). Average and its standard deviations in the whole strains were found to be  $0.44 \pm 0.12$ .

*Group B:* Lengths for the individual grain level ranged from 7.90 mm (No.174) to 5.10 mm (Nos.168, 171 and 172). In the strain level, the longest (7.31 mm) was obtained in No.173, followed by No.174 (7.15 mm) and No.165 (6.82 mm). The shortest (5.51 mm) was noted in No.168, followed by No.170 (5.57 mm) and No.171 (5.67 mm). Average and its standard deviations through the whole strains were found to be  $6.21 \pm 0.61$ . In the standard deviations of each strain, the largest (0.66) was obtained in No.174, followed by No.167 (0.57) and No.165 (0.52). The smallest (0.23) was noted in No.169, fol-



lowed by No.173 (0.29) and No.170 (0.30). Average and its standard deviations in the whole strains were found to be  $0.42 \pm 0.13$ .

*Whole:* Average and its standard deviations through the whole strains of both of the groups (= 15) were found to be  $6.27 \pm 0.58$ . Standard deviations of each strain were found to be  $0.43 \pm 0.13$ .

## 2. Widths

*Group A:* Widths for the individual grain level ranged from 2.80 mm (Nos.160 and 162) to 2.10 mm (Nos.160 and 164). In the strain level, the widest (2.53 mm) was obtained in No.164. The narrowest (2.35 mm) was noted in No.160. Average and its standard deviations through the whole strains were found to be  $2.46 \pm 0.06$ . In the standard deviations of each strain, the largest (0.17) was obtained in Nos.160 and 164. The smallest (0.12) was noted in No.161, followed by No.163 (0.13). Average and its standard deviations in the whole strains were found to be  $0.15 \pm 0.02$ .

*Group B:* Widths for the individual grain level ranged from 2.80 mm (Nos.165 and 170) to 2.10 mm (Nos.165, 168 and 169). In the strain level, the widest (2.53 mm) was obtained in No.170, followed by No.173 (2.46 mm) and Nos.166 and 171 (2.45 mm). The narrowest (2.24 mm) was noted in No.168, which was the same as in case of the length, followed by No.172 (2.32 mm) and No.167 (2.35 mm). Average and its standard deviations through the whole strains were found to be  $2.40 \pm 0.08$ . In the standard deviations of each strain, the largest (0.18) was obtained in No.165, followed by No.169 (0.17) and No.170 (0.15). The smallest (0.07) was noted in Nos.167, 173 and 174. Average and its standard deviations in the whole strains were found to be  $0.11 \pm 0.04$ .

*Whole:* Average and its standard deviations through the whole strains of both of the groups were found to be  $2.42 \pm 0.08$ . Standard deviations of each strain were found to be  $0.13 \pm 0.04$ .

## 3. Thicknesses

*Group A:* Thicknesses for the individual grain level ranged from 1.85 mm (No.162) to 1.15 mm (No.161), which was the same as in case of the length. In the strain level, the thickest (1.57 mm) was obtained in No.163, which was the same as in case of the length, followed by Nos.160 and 163 (1.53 mm). The thinnest (1.48 mm) was noted in No.161, which was the same as in case of the length, followed by No.164 (1.49 mm). Average and its standard deviations through the whole strains were found to be  $1.52 \pm 0.03$ . In the standard deviations of each strain, the largest (0.22) was obtained in No.161, followed by No.162 (0.16). The smallest (0.06) was noted in No.164, followed by No.163 (0.08). Average and its standard deviations in the whole strains were found to be  $0.12 \pm 0.06$ .

*Group B:* Thicknesses for the individual grain level ranged from 1.85 mm (Nos.165 and 173) to 1.15 mm (Nos.167, 168 and 169). In the strain level, the thickest (1.59 mm) was obtained in No.166, followed by No.173 (1.58 mm) and No.165 (1.57 mm). The thinnest (1.41 mm) was noted in No.169, followed by No.168 (1.48 mm) and Nos.167 and 172 (1.50 mm). Average and its standard deviations through the whole strains were found to be  $1.53 \pm 0.05$ . In the standard deviations of each strain, the largest (0.18) was

obtained in No.169, followed by No.168 (0.17) and No.167 (0.16). The smallest (0.08) was noted in No.170, followed by Nos.171 and 174 (0.09). Average and its standard deviations in the whole strains were found to be  $0.13 \pm 0.03$ .

*Whole:* Average and its standard deviations through the whole strains of both of the groups were found to be  $1.53 \pm 0.05$ . Standard deviations of each strain were found to be  $0.13 \pm 0.04$ .

#### 4. Ratios of length to width

*Group A:* Ratios of length to width (abbreviated as L/W) for the individual grain level ranged from 3.15 (No.163), which was the same as in case of the length, to 2.13 (No.161), which was the same as in cases of the length and thickness. In the strain level, the largest (2.83) was obtained in No.163, which was the same as in cases of the length and thickness, followed by No.160 (2.65). The smallest (2.34) was noted in No.161, which was the same as in cases of the length and thickness, followed by No.164 (2.58). Average and its standard deviations through the whole strains were found to be  $2.60 \pm 0.16$ . In the standard deviations of each strain, the largest (0.28) was obtained in Nos.163 and 164. The smallest (0.14) was noted in No.160, followed by No.161 (0.16). Average and its standard deviations in the whole strains were found to be  $0.22 \pm 0.06$ .

*Group B:* L/W for the individual grain level ranged from 3.57 (No.165) to 2.04 (No.169). In the strain level, the largest (2.98) was obtained in No.173, which was the same as in case of the length, followed by No.174 (2.97) and No.165 (2.88). The smallest (2.20) was noted in No.170, followed by No.171 (2.32) and No.169 (2.37). Average and its standard deviations through the whole strains were found to be  $2.60 \pm 0.26$ . In the standard deviations of each strain, the largest (0.30) was obtained in No.165, which was the same as in case of the width, followed by Nos.167 and 172 (0.27). The smallest (0.08) was noted in No.170, which was the same as in case of the L/W, followed by No.173 (0.13) and Nos.166 and 171 (0.16). Average and its standard deviations in the whole strains were found to be  $0.20 \pm 0.07$ .

*Whole:* Average and its standard deviations through the whole strains of both of the groups were found to be  $2.60 \pm 0.23$ . Standard deviations of each strain were found to be  $0.21 \pm 0.07$ .

#### 5. Ratios of the length to thickness

*Group A:* L/T for the individual grain level ranged from 5.08 (No.162), which was the same as in case of the thickness, to 3.14 (No.161), which was the same as in cases of the length, thickness and L/W. In the strain level, the largest (4.47) was obtained in No.163, which was the same as in cases of the length, thickness and L/W, followed by No.164 (4.33). The smallest (3.99) was noted in No.161, which was the same as in cases of the length, thickness and L/W, followed by No.160 (4.09). Average and its standard deviations through the whole strains were found to be  $4.23 \pm 0.17$ . In the standard deviations of each strain, the largest (0.56) was obtained in No.161, which was the same as in case of the thickness, followed by No.162 (0.44). The smallest (0.27) was noted in No.164, which was the same as in case of the thickness, followed by No.160 (0.28). Average and its standard deviations in the whole strains were found to be  $0.39 \pm 0.11$ .

*Group B:* L/T for the individual grain level ranged from 5.67 (No.173) to 2.97 (No.168). In the strain level, the largest (4.67) was obtained in No.173, which was the same as in cases of the length and L/W, followed by No.174 (4.65) and No.165 (4.38). The smallest (3.58) was noted in No.170, which was the same as in case of the L/W, followed by No.171 (3.67) and No.168 (3.79). Average and its standard deviations through the whole strains were found to be  $4.11 \pm 0.37$ . In the standard deviations of each strain, the largest (0.67) was obtained in No.174, which was the same as in case of the length, followed by No.173 (0.59) and No.168 (0.57). The smallest (0.10) was noted in No.170, which was the same as in cases of the thickness and L/W. Average and its standard deviations in the whole strains were found to be  $0.47 \pm 0.15$ .

*Whole:* Average and its standard deviations through the whole strains of both of the groups were found to be  $4.15 \pm 0.32$ . Standard deviations of each strain were found to be  $0.44 \pm 0.14$ .

## 6. Ratios of width to thickness

*Group A:* W/T for the individual grain level ranged from 2.09 (No.161) to 1.29 (No.161), which was the same as in cases of the length, thickness, L/W and L/T. In the strain level, the largest (1.71) was obtained in No.161, followed by No.164 (1.70). The smallest (1.54) was noted in No.160, which was the same as in case of the width, followed by No.163 (1.58). Average and its standard deviations through the whole strains were found to be  $1.63 \pm 0.07$ . In the standard deviations of each strain, the largest (0.24) was obtained in No.161, which was the same as in cases of the thickness and L/T, followed by No.164 (0.14). The smallest (0.06) was noted in No.163, followed by No.160 (0.10). Average and its standard deviations in the whole strains were found to be  $0.13 \pm 0.06$ .

*Group B:* W/T for the individual grain level ranged from 2.25 (No.169) to 1.25 (No.165). In the strain level, the largest (1.74) was obtained in No.169, followed by No.170 (1.63) and Nos.167 and 171 (1.59). The smallest (1.53) was noted in Nos.165 and 168, followed by No.166 (1.55). Average and its standard deviations through the whole strains were found to be  $1.59 \pm 0.06$ . In the standard deviations of each strain, the largest (0.22) was obtained in No.169, which was the same as in case of the thickness, followed by No.167 (0.21) and Nos.165 and 168 (0.19). The smallest (0.07) was noted in No.170, which was the same as in cases of the thickness, L/W and L/T, followed by No.174 (0.10) and No.171 (0.12). Average and its standard deviations in the whole strains were found to be  $0.16 \pm 0.05$ .

*Whole:* Average and its standard deviations through the whole strains of both of the groups were found to be  $1.60 \pm 0.07$ . Standard deviations of each strain were found to be  $0.15 \pm 0.05$ .

## Summary

During the trips in November in 1984 and from August to September in 1985 in

Kenya, 25 strains of wild rice, *i.e.*, 10 of *Oryza longistaminata* CHEV. et ROEHR. and 15 of *Oryza punctata* KOTSCHY, were collected and many populations of them were observed. Their localities and habitats were reported in detail. Locality names are as follows; Bunyala, Mombasa, Ngao, Saironi, Samburi, Mariakani.

From the analyses of grain characters of unhusked grains, average values and those standard deviations in the whole strains were found to be  $8.59 \text{ mm} \pm 0.17$ ,  $2.63 \text{ mm} \pm 0.09$ ,  $1.65 \text{ mm} \pm 0.10$ ,  $3.27 \pm 0.11$ ,  $5.23 \pm 0.34$  and  $1.61 \pm 0.12$  in length, width, thickness, ratios of length to width, of length to thickness, and of width to thickness, respectively, in case of *O. longistaminata*.

Strains of *O. punctata* were divided into two groups, *i.e.*, Group A --- collected in 1984, Group B --- collected in 1985. Lengths were found to be 6.38 mm, 6.21 mm and 6.27 mm in Group A, Group B and through the whole in average values, respectively. Widths were found to be 2.46 mm, 2.40 mm and 2.42 mm in the same order, respectively. Thicknesses were found to be 1.52 mm, 1.53 mm and 1.53 mm in the same order, respectively. Ratios of length to width were found to be 2.60, 2.60 and 2.60 in the same order, respectively. Ratios of length to thickness were found to be 4.23, 4.11 and 4.15 in the same order, respectively. Ratios of width to thickness were found to be 1.63, 1.59 and 1.60 in the same order, respectively. It may be noticeable that population of No.173, collected in waste land near Mariakani, showed 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, and morphological and genetical characters, ecotypic and varietal differentiations may be discussed in the future.

## References

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