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Distribution and Some Morphological Characters of Wild Rice in Madagascar

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Introduction

During the period from August to September in 1985, the writers have trip in Madagascar 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 this opportunity, wild rices distributed in Madagascar were studied.

On the distribution of wild rice in Madagascar, some reports have already been published [1-3]. Though Madagascar 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 Madagascar. 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 this trip were a northern part of Madagascar. Geographical distributions of wild rice found were briefly illustrated in Fig. 1. In this figure,

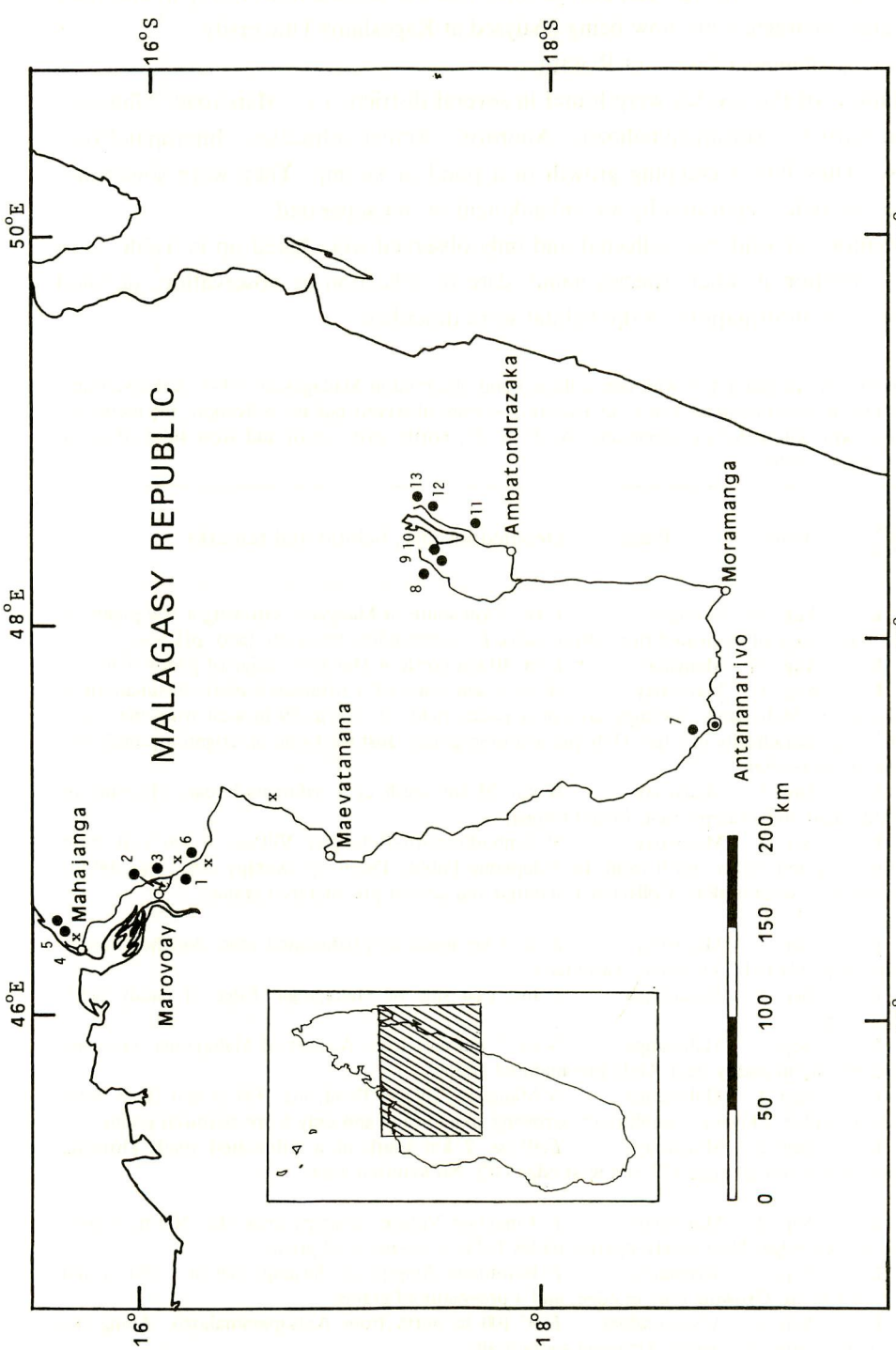

Fig. 1. Map showing several localities where the wild rice in Madagascar were collected and observed. Solid line; route of observation, filled circle; collection area, cross mark; growing area where the samples were observed but not collected, open circle; main town. Code–numbers used in the figure are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

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

Most of the seed samples collected were divided into two groups, one of which was deposited in FOFIFA, Madagascar, and another one was carried back to Japan and their plant and grain characters are now being analysed at Kagoshima University.

Oryza longistaminata CHEV. et ROEHR.

Populations of the species were found in several districts, *i e.*, Marovoay, Mahajanga, Antananarivo, Antsapanimahozo, Anororo, Ambatondrazaka, Imerimandroso, Antanifutsy. They had a creeping growth in a pond or swamp. They were sometimes adjacent to rice field, separated by an embankment or not separated.

Distributions of wild rice collected and only observed were listed up in Table 1. In this table, 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 wild rice collected and observed in Madagascar, 1985. Abbreviations : **L**; *Oryza longistaminata* CHEV. et ROEHR., –; only observed but no collection, m; meter or meters, km; kilometer or kilometers, *N, E, S, W*; north, east, south and west sides of main road, respectively

Collected No.	Species	Date	Place	Detailed locality, habitat and remarks
–	**L**	Aug. 29	Mangabe	*E* ca. 5 km south of Mangabe. Growing a few plants in the outer edge of cultivated rice, *Oryza sativa* L., surrounding the waste land. pH=6.2.
–	**L**	Aug. 29	Mangabe	*E* ca. 10 km north of Mangabe. Edge of paddy field.
W1	**L**	Aug. 31	Marovoay	*W* ca. 2 km south of a trifurcated road, Antananarivo, Marovoay, Mahajanga. Swampy area near paddy field, *O. sativa*, 50 m west from the road. Growing sporadically in edge. Only pre-matured grains. Just west side of irrigation canal, setting at the portion.
–	**L**	Aug. 31	Marovoay	*W* ca. 20 km south of a trifurcated road. Growing in paddy field and swampy area. Inland fishing.
W2	**L**	Sep. 1	Marovoay	*N* Ambodimadiro-Befanpisy Village. 6 km east from Marovoay and 500 m north from the Telephone Publik. Dried-up swampy area, dia. 200 m. Growing in several plots. Collected 1 matured and several pre-matured grains.
W3	**L**	Sep. 1	Marovoay	*E* ca. 5 km north of a trifurcated road. Northeast outer edge of paddy field, *O. sativa*, waste land.
–	**L**	Sep. 1	Mahajanga	*S* Just east side of Mahajanga. Edge of paddy field. Dried-up.
W4	**L**	Sep. 1	Mahajanga	*N* ca. 7 km east from Airport of Mahajanga. Growing sporadically in paddy field. Only pre-matured grains.
W5	**L**	Sep. 1	Mahajanga	*N* Mangatsa Village. Pond, dia. 300 m and 50 m, both side of bridge. Flowing a small river. Growing sporadically and only 5 pre-matured grains.
–	**L**	Sep. 2	Marovoay	*E,W* ca. 2 km south of a trifurcated road. Growing sporadically in east edge (*E*) and west edge (*W*). No matured grain.
W6	**L**	Sep. 2	Marovoay	*E* Tananbon Village. Swampy area, dia. 500 m. Growing in west edge. Near newly-opened paddy field. 6 pre-matured grains.
W7	**L**	Sep. 3	Antananarivo	*E* Befotoana-Ampijoroa. Swamp, 100 m x 100 m and 100 m x 50 m. Growing only in edge, and 4 pre-matured grains.
W8	**L**	Sep. 5	Antsapanimahozo	*E,W* 100 m north from Antsapanimahozo. Along the irrigation canal, 5 m width. Growing sporadically.
W9	**L**	Sep. 5	Antsapanimahozo	*N* ca. 2 km east from Antsapanimahozo. Dried-up irrigation canal, 5 m width. Mostly eatened by animals.

W10 L Sep. 5 Anororo *N,S* 100 m west from Anororo, west shore of lac Alaotra. Swampy area (*N*), dia. 500 m. Growing sporadically in north and northwest edges. Small pool (*S*), dia, 10 m. Growing sporadically in east edge.

W11 L Sep. 6 Ambatondrazaka *N* Experimental Field of CALA, FOFIFA, Complexe Agronomique du lac Alaotra. Edge of irrigation canals and an embankment. Growing thickly.

W12 L Sep. 6 Imerimandroso *E* Just south of Imerimandroso, north of Madiorano. Edge in swamp, 100 m 200 m. Pre-matured grains.

W13 L Sep. 6 Antanifutsy *E* Near Antanifutsy. Slightly high elevation. Growing thickly and sporadically in small river, adjointed swamp, 100 m x 500 m. Pre-matured grains.

Some morphological characters of unhusked grains

Thirteen strains of wild rice were collected on this trip, and they were used for morphological investigations of unhusked grains. However, grains of 2 strains were wholly immature and inadequate to be used for measurement. Three to 15 grains were used for the measurements of each strain. Measurements were done at length, width and thickness of the respective grains, centering 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.

The results are given in Table 2. Lengths for the individual grain level ranged from 9.65 mm (strain No.6) to 7.75 mm (No.3). In the strain level, the longest (9.28 mm) was obtained in No.8, followed by No.5 (9.15 mm) and No.6 (9.14 mm). The shortest (8.03 mm) was noted in No.13, followed by No.3 (8.13 mm) and No.10 (8.47 mm). Average and its standard deviations in the whole strains were found to be 8.80 ± 0.39. In the standard deviations of each strain, *i.e.*, those showing the intra-population's variations, the largest (0.37) was obtained in No.9, followed by Nos.3, 6 and 11 (0.28). The smallest

Table 2. Six morphological characters of unhusked grains

Strain No.	Length (mm)	Width (mm)	Thickness (mm)	L/W	L/T	W/T
1	9.03±0.23	2.47±0.02	1.63±0.02	3.66±0.07	5.53±0.08	1.51±0.02
2	–	–	–	–	–	–
3	8.13±0.28	2.62±0.05	1.67±0.05	3.11±0.14	4.88±0.04	1.57±0.06
4	9.00±0.18	2.50±0.03	1.65±0.03	3.60±0.10	5.46±0.19	1.52±0.04
5	9.15±0.24	2.53±0.09	1.58±0.05	3.62±0.17	5.80±0.20	1.60±0.06
6	9.14±0.28	2.56±0.06	1.61±0.09	3.57±0.09	5.70±0.42	1.59±0.09
7	8.93±0.21	2.36±0.23	1.70±0.16	3.81±0.30	5.29±0.40	1.39±0.04
8	9.28±0.17	2.37±0.06	1.65±0.11	3.93±0.11	5.65±0.40	1.44±0.14
9	8.73±0.37	2.28±0.10	1.58±0.04	3.84±0.22	5.53±0.30	1.45±0.09
10	8.47±0.17	2.32±0.06	1.58±0.05	3.66±0.13	5.35±0.10	1.47±0.08
11	8.90±0.28	2.41±0.12	1.58±0.02	3.70±0.21	5.63±0.18	1.53±0.09
12	–	–	–	–	–	–
13	8.03±0.06	2.23±0.02	1.52±0.05	3.60±0.06	5.30±0.20	1.47±0.03

(0.06) was noted in No.13, followed by Nos.8 and 10 (0.17). Average and its standard deviations in the whole strains were found to be 0.23±0.08.

Widths for the individual grain level ranged from 2.75 mm (No.7) to 2.10 mm (No.9). In the strain level, the widest (2.62 mm) was obtained in No.3, followed by No.6 (2.56 mm) and No.4 (2.50 mm). The narrowest (2.23 mm) was noted in No.13, which was also the same as in case of the length, followed by No.9 (2.28 mm) and No.10 (2.32 mm). Average and its standard deviations in the whole strains were found to be 2.42± 0.12. In the standard deviations of each strain, the largest (0.23) was obtained in No.7, followed by No.11 (0.12) and No.9 (0.10). The smallest (0.02) was noted in Nos.1 and 13, followed by No.4 (0.03). Average and its standard deviations in the whole strains were found to be 0.08±0.06.

Thicknesses for the individual grain level ranged from 1.95 mm (No.7), which was the same as in case of the width, to 1.45 mm (No.13). In the strain level, the thickest (1.70 mm) was obtained in No.7, followed by No.3 (1.67 mm) and No.4 (1.65 mm). The thinnest (1.52 mm) was noted in No.13, which was the same as in cases of the length and width, followed by Nos.5, 9, 10 and 11 (1.58 mm). Average and its standard deviations in the whole stains were found to be 1.61±0.05. In the standard deviations of each strain, the largest (0.16) was obtained in No.7, which was the same as in case of the width, followed by No.8 (0.11) and No.6 (0.09). The smallest (0.02) was noted in Nos.1 and 11, followed by No.4 (0.03). Average and its standard deviations in the whole strains were found to be 0.06±0.04.

Ratios of length to width (abbreviated as L/W) for the individual grain level ranged from 4.16 (No.9) to 2.92 (No.3), which was the same as in case of the length. In the strain level, the largest (3.93) was obtained in No.8, which was the same as in case of the length, followed by No.9 (3.84) and No.7 (3.81). The smallest (3.11) was noted in No.3, followed by No.6 (3.57) and No.4 (3.60). Average and its standard deviations in the whole strains were found to be 3.65±0.20. In the standard deviations of each strain, the largest (0.30) was obtained in No.7, which was the same as in cases of the width and thickness, followed by No.9 (0.22) and No.11 (0.21). The smallest (0.06) was noted in No.13, which was the same as in cases of the length and width, followed by No.1 (0.07) and No.6 (0.09). Average and its standard deviations in the whole strains were found to be 0.15±0.07.

Ratios of length to thickness (L/T) for the individual grain level ranged from 6.43 (No.6), which was the same as in case of the length, to 4.67 (No.7). In the strain level, the largest (5.80) was obtained in No.5, followed by No.6 (5.70) and No.8 (5.65). The smallest (4.88) was noted in No.3, which was the same as in case of L/W, followed by No.7 (5.29) and No.13 (5.30). Average and its standard deviations in the whole strains were found to be 5.46±0.24. In the standard deviations of each strain, the largest (0.42) was obtained in No.6, followed by Nos.7 and 8 (0.40). The smallest (0.04) was noted in No.3, followed by No.1 (0.08) and No.10 (0.10). Average and its standard deviations in the whole strains were found to be 0.23±0.13.

Ratios of width to thickness (W/T) for the individual grain level ranged from 1.73

(No.6), which was the same as in case of the length, to 1.27 (No.9), which was the same as in case of the width. In the strain level, the largest (1.60) was obtained in No.5, which was the same as in case of the L/T, followed by No. 6 (1.59) and No.3 (1.57). The smallest (1.39) was noted in No.7, followed by No.8 (1.44) and No.9 (1.45). Average and its standard deviations in the whole strains were found to be 1.50 ± 0.06. In the standard deviations of each strain, the largest (0.14) was obtained in No.8, followed by Nos.6, 9 and 11 (0.09). The smallest (0.02) was noted in No.1, which was the same as in cases of the width, thickness and L/W, followed by No.13 (0.03) and Nos.4 and 7 (0.04). Average and its standard deviations in the whole strains were found to be 0.07 ± 0.03.

Summary

During the trip from August to September in 1985 in Madagascar, 13 strains of wild rice, *i.e.*, *Oryza longistaminata* CHEV. et ROEHR., were collected and some populations of them were observed. Their localities and habitats were reported in detail. Locality names are as follows; Marovoay, Mahajanga, Antananarivo, Antsapanimahozo, Anororo, Ambatondrazaka, Imerimandroso, Antanifutsy.

From the analyses of unhusked grain characters, average values in the whole strains were found to be 8.80 mm $\pm$ 0.39, 2.42 mm $\pm$ 0.12, 1.61 mm $\pm$ 0.05, 3.65 $\pm$ 0.20, 5.46 $\pm$ 0.24 and 1.50 $\pm$ 0.06 in length, width, thickness, ratios of length to width, of length to thickness, and of width to thickness, respectively.

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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