

On Distribution and Grain Morphology of Cultivated Rice Collected in Madagascar, 1988

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Introduction

During the period of June in 1988, the writers took a trip to Madagascar for collecting 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.

On the distribution of the cultivated rice in Madagascar, some reports have already been published¹⁻⁴). In this trip, various types of cultivated rice, distributed and under cultivation, were collected in Madagascar. In the present report, only the habitat and record of some morphological characters of husked grains of the cultivated rice collected in Madagascar were described. Based on the analyses of the data obtained in the further morphological characters, varietal variations are going to be informed in the following papers.

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Abstract of distribution and habitat of cultivated rice

Geographical distribution and habitats of the cultivated rice collected in Madagascar were briefly illustrated in Fig. 1, in which are given the tripping-routes and collection sites, too.

Seed samples were collected in the following districts; Maevatanana, Mahajanga, Marovoay, Mampikony, Port Berge, Antsohihy, Bealanana, Befandrianana, Ambaton-drazaka (lac Alaotra), Brickaville, Tamatabe, Fenerive, Antsirabe and Ambositra. Dis-

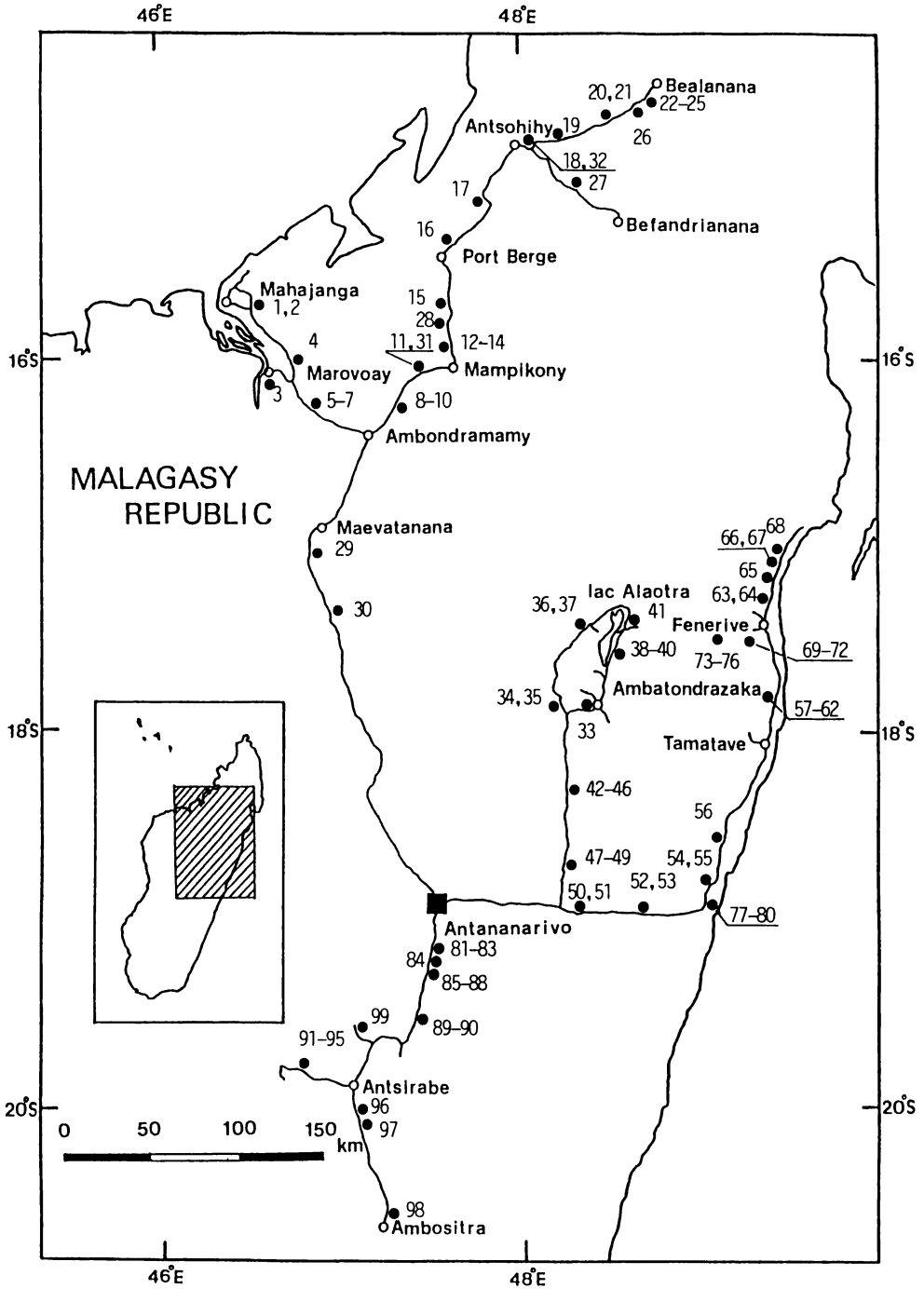


Fig. 1. Map showing several localities where the cultivated rices were collected in Madagascar. Solid line; routes of observations, filled circles; collection areas, open circles; main towns. Code numbers used in the figure are corresponding to the strain numbers used in the tables.

tribution of the cultivated rice collected was given in Table 1. In this table, the strain number, the date of collection, the local name and some informations for the habitat were described.

Table 1. Distribution and habitat of cultivated rice collected in Madagascar in 1988

Strain No.	Collecting date	Local name	Place, habitat and remarks
1	Jun. 4	Avia Mizaha	Ambovo Village, Mahajanga. Irrigated paddy field at the fringe of pond.
2	Jun. 4	Sanabody	Maintirano Village, Mahajanga. Irrigated paddy field.
3	Jun. 4	Andramonta	Tsararano Village, Marovoay. Irrigated paddy field. Mixed variety.
4	Jun. 5	Tsipala	Tanamsas-Andnofave Village, Marovoay. Collected from farmers' store. Mixed variety.
5	Jun. 5	Tsipala	Ampisotroandranorgdro Village, Marovoay. Collected from farmers' store.
6	Jun. 5	Andramonta	The same place as No.5.
7	Jun. 5	-Unknown-	The same habitat as No.5. Irrigated paddy field.
8	Jun. 5	-Unknown-	Tsinjorano Village, Ambondramamy. Collected from farmers' store.
9	Jun. 5	Tsipala	The same place as No.8.
10	Jun. 5	Masokibobo	The same place as No.8.
11	Jun. 5	Vary Vatosoa	Miarinarivo Village, Mampikony. Collected from farmers' store.
12	Jun. 6	Vary Vato	Tsimijacy Village, Mampikony. Collected from farmers' store.
13	Jun. 6	Tsipala	The same place as No.12.
14	Jun. 6	Naoromidina	The same place as No.12. Mixed variety.
15	Jun. 6	Tsipala	Ankatoaka Village, Port Berge. Irrigated paddy field.
16	Jun. 6	Makalioka	Ambondrona Village, Port Berge. Irrigated paddy field.
17	Jun. 6	Bemarijy & Andramonta	Marovantaze Village, Antsohihy. Collected from farmers' store.
18	Jun. 7	Mamoriake	Tsacahanenana-Ambaminanga Village, Antsohihy. Collected from farmers' store.
19	Jun. 7	Tsitaitra	Antanalase Village, Antsohihy. Collected from farmers' store. Mixed variety.
20	Jun. 7	Tsivimbina	Fintshabe Village, Bealanana. Collected from farmers' store.
21	Jun. 7	Tahosy	The same place as No.20.
22	Jun. 7	Makalioka	Anpandranana-Ambafosia Village, Bealanana. Collected from farmers' store. Mixed variety.
23	Jun. 7	Rakaraka	The same place as No.22.
24	Jun. 7	Komojy	The same place as No.22. Mixed variety.
25	Jun. 7	Rojo	The same place as No.22.
26	Jun. 7	Tsara Voa Banga	Antsahabe Village, Bealanana. Collected from farmers' store. Upland rice.
27	Jun. 8	Makalioka	Ambodimangabehivavy Village, Befandrianana. Irrigated paddy field.
28	Jun. 9	Vary Patsa	Tsararivotra Village, Mampikony. Collected from rain-fed rice field at the fringe of pond. Mixed variety.

29	Jun. 10	Bekimondro	Andranobevava Village, Maevatanana. Irrigated rice field.
30	Jun. 10	-Unknown-	The different habitat from No.29 in the same village. Irrigated paddy field. Mixed variety.
31	Jun. 5	-Unknown-	Miarinarivo Village. Mampikony. Irrigated paddy field.
32	Jun. 8	-Unknown-	Befandriana Nord. Irrigated paddy field.
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33	Jun. 14	Makalioka	Ambalabako Village, Ambatondrazaka. Collected from threshing floor in paddy field. Mixed variety.
34	Jun. 14	Makalioka	Tsinjoarivo, Ambatondrazaka. Collected from threshing floor in paddy field. Mixed variety.
35	Jun. 14	-Unknown-	Irrigated paddy field. Different habitat from No.34.
36	Jun. 14	Makalioka	Ampiatany, Ambatondrazaka. Collected from a rice heap adjacent to rice field. Mixed variety.
37	Jun. 14	Vary Malady	Antsahananja, Ambatondrazaka. Irrigated paddy field.
38	Jun. 15	Vary Malady	Andranomena, Ambatondrazaka. Irrigated paddy field.
39	Jun. 15	-Unknown-	The same habitat as No.38.
40	Jun. 15	Rojomena Rojofotsy	The same habitat as No.38.
41	Jun. 15	Makalioka	Madinano, Ambatondrazaka. Irrigated paddy field. Mixed variety.
42	Jun. 16	Vonjy	Ambodirano Village, Moramanga. Collected from farmers' store. Mixed variety.
43	Jun. 16	Betsileo	The same place as No.42.
44	Jun. 16	Makalioka	The same place as No.42. Mixed variety.
45	Jun. 16	Rojofotsy	The same place as No.42.
46	Jun. 16	Vary Be	The same place as No.42.
47	Jun. 16	Makalioka	Morarano (station), Moramanga. Collected from farmers' store. Mixed variety.
48	Jun. 16	Telovolana	The same place as No.47.
49	Jun. 16	Rojofotsy	The same place as No.47.
50	Jun. 16	Langakafotsy	Berendemy, Brickaville. Collected from farmers' store. Upland rice. Mixed variety.
51	Jun. 16	Somotra	The same place as No.50. Upland rice.
52	Jun. 16	Somotra	Marozevo, Brickaville. Collected from farmers' store. Upland rice.
53	Jun. 16	Vanjakohnandiana	The same place as No.52. Mixed variety.
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54	Jun. 17	Mena Vazana	Fierenana, Brickaville. Collected from farmers' store. Upland rice.
55	Jun. 17	Mena Vazana	The same place as No.54. Upland rice.
56	Jun. 17	Ramaditra	Antanahabo Village, Tamatave. Irrigated paddy field.
57	Jun. 17	Vimboahangy	Anosibe Village, Tamatave. Collected from farmers' store. Upland rice.
58	Jun. 17	Mintimalady	The same place as No.57. Upland rice.
59	Jun. 17	Telovorana	The same place as No.57. Upland rice.
60	Jun. 17	Diara	The same place as No.57.
61	Jun. 17	Makalioka	The same place as No.57.
62	Jun. 17	Vary Be	The same place as No.57. Upland rice. Mixed variety.
63	Jun. 18	Vary Gonibe	Ambatokitana Village, Fenerive. Collected from farmers' store. Mixed variety.

64	Jun. 18	Vary Be Malady	The same place as No.57. Upland rice.
65	Jun. 18	Marotia	Sahavary Village, Fenerive. Irrigated paddy field. Mixed variety.
66	Jun. 18	Kirimy	Manarorana Village, Fenerive. Collected from farmers' store.
67	Jun. 18	Lohambitro	The same place as No.66.
68	Jun. 18	Lohambitro (Menamongo)	The same place as No.66. Mixed variety.
69	Jun. 18	Bemahasoa	Garrecheck Village, Fenerive. Collected from farmers' store. Upland rice.
70	Jun. 18	Lohambitrobe	The same place as No.69. Upland rice.
71	Jun. 18	Rambompiso	The same place as No.69. Upland rice.
72	Jun. 18	Tsipala	The same place as No.69. Lowland rice. Mixed variety.
73	Jun. 18	Vary Gony	Anosibe Village, Fenerive. Collected from farmers' store. Mixed variety.
74	Jun. 18	Telovorana	The same place as No.73. Upland rice.
75	Jun. 18	Vary Botrika	The same place as No.73.
76	Jun. 18	Vary Kitrana	The same place as No.73.
77	Jun. 19	Vary Kitrana	Menagisa Village, Brickaville. Collected from farmers' store.
78	Jun. 19	Vary Somotra	The same place as No.77.
79	Jun. 19	Kirotsaka	The same place as No.77.
80	Jun. 19	Ramilona	Brickaville. Irrigated paddy field.
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81	Jun. 22	Rojomena	Ambalavo Village, Antsirabe. Collected from farmer's store.
82	Jun. 22	Botry-Tsindrilahy	The same place as No.81. Mixed variety.
83	Jun. 22	Botry	The same variety as No.81. Mixed variety.
84	Jun. 22	Ambolavava	Amboasary Village, Antsirabe. Collected from farmers' store.
85	Jun. 22	Botry	Ambohidrano-Sud Village, Antsirabe. Collected from farmers' store.
86	Jun. 22	Rojo	The same place as No.85. Mixed variety.
87	Jun. 22	Japone (Unknown)	The same place as No.85.
88	Jun. 22	Botry	The same place as No.85.
89	Jun. 22	Telorirana	Vohitsara Village, Antsirabe. Collected from farmers' store.
90	Jun. 22	Rojomena	The same place as No.89. Mixed variety.
91	Jun. 23	Rijakely (short culm)	Andoharano Village, Antsirabe. Collected from farmers' store.
92	Jun. 23	Rijakely (long culm)	The same place as No.91.
93	Jun. 23	Mangakely	Another habitat from No.91 in the same village.
94	Jun. 23	Tsipala	Ankazomiriotre Village, Antsirabe. Collected from farmers' store.
95	Jun. 23	Mavokely	Antsirabe. Collected from farmers' store. Mixed variety.
96	Jun. 23	Manfe	Manandona Village, Ambositra. Collected from farmers' store. Mixed variety.
97	Jun. 23	Mangatovo	Ankarina Village, Ambositra. Collected from farmers' store. Mixed variety.
98	Jun. 23	Kalafohindrazaha	Ambositra. Irrigated paddy field.
99	Jun. 24	Latsika	Kianjasoa Village, Antsirabe. Delivered from a office of ODR station in Antsirabe.

One hundred and two strains of 99 seed samples were collected during the trip. At that time, cultivated rice had been harvested from most of the fields. Seventy-seven strains of 75 seed samples were gathered from farmers' stores, as well as from threshing floor and unthreshing panicles piled to dry. Almost all of those were ascertained to be mixed varieties. The other seed-samples were collected from the paddy fields of the dry-season-cropping found in the irrigated paddy fields and in the swampy low lands adjacent to ponds, and from the upland paddy fields.

Some morphological characters of husked grains

One hundred and two strains were collected in this trip and those were used for morphological investigations of husked grains.

Measurements were done for length, width and thickness of husked grains, using 20 grains of each strain. Measurements were done too at the largest position of the respective characters. Moreover, of the husked grains, calculations were done on the ratios of the following components, namely, "length to width", "length to thickness" and "width to thickness," using average value of the respective characters.

The results are given in Table 2. Lengths of grains were observed to be between 4.61 mm and 7.76 mm. The shortest grain was obtained in the strain No.75. The longest was obtained in No.35. Average value was found to be 6.47 mm. The standard deviations of each strain, *i.e.*, showing intra-strain variation, were noted to be between 0.13 (No.11) and 1.93 (No.1).

Table 2. Some morphological characters of husked grains collected in Madagascar in 1988

Strain No.	Length (L) (mm)	Width (W) (mm)	Thickness (T) (mm)	L/W	L/T	W/T
1	6.50±1.93 ¹⁾	2.26±0.66	1.83±0.53	2.65±0.80	3.26±0.97	1.14±0.33
2	6.24±1.82	1.87±0.55	1.53±0.45	3.08±0.91	3.77±1.10	1.13±0.33
3-1	6.84±0.45	2.57±0.33	1.82±0.12	2.71±0.47	3.76±0.27	1.41±0.17
3-2	7.19±0.31	2.19±0.24	1.80±0.07	3.33±0.46	3.98±0.28	1.21±0.10
4	6.88±0.52	2.30±0.36	1.80±0.07	3.07±0.62	3.82±0.34	1.27±0.18
5	7.38±0.48	2.01±0.13	1.79±0.08	3.69±0.24	4.12±0.25	1.11±0.05
6	6.07±0.38	2.38±0.21	1.68±0.08	2.57±0.33	3.61±0.22	1.41±0.13
7	4.73±0.54	2.30±0.31	1.71±0.16	2.07±0.30	2.77±0.41	1.34±0.17
8	7.23±0.31	2.30±0.31	1.71±0.16	3.19±0.47	4.24±0.43	1.34±0.17
9	7.61±0.34	2.11±0.21	1.78±0.10	3.63±0.35	4.26±0.23	1.18±0.12
10	5.07±0.33	2.92±0.18	1.90±0.09	1.80±0.26	2.76±0.42	1.53±0.14
11	5.96±0.13	2.50±0.19	1.74±0.09	2.40±0.20	3.43±0.21	1.44±0.14
12	5.53±0.30	2.53±0.13	1.70±0.08	2.18±0.12	3.21±0.23	1.47±0.07
13	7.57±0.38	2.11±0.21	1.75±0.06	3.61±0.38	4.32±0.30	1.20±0.13

14	6.00±0.98	2.26±0.31	1.79±0.08	2.78±0.73	3.47±0.59	1.28±0.17
15	7.53±0.30	2.11±0.21	1.73±0.08	3.46±0.51	4.22±0.41	1.23±0.14
16	7.19±0.41	2.03±0.13	1.70±0.05	3.53±0.25	4.22±0.22	1.19±0.07
17	6.11±0.28	2.57±0.18	1.75±0.08	2.37±0.12	3.48±0.16	1.46±0.12
18	7.30±0.46	2.07±0.18	1.72±0.06	3.54±0.38	4.23±0.20	1.20±0.10
19	6.96±0.41	2.42±0.18	1.75±0.06	2.88±0.26	3.98±0.24	1.38±0.10
20	7.46±0.36	2.42±0.18	1.77±0.13	3.09±0.21	4.21±0.29	1.36±0.07
21	6.84±0.30	2.50±0.19	1.90±0.11	2.75±0.21	3.66±0.33	1.33±0.13
22	6.96±0.49	2.38±0.21	1.89±0.05	2.85±0.44	3.63±0.35	1.28±0.10
23	6.23±0.24	2.69±0.24	1.97±0.09	2.33±0.23	3.16±0.19	1.36±0.11
24	7.07±0.72	2.19±0.24	1.87±0.12	3.29±0.62	3.80±0.57	1.16±0.05
25	7.11±0.21	2.57±0.18	1.96±0.06	2.74±0.19	3.63±0.16	1.33±0.11
26	6.69±0.36	2.65±0.23	1.93±0.08	2.53±0.23	3.45±0.25	1.37±0.12
27	7.03±0.49	2.07±0.18	1.70±0.08	3.41±0.40	4.37±0.37	1.28±0.06
28	6.00±0.67	2.19±0.31	1.69±0.08	2.82±0.65	3.54±0.41	1.29±0.18
29	5.69±0.31	2.30±0.24	1.67±0.07	2.51±0.22	3.46±0.28	1.38±0.16
30	6.00±0.55	2.46±0.23	1.72±0.16	2.43±0.25	3.45±0.26	1.42±0.13
31	6.46±0.41	2.42±0.18	1.66±0.06	2.68±0.34	3.88±0.20	1.45±0.13
32	6.00±0.39	2.46±0.13	1.76±0.05	2.45±0.32	3.41±0.27	1.39±0.07

33	7.46±0.30	2.07±0.18	1.81±0.03	3.62±0.37	4.12±0.21	1.14±0.09
34	6.26±0.46	2.61±0.21	1.93±0.14	2.41±0.26	3.25±0.32	1.35±0.15
35	7.76±0.24	2.15±0.23	1.86±0.07	3.54±0.48	4.14±0.21	1.18±0.15
36	7.16±0.54	2.23±0.24	1.85±0.09	3.27±0.62	3.89±0.49	1.20±0.09
37	6.53±0.49	2.73±0.24	1.93±0.10	2.42±0.33	3.40±0.36	1.14±0.10
38	5.84±0.30	2.50±0.06	1.84±0.07	2.33±0.12	3.17±0.23	1.35±0.05
39	6.73±0.37	2.57±0.26	1.88±0.09	2.62±0.36	3.57±0.29	1.37±0.16
40	6.46±0.57	2.76±0.24	1.95±0.07	2.34±0.26	3.30±0.25	1.14±0.12
41	6.80±0.53	2.57±0.33	1.86±0.08	2.70±0.56	3.66±0.42	1.38±0.16
42	7.23±0.31	2.53±0.13	1.99±0.09	2.85±0.15	3.63±0.18	1.27±0.08
43	6.53±0.30	2.65±0.23	1.88±0.05	2.48±0.26	3.50±0.27	1.42±0.11
44	7.07±0.58	2.46±0.36	1.86±0.12	2.94±0.62	3.79±0.44	1.31±0.16
45	6.65±0.36	2.92±0.18	2.08±0.08	2.28±0.24	3.19±0.20	1.40±0.11
46	6.42±0.26	2.61±0.21	1.86±0.10	2.47±0.22	3.45±0.18	1.40±0.11
47	7.65±0.23	2.03±0.13	1.80±0.04	3.76±0.24	4.23±0.14	1.12±0.08
48	5.38±0.28	3.06±0.11	2.17±0.07	1.79±0.09	2.48±0.16	1.38±0.05
49	6.61±0.34	2.84±0.23	1.96±0.06	2.34±0.24	3.37±0.23	1.45±0.13
50	6.88±0.44	2.80±0.24	2.06±0.05	2.49±0.30	3.39±0.32	1.36±0.11
51	7.07±0.26	2.80±0.24	2.12±0.08	2.49±0.22	3.30±0.15	1.33±0.11
52	7.00±0.39	3.05±0.13	2.09±0.07	2.33±0.13	3.34±0.20	1.43±0.05
53	7.07±0.72	2.19±0.24	1.87±0.12	3.29±0.62	3.80±0.57	1.16±0.05

54	6.76±0.42	2.57±0.33	1.82±0.12	2.66±0.35	3.72±0.29	1.41±0.17
55	7.15±0.23	2.57±0.18	1.96±0.17	2.78±0.18	3.66±0.24	1.32±0.13
56	5.96±0.23	2.03±0.04	1.72±0.06	2.98±0.11	3.46±0.12	1.16±0.04
57	5.80±0.36	3.19±0.24	2.13±0.06	1.82±0.13	2.71±0.14	1.49±0.11
58	5.84±0.36	2.92±0.18	1.91±0.07	2.00±0.17	3.04±0.18	1.52±0.10
59	7.76±0.42	2.53±0.13	2.00±0.05	3.06±0.20	3.88±0.19	1.27±0.07
60	5.88±0.21	2.42±0.18	1.78±0.08	2.41±0.19	3.35±0.24	1.39±0.09
61	7.65±0.30	2.06±0.10	1.83±0.05	3.71±0.44	4.06±0.35	1.10±0.07
62	6.61±0.73	2.92±0.18	1.95±0.06	2.27±0.33	3.38±0.35	1.49±0.11
63-1	5.96±0.13	2.46±0.13	1.81±0.07	2.43±0.17	3.28±0.14	1.35±0.09
63-2	6.34±0.45	2.38±0.21	1.81±0.07	2.69±0.27	3.56±0.28	1.33±0.13

64	7.15±0.30	2.69±0.24	1.85±0.07	2.67±0.24	3.86±0.24	1.45±0.13
65-1	6.03±0.30	2.51±0.13	1.70±0.08	2.41±0.12	3.42±0.23	1.41±0.06
65-2	6.26±0.31	2.30±0.24	1.68±0.09	2.75±0.37	3.71±0.20	1.37±0.18
66	6.65±0.49	2.23±0.24	1.74±0.05	2.95±0.44	3.80±0.26	1.30±0.15
67	6.53±0.36	2.80±0.24	1.81±0.07	2.31±0.22	3.55±0.27	1.54±0.16
68-1	6.23±0.31	2.53±0.23	1.83±0.10	2.47±0.27	3.40±0.22	1.38±0.16
68-2	7.00±0.27	2.46±0.13	1.92±0.06	2.85±0.21	3.63±0.18	1.27±0.07
69	5.92±0.38	2.73±0.31	1.92±0.05	2.20±0.34	3.07±0.18	1.41±0.17
70	7.23±0.37	2.53±0.13	1.87±0.12	2.85±0.13	3.87±0.27	1.36±0.11
71	7.03±0.30	2.61±0.28	1.93±0.10	2.72±0.37	3.64±0.29	1.35±0.17
72	6.96±0.77	2.42±0.26	1.93±0.10	2.86±0.57	3.62±0.50	1.28±0.14
73	5.84±0.49	2.26±0.24	1.78±0.12	2.60±0.29	3.26±0.17	1.26±0.12
74	7.50±0.33	2.73±0.24	1.99±0.08	2.77±0.32	3.76±0.20	1.37±0.13
75	4.61±0.21	2.53±0.13	1.79±0.07	1.82±0.12	2.57±0.16	1.41±0.08
76	5.65±0.23	2.46±0.13	1.74±0.12	2.33±0.17	3.33±0.31	1.43±0.12
77	6.04±0.22	2.52±0.16	1.86±0.06	2.40±0.23	3.21±0.11	1.33±0.04
78	6.07±0.26	2.61±0.21	1.88±0.07	2.33±0.21	3.23±0.11	1.39±0.10
79	5.53±0.23	2.42±0.18	1.73±0.09	2.30±0.26	3.19±0.23	1.39±0.07
80	6.19±0.24	2.38±0.21	1.75±0.08	2.61±0.27	3.53±0.21	1.35±0.09

81	6.53±0.23	2.80±0.24	1.95±0.07	2.34±0.21	3.34±0.21	1.43±0.10
82	5.61±0.94	2.92±0.18	1.99±0.08	1.92±0.29	2.81±0.41	1.46±0.10
83	5.57±0.97	2.80±0.24	2.01±0.09	2.02±0.51	2.84±0.64	1.41±0.10
84	6.53±0.36	2.76±0.24	2.00±0.08	2.37±0.27	3.24±0.21	1.38±0.11
85	4.80±0.24	2.88±0.21	1.96±0.09	1.67±0.19	2.45±0.15	1.46±0.09
86	6.50±0.33	2.61±0.28	1.85±0.09	2.51±0.25	3.50±0.19	1.40±0.11
87	5.03±0.23	3.03±0.13	2.12±0.08	1.73±0.26	2.50±0.46	1.44±0.07
88	5.02±0.12	2.75±0.25	2.12±0.05	1.83±0.16	2.35±0.06	1.29±0.13
89	6.15±0.23	2.76±0.24	1.91±0.09	2.23±0.19	3.21±0.14	1.44±0.13
90	6.57±0.38	2.61±0.21	1.70±0.10	2.53±0.27	3.42±0.16	1.36±0.13
91	5.23±0.24	3.15±0.23	2.16±0.05	1.66±0.11	2.41±0.12	1.45±0.11
92	5.14±0.17	2.96±0.13	2.06±0.06	1.76±0.25	2.55±0.44	1.44±0.05
93	6.42±0.33	2.80±0.24	1.94±0.06	2.29±0.23	3.30±0.22	1.45±0.12
94	7.53±0.45	2.53±0.13	1.95±0.06	2.97±0.25	3.85±0.20	1.30±0.06
95	6.57±0.38	2.88±0.21	1.97±0.11	2.29±0.21	3.33±0.28	1.46±0.10
96	6.26±0.31	2.69±0.24	1.86±0.08	2.34±0.20	3.35±0.17	1.44±0.13
97	6.65±0.36	2.84±0.23	1.96±0.07	2.35±0.20	3.39±0.23	1.44±0.10
98	4.69±0.24	3.06±0.12	1.96±0.05	1.56±0.08	2.39±0.14	1.53±0.04
99	5.92±0.43	2.61±0.21	2.06±0.09	2.28±0.18	2.96±0.37	1.29±0.12

Grand mean ²⁾	6.47±0.41	2.52±0.21	1.86±0.09	2.61±0.30	3.84±0.28	1.34±0.11

1) Mean of 20 grains and standard deviation.

2) Mean of means in the respective strains (n=102) and standard deviation.

Widths of grains were observed to be between 1.87 mm and 3.19 mm. The narrowest grain was obtained in No.2. The widest was obtained in No.57. Average value was found to be 2.52 mm. The standard deviations of each strain were noted to be between 0.04 (No.56) and 0.66 (No.1).

Thicknesses of grains were observed to be between 1.53 mm and 2.17 mm. The

thinnest grain was obtained in No.2. The thickest was obtained in No.48. Average value was found to be 1.86 mm. The standard deviations of each strain were noted to be between 0.03 (No.33) and 0.53 (No.1).

To make clear the relationships of the three components, *i.e.*, length and width, length and thickness, and width and thickness of husked grains, correlation coefficients were calculated. The correlation coefficient between length and width of husked grains was ascertained to be 0.44, showing positive correlation among them at 5% level. The correlation coefficient between length and thickness of husked grains was ascertained to be 0.07, showing no significant correlation even at 5% level. The correlation coefficient between width and thickness was ascertained to be 0.77, showing significant correlation among them at 0.1% level.

Ratios of grain-length to grain-width were observed to be between 1.56 and 3.76. The smallest value was obtained in No.98. The largest was obtained in No.47. Average value was found to be 2.61. The standard deviations of each strain, *i.e.*, showing intra-strain variations, was noted to be between 0.08 (No.98) and 0.91 (No.2).

Ratios of grain-length to grain-thickness of husked grains were observed to be between 2.39 and 4.37. The smallest value was obtained in No.98. The largest was obtained in No.27. Average value was found to be 3.84. The standard deviations of each strain was noted to be between 0.11 (No.77 and No.78) and 1.10 (No.2).

Ratios of grain-width to grain-thickness of husked grains were observed to be between 1.10 and 1.54. The smallest value was obtained in No.61. The largest was obtained in No.67. Average value was found to be 1.34. The standard deviations of each strain was noted to be between 0.04 (No.56 and No.98) and 1.33 (No.1 and No.2).

Summary

During the trip from June 1 to June 28 in 1988, in Madagascar, 99 strains of seed sample of cultivated rice, *i.e.*, *Oryza sativa* L. , were collected. Their localities and habitats were reported (Table 1). Locality names are as follows; Maevatanana, Marovoay, Mahajanga, Mampikony, Port Berge, Antsohihy, Bealanana, Befandrianana, Ambaton-drazaka, Brickaville, Tamatabe, Fenerive, Antsirabe and Ambositra.

One hundred and two strains segregated from 99 samples were used for morphological investigations of husked grains.

In average values, length, width and thickness of husked grains were 6.47 mm, 2.52 mm and 1.86 mm, respectively. Of husked grains, relationships between length and width, length and thickness, and width and thickness were 0.44, 0.07 and 0.77, respectively. Of husked grains, ratios of the following components, namely, "length to width", "length to thickness" and "width to thickness", were 2.61, 3.84 and 1.34 in average values, respectively.

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