General Remarks on Cultivated Rice in Africa Concerned

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Introduction

The present author has been carrying out a research project on the origin and differentiation of the cultivated rice in the world for the past 20 years. For observing and collecting the cultivated and wild rice species, several scientific tours in Asian countries had already been done by many researchers, including the present author [5,6,8]. These reports and experimental results had contributed not only to the theoretical studies but also to the breeding programmes of the cultivated rice.

Theoretically, following the studies carried in Asian countries, further studies in African areas loom up to be a necessary condition for the realization of these purposes. Accordingly, as a part of the project, a scientific survey team was organized by the author.

During the periods from October to November in 1984 and from August to November in 1985, the writer travelled through 7 countries of Africa, *i.e.*, Madagascar, Tanzania, Kenya, Nigeria, Ivory Coast, Liberia and Senegal, before and after some preliminary and arranging studies in France, for the collection of the wild and cultivated rice species under the project, named "Studies on the Distribution and Ecotypic Differentiation of Wild and Cultivated Rice Species in Africa", supported by a Grant from Ministry of Education, Science and Culture of the Japanese Government. In these opportunities, the cultivated rice distributed and under cultivation in African countries were studied.

The author is most grateful to the Government Officials in REPOBLIKA DEMOKRATIKA MALAGASY, REPUBLIC OF KENYA, UNITED REPUBLIC OF TANZANIA, FEDERAL REPUBLIC OF NIGERIA, REPUBLIOUE DE CÔTE D'-IVOIRE, REPUBLIC OF LIBERIA, RÉPUBLIQUE DE SENEGAL, RÉPUBLIQUE FRANCAISE. Thanks are also due to the scientists in the respective countries.

On documentary records on cultivated rice in Africa

On the distribution of cultivated rice species in Africa, some reports have already been published.

The present author's opinion agrees with Dr. CHANG's [2]. The origin, evolution, cultivation, dispersal and diversification of the two cultivated rice species (*Oryza sativa* L. and *O. glaberrima* STEUD., see Table 1) have evoked interests not only among the biological scientists but also among geographers, and other social scientists. Because of the gaps or deficiencies in evidences outside the botanical disciplines, as well as on account of the state of flux still facing the biosystematics of the 20 taxa in the genus *Oryza*, hitherto publication to fix a data on this broad subject have been largely discipline-oriented and have failed to provide a concise and comprehensive view.

ROSCHEVICZ first postulated that the center of origin of *O. glaberrima* was in Africa [13]. PORTÈRES suggusted that the common projenitor was of a rhizomatous and floating form [12]. Almost all the botanists have generally treated the two cultivated species as distinct geographic entities. Recently, re-examinations have been carried out on the geographic distributions of the wild and the primitive strains of cultivated rices [3]. Judging from the recent findings on the evolutionary processes of the grasses and of the crop plants [14], it is most reasonable to visualize the general process as in the following, namely, wild prennial→wild annual →cultivated annual.

PORTÈRES stated that [12] the primary variation center of *O.glaberrima* is to be in the Central Niger Delta (swampy basin). Primitive forms with brittle spikelets and very often with antocyan coloring are found there, forming the Nigerica group. The secondary variation-center is in the district of Macenta (Guinean coast). This center too is very rich in variation. However, generally the spikelets are not brittle. They form a Senegambica group. The third center includes intermediate type ranged between the Nigerica and Senegambica groups. The loss of anthocyan, white grain and also that of floating are conspicuous. Spikelets are not brittle. The third group, Humilis, is found on the Dorsale Guineenne (Fig.1.).

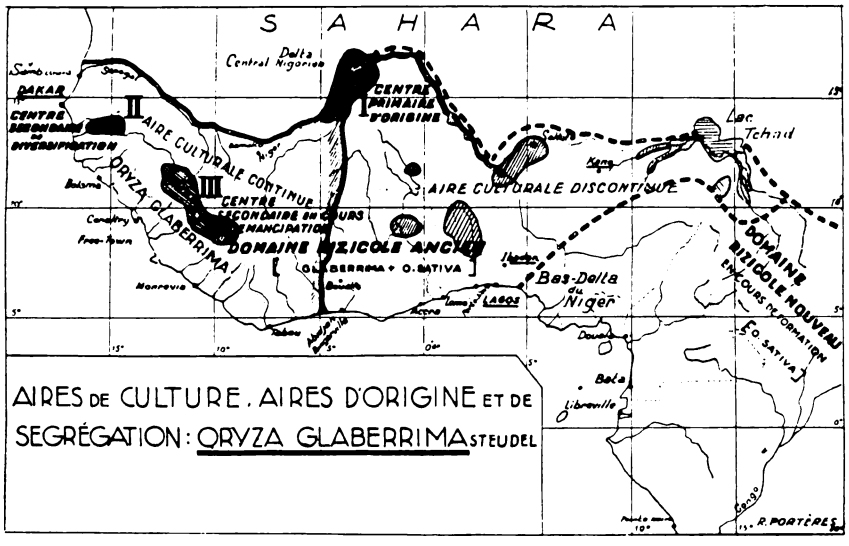

Fig. 1. Centers of variations in *O. glaberrima* (PORTÈRES, 1956 [12]).

After PORTÈRES, the primary center of *O. glaberrima* was found about 1,500 B. C., while the Asiatic rice culture had been under development since 6,000 B. C. The secondary center is estimated to be 500 years younger than the primary one. Judging from the history of domestication and the extent of varietal diversity within the species, it appears plausible that the differentiation–date of *O. sativa* in Asia is earlier than date of *O. glaberrima* in West Africa.

The geographical dissemination of one of the cultivated species, *O. sativa*, in the Asia has been discussed by many workers. On the other hand, that of another cultivated species, *O. glaberrima*, in Africa has rarely been discussed.

In the viewpoint of ecological diversification, *O. glaberrima* in West Africa is the dominant crop growing in the flooded areas of the Niger and Sokoto River basins (Table 1), where broadcasting of it has been executed on hoed fields. On the shallowly flooded land, a rainfed lowland crop is either directly sown by broadcasting or dibbling, or is transplanted. The African cultivars and their annual wild species are less diverse than their Asian counterparts [2]. While PORTÈRES [12] recognized already the two subspecies (*vulgalis* and *humilis*) in *O. glaberrima*. OKA [9] considered that the barthii–glaberrima complex might have differentiated into two subspecies, deep water one and upland one.

Table 1. Distribution and habitat of cultivated rice collected in 6 countries of Africa; Madagascar in 1985, Kenya in 1985, Nigeria in 1984 and 1985, Ivory Coast in 1984, Liberia in 1985, Senegal in 1985. Abbreviations: **S**; *Oryza sativa* L., **G**; *Oryza glaberrima* STEUD., m; meter or meters, km ; kilometer or kilometers

Collected No.	Species	Date	Variety name	Place, habitat and remarks
MADAGASCAR in 1985				
C19	**S**	Aug. 28	Bekimondro	Maevatanana. Collected from farmer's store. Mixed variety.
C20	**S**	Aug. 28		Samples from **C20** to **C23** were separated from **C19**.
C21	**S**	Aug. 28		
C22	**S**	Aug. 28		
C23	**S**	Aug. 28		
C24	**S**	Aug. 29	Rokorintsane	Maevatanana. Collected from farmer's store. Mixed variety.
C25	**S**	Aug. 28		Separated from **C24**.
C26	**S**	Aug. 29	Bekimondro	Maevatanana. Collected from farmer's store. Mixed variety.
C27	**S**	Aug. 29		Samples from **C27** to **C30** were separated from **C26**.
C28	**S**	Aug. 29		
C29	**S**	Aug. 29		
C30	**S**	Aug. 29		
C31	**S**	Aug. 29	Tsipala	Ambolajanakomby. Irrigated paddy field at the fringe of pond.
C32	**S**	Aug. 29	Hozolahy	The same place as **C31**. Collected from a rice heap adjacent to rice field.
C33	**S**	Aug. 29	Japone	The same place as **C31** and **C32**. Collected from farmer's store. Mixed variety.

C34	S	Aug. 29		Separated from **C33**.
C35	S	Aug. 30	1329 Boina	Tsararano Village, Marovoay. Irrigated paddy field of FIFABE.
C36	S	Aug. 31	Ali–combo	Murarano Village, Marovoay. Collected from farmer's store.
C37	S	Aug. 31	Tsipala	The same place as **C36**. Collected from farmer's store.
C38	S	Aug. 31	1329 Boina	The same palce as **C36** and **C37**. Collected from farmer's store.
C39	S	Aug. 31	Andramonta	Mbalano Village, Marovoay. Collected from farmer's store. Mixed variety.
C40	S	Aug. 31		Samples from **C40** to **C42** were separated from **C39**.
C41	S	Aug. 31		
C42	S	Aug. 31		
C43	S	Aug. 31	Menakely	Mbalano Village, Marovoay. Irrigated paddy field.
C44	S	Sep. 3	Rojofotsy	Andranovelona. Collected from farmer's store. Mixed variety.
C45	S	Sep. 3		Samples from **C45** to **C48** were separated from **C44**.
C46	S	Sep. 3		
C47	S	Sep. 3		
C48	S	Sep. 3		
C49	S	Sep. 3	Botry	Mohitsy Village, Antananarivo. Collected from a store of rice mill. Mixed variety.
C50	S	Sep. 3		Samples from **C50** to **C52** were separated from **C49**.
C51	S	Sep. 3		
C52	S	Sep. 3		
C53	S	Sep. 5	Makalioka	Antsapanimahozo. Collected from farmer's store.
C54	S	Sep. 5	Vary malady	Anororo. Collected from threshing floor in paddy field. Mixed variety.
C55	S	Sep. 5		Samples from **C55** to **C60** were separated from **C54**.
C56	S	Sep. 5		
C57	S	Sep. 5		
C58	S	Sep. 5		
C59	S	Sep. 5		
C60	S	Sep. 5		
KENYA in 1985				
C61	S	Sep. 17	Sindano	Tnaka Kona (a) Village, Busia. Collected from farmer's store.
C62	S	Sep. 17	Basmati	The same place as **C61**. Collected from farmer's store.
C63	S	Sep. 17	Daudra–precoce	Bumala. Upland field.
C64	S	Sep. 20	Bi–bi–ya–muhaka	Waa Village, Kwale. Rainfed paddy field.
C65	S	Sep. 20	Moshi wa sigara	Matuga Village, Kwale. Collected from farmer's store. Mixed variety.
C66	S	Sep. 20		Samples from **C66** to **C69** were separated from **C65**.
C67	S	Sep. 20		
C68	S	Sep. 20		
C69	S	Sep. 20		
C70	S	Sep. 20	Kitumbo	Matuga Village, Kwale. Collected from farmer's store. Mixed variety.
C71	S	Sep. 20		Samples from **C71** to **C73** were separated from **C70**.
C72	S	Sep. 20		
C73	S	Sep. 20		

C74	**S**	Sep. 21	Mtezaminami	Mnazini Village, Tana river. Collected from farmer's store. Mixed variety.
C75	**S**	Sep. 21		Samples from **C75** to **C80** were separated from **C74**.
C76	**S**	Sep. 21		
C77	**S**	Sep. 21		
C78	**S**	Sep. 21		
C79	**S**	Sep. 21		
C80	**S**	Sep. 21		
C81	**S**	Sep. 22	Gamti	Samples from **C81** to **C88** were collected from farmer's store in Hewani Village, Tana River.
C82	**S**	Sep. 22	Asfala	
C83	**S**	Sep. 22	Bi–bi–ya–muhaka	
C84	**S**	Sep. 22	Mututudo	
C85	**S**	Sep. 22	Basmati	
C86	**S**	Sep. 22	Basmati	
C87	**S**	Sep. 22	Muriziki	
C88	**S**	Sep. 22	Mtezaminami	
C89	**S**	Sep. 22	Sindano	Hewani Village, Tana River. Irrigated paddy field.
C90	**S**	Sep. 23	Kisuke	Ngao Village, Tana River. Collected from farmer's store.
C91	**S**	Sep. 23	Fazani	Idosowerinage Village, Tana River. Irrigated paddy field.
C92	**S**	Sep. 23	Muenosi	Idosowerinage Village, Tana River. Irrigated paddy field.

NIGERIA in 1984

C5	**S**	Nov. 6	Samples from **C5** to **C7** mixed–growing in rainfed paddy field in Tegina.
C6	**S**	Nov. 6	
C7	**G**	Nov. 6	
C8	**S**	Nov. 6	Samples from **C8** to **C10** mixed–growing in rainfed paddy field in Kagara.
C9	**S**	Nov. 6	
C10	**G**	Nov. 6	
C11	**S**	Nov. 6	**C11** and **C12** mixed–growing in rainfed paddy field in Kagara.
C12	**G**	Nov. 6	
C13	**G**	Nov. 7	Zaria. Road–side depression.
C14	**G**	Nov. 7	60 km north of Zaria to Kano. Road–side depression.
C15	**G**	Nov. 7	The same place as **C14**.
C16	**G**	Nov. 7	64 km north of Zaria to Kano. Road–side depression.
C17	**G**	Nov. 7	The same place as **C16**.
C18	**G**	Nov. 9	Ngala. Irrigated paddy field of South East Chad Irrigation Project.

NIGERIA in 1985

C93	**S**	Oct. 1	Badeggi. Road–side swamp.
C94	**G**	Oct. 1	**C94** and **C95** mixed–growing in deep water paddy field of National Cereals Research Station in Badeggi.
C95	**S**	Oct. 1	
C96	**G**	Oct. 2	**C96** and **C97** mixed–growing in field of river flood plain, 70 km south of Jega to Kontagola.
C97	**S**	Oct. 2	
C98	**G**	Oct. 3	Rafingiwa Village between Bunza and Kende. Irrigated paddy field adjacent to pond.
C99	**G**	Oct. 3	The same place as **C98**. Embankment of irrigation canal.

C100	**G**	Oct. 3		Kende. Depression in river flood plain.
C101	**S**	Oct. 3		The same habitat as **C100**.
C102	**S**	Oct. 3		The same habitat as **C100** and **C101**.
C102	**S**	Oct. 3		The same habitat as **C100**, **C101** and **C102**.
C103	**S**	Oct. 4		Birnin Kebbi. River flood plain. Mixed-growing with *O. glaberrima* in the river.
C104	**S**	Oct. 4		The same place as **C103**.
C105	**G**	Oct. 4		**C105** and **C106** mixed-growing in field of river flood plain in Arugungu.
C106	**S**	Oct. 4		
C107	**G**	Oct. 4		Sokoto. River flood plain.
C108	**G**	Oct. 4		The same place as **C107**.
C109	**S**	Oct. 5		Rabah. Road-side ditch.
C110	**S**	Oct. 5		Rabah. River flood plain. Growing along the river.
C111	**S**	Oct. 5		The same place as **C110**.
C112	**G**	Oct. 5		The same place as **C110** and **C111**. Growing in the edge of river.
C113	**G**	Oct. 5		Goronyo. Road-side dried up swamp.
C114	**G**	Oct. 5		Goronyo. Road-side dried up swamp.
C115	**S**	Oct. 6		Samples **C115** to **C118** mixed-growing in paddy field, 3 m below the road in Talta.
C116	**G**	Oct. 6		
C117	**G**	Oct. 6		
C118	**G**	Oct. 6		
C119	**S**	Oct. 6		14 km south of Maradun. Road-side swamp.
C120	**G**	Oct. 6		The same place as **C119**.
C121	**S**	Oct. 7		18 km south east of Pambeguma. Pond.
C122	**G**	Oct. 7		48 km south east of Pambeguma. Pond.
C123	**G**	Oct. 8		Lafia. Road-side ditch.
C124	**S**	Oct. 10		Outurcupo. Upland field.

IVORY COAST in 1984

C1	**S**	Nov. 1	Ferkessedougou. Irrigated paddy field.
C2	**G**	Nov. 2	Samples from **C2** to **C4** were collected in the experimental field of IDESSA in Bouké.
C3	**G**	Nov. 2	
C4	**G**	Nov. 4	

LIBERIA in 1985

C125	**S**	Oct. 17	Lac-23	Kpatawee, Bong County. Irrigated paddy field in Chinese farm.
C126	**G**	Oct. 17	Siawound	Gayea, Bong County. Shifting field.
C127	**S**	Oct. 18	Ta-a-boah	Baila, Bong County. Shifting field on hill slope.
C128	**S**	Oct. 18	Yo polu	The same place as **C127**.
C129	**G**	Oct. 18		Blefuanai, Bong County. Upland field in farmer's garden.
C130	**G**	Oct. 18		Gbalatuai, Bong County. Swampy low land in a valley.
C131	**S**	Oct. 18		The same place as **C130**.
C132	**G**	Oct. 18		The same place as **C130** and **C131**.
C133	**G**	Oct. 19		Gayea, Bong County. Edge of upland field. Growing wild status.
C134	**S**	Oct. 19	Jao	Gayea, Bong County. Shifted upland field.
C135	**S**	Oct. 19	Pantio	Gayea, Bong County. Shifting field.
C136	**S**	Oct. 19	Qua Qua	Gayea, Bong County. Shifting field.
C137	**G**	Oct. 19	Siawound	Palala, Bong County. Shifting field on hill slope.
C138	**S**	Oct. 19	Vilikolin	Palala, Bong County. Shifting field on hill slope.
C139	**S**	Oct. 19	Yopo	Palala, Bong County. Shifting field on hill slope.

C140 **S** Oct. 22 Gbedin, Nimba County. Swampy area.
C141 **S** Oct. 23 Zor Ble, Nimba County. Irrigated paddy field.
C142 **G** Oct. 23 Gata Ble, Nimba County. Swampy valley surrounded by shifting field on hill side slope.
C143 **G** Oct. 23 Bee Ble, Nimba County. Shifting field on hill side slope. A few plants growing as weed in *O. sativa* field.
C144 **G** Oct. 24 Gata Sanniqullie, Nimba County. Shifting field on hill side slope. Growing as weed in *O. sativa* field.

C145 **G** Oct. 24 Ma Gboi–Darvoryee, Nimba County. Shifting field on hill side slope. Growing as weed in *O. sativa* field.
C146 **G** Oct. 24 Ma Gboi–Darvoryee, Nimba County. Shifting field on hill slope. Growing as weed in *O. sativa* field.

SENEGAL in 1985

C147 **G** Oct. 30 Ziguinchor. Road–side submerged paddy field.
C148 **G** Oct. 30 Near Ziguinchor. Rainfed paddy field. A few plants growing as weed in *O. sativa* field.
C149 **G** Oct. 30 Near Ziguinchor. Rainfed paddy field. Growing as weed in *O. sativa* field.
C150 **G** Oct. 30 Niassaran Near Ziguinchor. Rainfed paddy field.
C151 **G** Oct. 30 N'bagnera Near Ziguinchor. Rainfed paddy field.

C152 **S** Oct. 30 Waga Guidel Village, near Ziguinchor. Rainfed paddy field.
C153 **G** Oct. 30 Boutoupo Village, near Ziguinchor. Rainfed paddy field. Growing as weed in *O. sativa* field.
C154 **S** Oct. 31 Bilikissa Niaguis Village, between Ziguinchor and Diattacounda. Rainfed paddy field.
C155 **G** Oct. 31 Lola coyo Agnack Village, between Ziguinchor and Diattacounda. White grain.
C156 **G** Oct. 31 Lola wouling The same field as **C155**. Red grain.

C157 **G** Oct. 31 Kunu mano Agnack Village between Ziguinchor and Diattacounda. Swamp surrounded by paddy field. Intermediate from *O. glaberrima* and O. *breviligulata.* Immatured.
C158 **G** Oc. 31 Lola fingo Agnack Village between Ziguinchor and Diattacounda. Upland field.
C159 **G** Oct. 31 Lola woulaigre Adeane Village between Ziguinchor and Diattacounda. Rainfed paddy field.
C160 **S** Oct. 31 Boucolonding Adeane Village between Ziguinchor and Diattacounda. Rainfed paddy field.
C161 **S** Oct. 31 Tambango Adeane Village between Ziguinchor and Diattacounda. Rainfed paddy field.

C162 **S** Oct. 31 Moussou noring Diagnon Village between Ziguinchor and Diattacounda. Rainfed paddy field.
C163 **G** Oct. 31 Mano moussou coyo Diagnon Village between Ziguinchor and Diattacounda. Rainfed paddy field.
C164 **G** Oct. 31 Mano moussou coyo Diagnon Village between Ziguinchor and Diattacounda. Rainfed paddy field.
C165 **S** Oct. 31 Rasta mano Kaour Village between Ziguinchor and Diattacounda. Rainfed paddy field.
C166 **G** Oct. 31 Mano moussou coyo Goudomp Village between Ziguinchor and Diattacounda. Upland field. Mixed–growing with *O. sativa.*

C167 **S** Nov. 1 Coungsoungoutou mano Djibanar Village between Ziguinchor and Kolda. Rainfed paddy field.
C168 **G** Nov. 1 Simbandi Balante Village between Ziguinchor and Kolda. Submerged paddy field. Growing as weed in *O. sativa* field. Awned grain.

C169 **G** Nov. 1 The same field as **C168**. Awnless grain.
C170 **G** Nov. 1 Mano moussou Amdoulaye Village between Ziguinchor and Kolda. Upland field. A few plants remaining in the field where *O. sativa* was already harvested.
C171 **G** Nov. 1 Mano moussou fingo Sindima Village between Ziguinchor and Kolda. Rainfed paddy field. Mixed-growing with *O. sativa*. Black grain.

C172 **G** Nov. 1 Woulingo The same field as **C171**. Red grain.
C173 **S** Nov. 1 Banbatou Village between Ziguinchor and Kolda. Rainfed paddy field.
C174 **G** Nov. 1 Mano ouaigue Dar es Salaam Village between Ziguinchor and Kolda. Rainfed paddy field. Mixed-growing with *O. sativa*.
C175 **G** Nov. 1 Fotou Kitim Village between Ziguinchor and Kolda. Rainfed paddy field.
C176 **G** Nov. 2 Kampissa Village between Kolda and Velingara. Irrigated paddy field in low land. Mixed-growing wtith *O. sativa*. Red grain.

C177 **G** Nov. 2 The same field as **C176**. Black grain.
C178 **G** Nov. 2 Bololo woulingo Kampissa Village between Kolda and Velingara. Rainfed paddy field. Mixed-growing with *O. sativa*. Red grain.
C179 **G** Nov. 2 The same field as C178. Black grain.
C180 **G** Nov. 2 Bololo woulingo Kilidio Saboly Village between Kolda and Velingara. Rainfed paddy field. Mixed-growing with *O. sativa*. Red grain.
C181 **G** Nov. 2 Bololo fingo The same field as **C180**. Black grain.

C182 **S** Nov. 2 Mano nding wouling Biaro Village between Kolda and Velingara. Rainfed paddy field. Small grain.
C183 **S** Nov. 2 Mano nding wouling The same field as **C182**. Similar type but larger grain than that of **C182**.
C184 **G** Nov. 3 Bololo wouling Bassè, GAMBIA. Rainfed paddy field. Mixed-growing with *O. sativa*.
C185 **G** Nov. 4 Kebero wouling Toubacouta between Kolda and Sefa. Rainfed paddy field. Mixed-growing with *O. sativa*. Awned grain.
C186 **G** Nov. 4 Kebero wouling The same field as **C185**. Awnless grain.

C187 **G** Nov. 4 Wer wer Oudoucar Village between Kolda and Sefa. Rainfed paddy field. Mixed-growing with *O. sativa*.
C188 **G** Nov. 4 Eyona Bonghari Village between Bignona and Ziguinchor. Rainfed paddy field. A few plant remaining in the field where *O. sativa* was already harvested.
C189 **G** Nov. 5 Mano mano yafitte Bandiana Village between Ziguinchor and Bignona. Rainfed paddy field. Growing as weed in *O. sativa* field.
C190 **S** Nov. 6 Banjul, GAMBIA. Rainfed paddy field, ridge culture.
C191 **G** Nov. 6 Bololo wouling Banjul, GAMBIA. Rainfed paddy field, Mixed-growing with *O. sativa*.

C192 **G** Nov. 6 Mano moussou Banjul, GAMBIA. Upland field. Growing as weed in the *O. sativa* field.
C193 **G** Nov. 6 Mano mano Pirang Village, GAMBIA, between Banjul and Kafuta. Rainfed paddy field. Growing as weed in the *O. sativa* field. Red grain.
C194 **G** Nov. 6 Mano mano The same field as **C193**. Black grain.
C195 **G** Nov. 6 Mano mano Fraba Bantan Village, GAMBIA, between Banjul and Kafuta. Rainfed paddy field. A few plants remaining in the field where *O. sativa* was already harvested. Red grain.
C196 **G** Nov. 6 Mano mano The same field as **C195**. Black grain.

C197 **G** Nov. 6 Bololo blanc Collection site and habitat are of indistinctness. White pericarp.
C198 **G** Nov. 6 Mano mano Lame Village, GAMBIA, between Banjul and Kafuta. Rainfed paddy field. Mixed-growing with *O. sativa*. Red grain.

C199	**G**	Nov. 6	Mano mano	The same field as **C198**. Black grain.
C200	**S**	Nov. 7	Barafita	Kafoutine. Upland field.
C201	**S**	Nov. 10	D–52–37	Colonat Village, Richard Toll. Submerged paddy field.

After SIMPSON [15], both the "*O. sativa complex*" in tropical Asia and the "*O. glaberrima complex*" in West Africa come to be considered to be as the evolutionary species that are still undergoing incessant and dynamic changes through the hybridization–differentiation cycles.

O. sativa introduced into West Africa in the 17th century, has been rapidly spreading itself in the rainfed lowland areas having let *O. glaberrima* grow formerly. In the irrigated areas and in the mangrove swamps, only *O. sativa* is in growth [10]. However, rice–cultivation in East Africa and Madagascar [1] is postulated to have been occasioned earlier than in the age mentioned above.

IRAT (Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres and ORSTOM (Office de la Recherche Scientifique et Techniques Outer–Mer) held a meeting on African Rice Species in 1977 with the attendance of 19 participants. In the publication from this meeting [4], the following items were discussed ; genetic diversity of *O. glaberrima* and *O. breviligulata* as shown from the direct observation, enzyme variability of the *sativa complex* of *Oryza* in Africa, the ancestors of the cultivated rice and their evolution, morphological varieties and agronomic potentials of *O. glaberrima* and wild species, genetic variations of *O. glaberrima*, their survey and evolution.

Recently, indigenous rice–collections in African countries were done by several scientists [11,16]. It is important to ascertain the location where genetic diversity exists of the place where rich variations have been occasioned well in spite of such obstacles as endemic diseases [7], not only in Asian but also in African countries.

Northeastern part of India has been looked upon as one of the differentiation centers of *O. sativa,* owing to the several genetical and cytogenetical investigations [6]. Some strains of *O. sativa* are found in the whole areas of Africa. However, it is not easy to identify a route of migration from Asian areas and to clarify the diversification of the species in Africa. Taking into account these items, it comes to be quite important to ascertain the varietal differentiations and phylogenetical relationships of the cultivated rice in Asian areas. It is also requested to confirm to the evolutional relationships between *O. sativa* and *O. glaberrima* and between the cultivated and the wild species belonging to the genus *Oryza*.

Some records obtained during the tours

The localities concerned in these trips in African countries were mentioned in detail in Table 1. Geographical situations of the cultivated rice collected were briefly illustrated in Fig. 2. In this figure, countries concerned and the strain numbers of the cultivated rice collected are given.

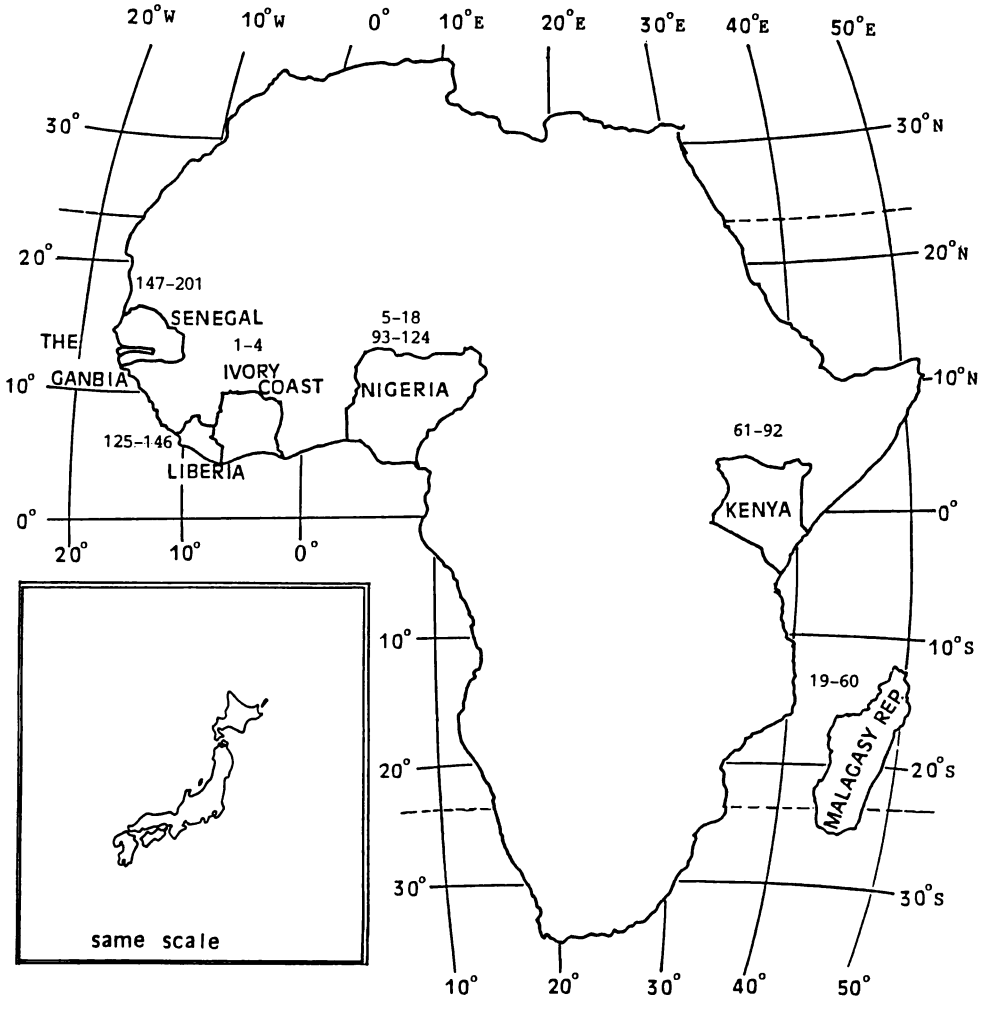

Fig. 2. Map showing countries where the cultivated rice in Africa was collected and observed. Code-numbers used in the figure are corresponding to the strain-number used in Table 1.

Most of the seed–samples collected were divided into two groups, one of which was deposited in the scientific organizations in the respective countries, and another one was carried back to Japan. These plant– and grain–characters are being put under analyses at these institutes and Kagoshima University, Japan.

The number of strains collected was 201 in the total. They were constituted by 121 of *Oryza sativa* L. and 80 of *O. glaberrima* STEUD. On both of the species, the following remarks might preliminary be mentioned.

Oryza sativa L. (121 strains)

Populations of the species were found in abundant at the fields of East and West Africa, *i.e.*, 42 strains in Madagascar, 32 strains in Kenya, 5 strains (1984) and 17 strains (1985) in Nigeria, 1 strain in Ivory Coast, 11 strains in Liberia, 13 strains in Senegal, and strains in many other fields were observed but not collected in these trips. They have had almost erect growths in lowland, shallow water, deep water, upland conditions, and sometimes in the waste land. They were sometimes adjacent to a field of *O. glaberrima*, and wild rice, being separated by an embankment.

Oryza glaberrima STEUD. (80 strains)

Populations of the species were found in abundant at the fields of West Africa, *i.e.*, 9 strains (1984) and 15 strains (1985) in Nigeria, 3 strains in Ivory Coast, 11 strains in Liberia, 42 strains in Senegal, and many other populations were observed but not collected in these trips. They have had almost erect growths in lowland, shallow water, upland conditions, and sometimes in the waste land. They were sometimes adjacent to a field of *O. sativa* and wild rice, separated by an embankment, or otherwise, growing together with *O. sativa* and/or wild rice sympatrically or allopatrically.

In many fields, *O. glaberrima* was in growth in a mixed stand with *O. sativa*. Sometimes the mixed stand appeared to have been results from mechanical mixtures during harvesting and drying. In some cases, a 1:1 mixture appeared to be intentionally provided by the farmer. *O. longistaminata* was also frequently found in *O. glaberrima* fields. Sometimes farmers cultivated both the species in the same field as an insurance crop.

Documents of the cultivated rices collected were listed up in Table 1. Populations observed but not collected were omitted in the table. In this table, collection–number, species–name, year, month and date of collection, abstract of locality and brief information of habitat, were described.

In 1986, most of the strains collected were sown in the Experimental Farm in Kagoshima University. About 60 characters including plant– and grain–morphological ones are under analyses.

Abstract

During the two tours done in 1984 and 1985 in the 7 countries of Africa, 201 strains of cultivated rice species, *i.e.*, 121 strains of *Oryza sativa* L. and 80 strains of *Oryza glaberrima* STEUD., were collected. Basing on the analyses of the data obtained in the

field survey, morphological, genetical and ecological characters, geographical, ecotypic and varietal differentiations might be ascertained in the following papers.

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