

ミャンマー北部および西部地域における 野生イネの探索収集 (2004 年)

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Exploration and Collection of Wild Rice in Northern and Western Region of Myanmar, 2004

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Summary

Myanmar has been known as a part of the gene center of rice from old times. Its diversity of wild rice as well as cultivated rice has been well conserved compared to surrounding countries. However, areas such as northern and western of the Myanmar were not surveyed for wild rice. Therefore, it is an important subject to survey and collect wild rice around these areas as important genetic materials for breeding and research. We explored and collected wild rice in the northern and western parts of Myanmar as a Myanmar-Japan collaborative field research under the NIAS Genebank Project in 2004.

A total of 102 seed samples consisting of 93 *Oryza rufipogon*, six *O. officinalis* and three *O. granulata* were collected in this exploration. Regarding primary features of *O. rufipogon* collected in the northern and western part of Myanmar, many wild rice plants were growing in swamps and canals disturbed by people and livestock near paddy fields. Although some populations near paddy fields looked like hybrid swarms with introgression from cultivated forms, hybrid swarms did not necessary occur in habitats of wild rice in the vicinity of paddy fields. Many wild rice plants growing in deep water showed floating ability, while the others growing in shallow water formed rigid root systems in the soil. Relationships between plant height and depth of water varied among sites. Seed fertilities of wild rice plants collected in this survey were generally low, but those of the plants which looked like hybrids between wild and cultivated types were relatively high. We found distinctive habitats distributed in different areas. Many habitats of floating wild rice showing high seed fertility was discovered in Indawgyi

Lake of Kachin State. A short grass-type wild rice having compact panicles were found near paddy fields along the roadside in Rakhine State and Ayeyarwady Division. It is important to elucidate the features of these habitats for understanding ecotypic differentiation of wild rice in Myanmar.

Keywords: rice, wild relatives, *Oryza rufipogon*, *O. officinalis*, *O. granulate*, Myanmar

Introduction

It is an urgent subject to investigate and comprehend a genetic diversity of wild rice distributed in various environments, to discuss *in situ* conservation of it, and to make a core collection which represents its wide diversity. Wild rice species are morphologically and physiologically different from cultivated rice (*Oryza sativa* L.) and are considered as germplasm carrying great genetic variation that cultivated rice landraces do not have. Although they should be important genetic resources for breeding and research, their habitats in tropical regions are rapidly decreasing due to land development in recent years.

Myanmar is located in the westernmost of Southeast Asia. Its area of 680,000 square kilometers, which is 1.8 times as large as that of Japan, includes diversified environments from marshland delta to cool mountain range. An area ranging from Myanmar to Yunnan Province of China has been known as a center of genetic diversity of rice for a long time. The diversity of wild rice as well as that of cultivated rice might have been well conserved in Myanmar compared to surrounding countries, because traditional agriculture is being maintained and a natural environment also remains without large-scale destruction there. In case of the cultivated rice, a considerable amount of accessions has been collected not only by explorations of Seed Bank of DAR itself but also by those of JICA Seed Bank Project, MAFF Genebank project and so on ¹⁾ ²⁾. Wild rice have also been collected by explorations of Seed Bank of DAR and International Rice Research Institute ³⁾ ⁴⁾ in some extent, while areas such as northern Kachin State, western Rakhine State were not surveyed in detail. It is an important subject to survey and collect the wild rice in these areas as precious genetic resources. Therefore, we explored and collected wild rice in the northern and western parts of Myanmar in cooperation with DAR under the NIAS Genebank project.

Methods

We made a field survey on wild rice for 30 days from November 10 to December 9 in 2004. This period was decided based on the information that wild rice set seed gradually from the beginning of the dry season in late October and cultivated rice is also harvested in many areas of Myanmar at one month or more after the dry season begins.

The survey route and collection sites are shown in Fig. 1. The survey areas included Mandalay Division, Sagaing Division, Kachin State, Magway Division, Rakhine State, Bago Division, and Ayeyarwady Division. We tried to find wild rice based on its plant form, in particular, shape of panicles from a car window while we were moving by car. We also guessed the habitats of wild rice from the ecological information of the circumference and stopped the car to survey around at the possible habitats. In case of survey at Indawgyi Lake in the Kachin State, a boat was hired

instead of a car. Information on collection sites including habitat, latitude, longitude, altitude and other ecological aspects were recorded as the passport data.

The collected seed materials were divided into two subsets: one for the Seed Bank of DAR and other for NIAS based on a material transfer agreement (MTA). The latter were introduced into Japan in accordance with quarantine rules of the both countries. Some of them are cultured in an isolated greenhouse of the NIAS for quarantine and evaluation on primary traits in 2005. When their seeds are propagated sufficiently, they will be conserved to the Genebank of NIAS. Leaf samples collected at several sites as the materials for DNA polymorphism analysis were transferred into Japan in accordance with quarantine rules. We also collected plant voucher specimens in some sites, which are stored at Seed Bank, DAR at Yezin.

Results and Discussion

Summary of collected accessions

A total of 102 wild rice samples consisting of 93 *O. rufipogon*, six *O. officinalis* and three *O. granulate* were collected in this exploration (Table 1). A total of 23 samples including 13 *O. sativa*, one *Vigna stipulacea*, one *V. tenuicaulis*, three *V. angularis*, one *Colocasia esculenta*, one *Eleusine coracana*, one *Sesamum indicum*, one *Coix lacryma-jobi* and one *C. sp.* were also found and collected during the survey. Wild rice of *O. sativa* complex (AA genome) in Asia has often been treated as two different wild taxa, i.e. *O. rufipogon* and *O. nivara*. We use a single taxon, *O. rufipogon* in a broad sense for them in this report, since we observed a continuous variation other than typical *O. rufipogon* and typical *O. nivara* in this field survey. More studies have to be done to clarify the intraspecific differentiation of this taxon.

O. rufipogon

O. rufipogon plants were collected in Mandalay Division, Sagaing Division, Kachin State, Rakhine State, Bago Division, and Ayeyarwady Division except for Magway Division. There are some differences in morphological features among the collection areas. Almost all the plants of *O. rufipogon* collected in the northern and western region of Myanmar were found in swamps or canals near paddy fields and influenced more or less by disturbance of livestock. Hybrid swarms probably derived from hybridization with cultivated rice were often but not always found at sites where wild rice occurred in the vicinity of paddy fields. Many *O. rufipogon* plants growing in deep water showed floating ability, while those growing in the shallow water formed a root system in the soil. Relationship between plant height and water depth was various among sites. Seed fertilities of this species observed at this time were generally low, although those of plants that looked like hybrid derivatives between wild and cultivated types were relatively high. Wild populations at Indawgyi Lake of the Kachin State exceptionally showed a combination of floating habit and high seed fertility, which could not be found at other sites. In the Rakhine State and Ayeyarwady Division, a short grass-type having compact panicles was found near paddy fields along the road but there was no such wild rice found in other areas. Detailed information of collected accessions was described below for each area:

1) Kachin State

A total of 47 seed samples (hereinafter referred as #5, #6, #13, #14, #20, #21-1~30 and

#22~#32) were collected in Kachin State. Among them, the #5, #6, #20 and #21-1~30 were found beside a road.

The #5 grew spontaneously in a swamp beside a paddy field. Since this population included individuals having open panicles and those having compact ones, they seemed to be derived from a hybrid between wild and cultivated types. But plant type of every individual was similar to that of wild rice. Most of the plants showed low fertility.

The #6 and #20 were found in a canal near paddy fields along the road. Their panicles were open-shaped. Some plants matured their seeds, while others just flowered, indicating that maturing period was not uniform in each population. Their fertilities were found to be not so high.

The #21 was found in a swamp beside the road, in which the depth of water was roughly ranging from 0 to 0.6 m. Although the morphological features were similar to those of #6 and #20, there was no paddy field near them. We collected seeds and leaves from individual plants in 1.0 m interval (totally 30 samples) for further analysis on population genetics.

The #13 and #14 were found in a broad swamp near paddy fields in Waing-Maw Township in the vicinity of Myitkyina City. Since they showed a vigorous plant type and large panicles, they were probably derived from hybrids between wild and cultivated types. The seeds of the individuals having open panicles were collected as #13 and those having compact panicles as #14.

The #22 to #32 were collected in Indawgyi Lake which is the largest lake in the Myanmar. According to local information, the water level of Indawgyi Lake in this season normally goes down more than 2.0 m from the highest water level in wet season. The weather during the survey was apt to be clouded until around 10:00 a.m., but it was fine in the afternoon. Because it was difficult to access to wild rice growing on shore of the lake from land side, we approached populations of wild rice by a boat from the lake and collected their seeds. According to local information that there is no population in southern part of the lake, we surveyed wild rice and collected their seeds in eastern, northern and western parts. The wild rice plants grew spontaneously for several kilometers in most of the areas explored. Typical vegetation was allocated in order of *O. rufipogon*, wild *Ipomoea auatica*, *Eichhornia crassipes*, and *Salvinia cucullata* from land side. In particular, *O. rufipogon* was distributed in range of 300 to 500 m from shore. Several other plants such as *Coix* sp., *Cyperus* sp., *Polygonum* sp., *Phleum* sp., and *Sesbania* sp. were observed in the population of wild rice. The wild rice floated and its total plant length was more than 6.0 m (Photo 1). It showed relatively high seed set and matured seeds started shattering (upper left corner in Photo 1). The samples of #22 to #26 were collected in the eastern part of the lake. The #27 and #28 were collected in the northeastern part in which a river flows. Around this area, the wild rice grew in crowds where local people made a channel across the population of wild rice to come and go by boat. The #27 and #28 were collected from the shore and the channel with 1.5 m breadth, respectively. The #29, #30 and #31 were collected near Nut-Thaung-Se village located in the northwestern part of the lake. These populations were influenced by disturbance of the people and livestock such as cattle and water buffalo. The #32 was collected from a large population that was protruded in an arc several hundred meters from the shore in the western part of the lake. For each of the #28,

#29 and #32, leaves were collected from 50 plants at a regular interval for further analysis on DNA polymorphism.

2) Sagaing Division

The #35 and #36 were collected in Sagaing Division. The #35 grew in crowds in a swamp around 1.5 m below the road and cultivated rice was grown over there. Small hybrid swarms were formed at two places in the #35 population and we collected the seeds from one plant as #36 (Photo 2). Since the #36 has taller height and higher seed set than those of #35 plants, they seemed to be derived from hybrids between wild and cultivated types.

3) Mandalay Division

Five samples (#39-I~V) were collected at a single site in Mandalay Division. That site was Nay-Yaung-Pya-Inn Lake in the suburbs of Pyinmana city located about 17 kilometers from the DAR, Yezin. The populations grew spontaneously in a whole region of the lake with square of several hundred meters. The depth of water of this lake was very shallow, ranging from 0.2 to 0.5 m when we visited in the dry season. Their panicles were open-shaped and their seed fertility was not so high. We observed that most of the wild rice plants in this habitat were eaten by many cattle and water buffalo, suggesting that they were affected by disturbance of the livestock (Photo 3). The five seed samples were collected from five places that differed for the depth of the water in the lake. The leaves were also obtained from ten plants in each place (50 samples in total) for further analysis on DNA polymorphism.

4) Rakhine State

A total of 23 seed samples were collected in the Rakhine State. They were classified into three groups based on their morphological and environmental features.

The first group (#47, #49, #53, #54, #57, #61, #62, #63, #65, #66 and #69) had shorter plants mostly in shallow water. It was frequently observed along the survey route in this state. It often grew in swamp where water surface was 1.5 to 2.0 m below the road (Photo 4). The populations were distributed mostly in shallow swamp with around 0.2 m depth of water but sometimes in slightly wet swamp or in a canal with around 1.0 m depth of water. Although most of the wild rice plants showed less than 0.5 m of plant height from the surface of the water, had compact panicles (upper right corner in Photo 4) and grew root system in the soil, the #47, #49, and #66 in deeper water showed floating ability. According to farmer's information, #69 growing root system in the soil in dry season showed floating ability when water level rose more than 1.0 m in the wet season. A possibility is suggested that non-floating populations of this group distributed in other sites can also appear floating ability in the wet season. Most of the collection sites were located near paddy fields and many footmarks of human and livestock found in the habitats indicated that these populations were disturbed by people and livestock. It is interesting to note that no hybrid swarms were observed there even in this situation. Various seed set was found from mostly sterile to relatively high fertile. Most of the plants presented red awn color but #49, #66 and #69 did not. For the population #54, leaf samples were collected from 50 individuals at regular interval for further DNA analysis.

The second group (#48, #50, #51, #52, #64, #68 and #70) was growing in waterside of a reservoir and swamp with water level of more than 1.0 m except for the #67. The #67 was growing in swamp with water level of around 0.6 m. Most wild rice plants of this group were

generally characterized by a tall grass with more than 1.0 m from the water surface and had open-type panicles with low seed fertility.

Third group (#46, #58 and #59) occurred as hybrid swarms. Several types were mixed in the #46 which grew at area of dozens of square meters in a swamp around 2.0 m below the road surface level, for example, different plant height, red or white awn colors and shattering and non-shattering types. Gene flows seemed to occur between wild rice and cultivated rice in the vicinity. The #58 and #59 were found in a shallow swamp like a puddle near factories and bus station in Sittwe city. Several types of plant height, and open- and compact-type panicles with low fertility were observed mixed. Among these plants, weedy rice was separately collected as # 60 based on morphological features quite similar to cultivated rice.

5) Bago Division

Eight samples (#72, #75, #76, #77, #78, #79, #80 and #81) were collected in Bago Division. All but the #72 were growing in grooves along the road. They showed a tall-grass type and their awn color was observed red or white. No populations showed floating ability, although water environments of the sites varied from slightly dry land to shallow puddle. The #78, #79 and #80 samples were found in a hybrid swarm at the same site but separately collected as compact-type, open-type and cultivar-like panicle, respectively. The #72 was growing in a lake of around two hundred square meters (Photo 5). In general a tall-grass type of wild rice was found in deep water, while a short grass-type was on a dry land near the waterside. Plasticity of culm length for change of water environment was suggested, since the-tall grass and short-grass-types were morphologically similar to each other except for culm length (upper right corner in Photo 5).

6) Ayeyarwady Division

All samples (#82-#90) were collected in swamp around 2.0 m below the road in Ayeyarwady Division (Photo 6). Their habitats were disturbed by many cattle and water buffalo. They were different in plant height and panicle types between the sites but commonly showed a poor root system. Some populations also showed floating ability in swamp (upper right corner in Photo 6). All samples except for the #84 showed low fertility but the #84 held moderate fertility. The #84, #85 and #86 were found at the same site and were classified by panicle shapes as cultivar-like type, compact type, and open type, respectively. The #87 (compact panicle-type) and #88 (open panicle-type) were found sympatric at the same site.

O. officinalis

Six populations of *O. officinalis* were found in Kachin State (#19 and #34) and Rakhine State (#43, #44, #71 and #74). The #19 was distributed as the dominant species through a relatively wet field of dozens of square meters located around 2.0 m below the road surface. A part of population was eaten and disturbed by livestock. The #34 was observed in a shade of a bush near paddy fields along the road, where no footmarks of disturbance made by livestock were found. The #43 was a small colony beside a dried-up stream around 2.0 m below the road surface (Photo 7). There were no footmarks made by livestock there. Both #44 and #74 were small populations of a few square meters in slightly wet fields beside the road. Only one plant was found as the #71 beside a small bridge, because other plants might have disappeared by

the construction of the bridge. These suggests that the habitats of *O. officinalis* are the places that are hard to dry excessively being somewhat shaded by a shrub or grasses.

O. granulata

Three samples of *O. granulata* (#4, #37, and #38) were collected at an elevation of 200 to 350 m in a mountain between Shwebo and Mohnyin in Sagaing Division. This species propagates both by seed and by bunch. Their habitat of this species was featured by a bamboo forest that has weak daylight and good drainage. It is also found along with a road or trail along with or into a bamboo forest (Photo 8). Unfortunately, we could not collect enough matured seeds, because most matured seed were shattered from short panicles.

Caryopsis shape and germination rate of wild rice collected

Concerning the wild rice and cultivated rice collected in the present survey, we measured length and width of ten caryopsis randomly selected from each sample. The three wild species showed smaller sizes of caryopsis compared to cultivated rice, among which *O. rufipogon* showed relatively similar length to cultivated rice (Fig. 2). Comparing caryopsis shapes among samples of *O. rufipogon* in Kachin State, Rakhine State, Bago Division and Ayeyarwady Division, variation of caryopsis length showed similar trend among samples of these areas, ranging from 6 to 8 mm. By contrast, the samples collected in Kachin State and Ayeyarwady Division showed slightly smaller ranges of variation of caryopsis width (1.9 to 2.4 mm) than those collected in the Rakhine State and Bago Division (1.9 to 2.7 mm) (data not shown).

For propagation and evaluation of primary traits, 30 seeds each of 25 samples of *O. rufipogon* were directly sowed in an isolated green house at NIAS, Tsukuba on April 22, 2005. After one week, their germination rates were recorded. They ranged from 0 to 90% (Fig. 3). The short-grass-type collected in the Rakhine State, Bago Division, and Ayeyarwady Division showed low germination rates. There are two possible explanations. We might have collected immature seeds because we surveyed there in the late half of the itinerary when most of fully matured seeds might have been shattered away. Or, those short-grass-type plants might have stronger seed dormancy, because some of them could germinate vigorously after dehusked. Further study will be needed to confirm this phenomenon. The #13, #14, #36 and #46 collected from hybrid swarms showed high germination rates. They might have been derived from hybrids between wild and cultivated types. Therefore, the high germination rates could be explained by recombination of non-dormancy from cultivated rice.

Future subject

During this exploration, we could survey populations beside the main roads or highways in the northern and western areas of Myanmar. Collection of wild rice at Indawgyi Lake in Kachin State which had never been investigated in detail was one of the fruitful results. The six samples of #21, #28, #29, #32, #39 and #54 will be analyzed for their population structures and diversities based on DNA polymorphism using PCR markers. Moreover, it is essential for substantial comprehension of ecological, physiological and morphological features of wild rice in the areas surveyed and compare them with wild rice distributed in other areas in

Myanmar. For example, field studies should be done in an area from the northwestern part of Mandalay Division to Chin State where we could not survey at the time because of car troubles, southeastern of Kachin State, Mon State and Tanintharyi Division. In this exploration, we found several types of wild rice such as floating rice, hybrid plants or populations derived from a cross between wild rice and cultivated rice, and weedy rice. Finally it is concluded that Myanmar is an ideal place for the studies on the “wild-weed-cultivated species complex” in the genus *Oryza* and for *in situ* conservation of wild rice genetic resources, since diversified wild rice as mentioned above are distributed there.

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和文摘要

ミャンマーはイネの遺伝資源中心地のひとつとして古くから知られ、在来品種のみならず近縁野生種の多様性も近隣諸国に比べよく保存されている。しかしながら、北部 Kachin 州や西部 Rakhin 州など調査が十分に行われていない地域もある。そこで、今回、ミャンマー農業灌漑省農業研究部 (DAR) と共同でミャンマーの北部および西部地域を中心に野生イネの調査・収集を生物研ジーンバンク事業として実施した。

今回の探索で、野生イネは合計で 102 点を収集した。このうち、*O. rufipogon* は 93 点、*O. officinalis* は 6 点、*O. granulata* は 3 点である。今回ミャンマー北部および西部で収集した *O. rufipogon* の主な特徴をみると、多くの野生イネが水田脇の湿地や水路に自生しており、人や家

畜による攪乱を受けていた。いくつかの水田脇の自生地では hybrid swarm が形成されていたが、必ずしも水田脇の集団に hybrid swarm が形成されているとは限らなかった。水深の深い湿地の野生イネは浮稲性を持っていたが、比較的浅い湿地では地面に根を張る野生イネが多く観察された。一方、草丈と水位の関係は、必ずしも相関があるようには観察されなかった。野生イネの種子稔性は一般に低い傾向にあったが、栽培種との雑種と思われる個体は種子稔性が比較的高かった。地域ごとに特異的な特徴をみると、北部 Kachin 州の Indawgyi 湖では、高い種子稔性を持った浮稲性の野生イネの巨大な自生地を発見した。Rakhine 州や Ayeyarwady 管区では、水田脇に短稈型で非開帳性の穂を持つ野生イネを多数観察した。これら地域ごとに特異的な集団の特性を明らかにすることは、ミャンマーの野生イネの生態を理解するうえで重要である。

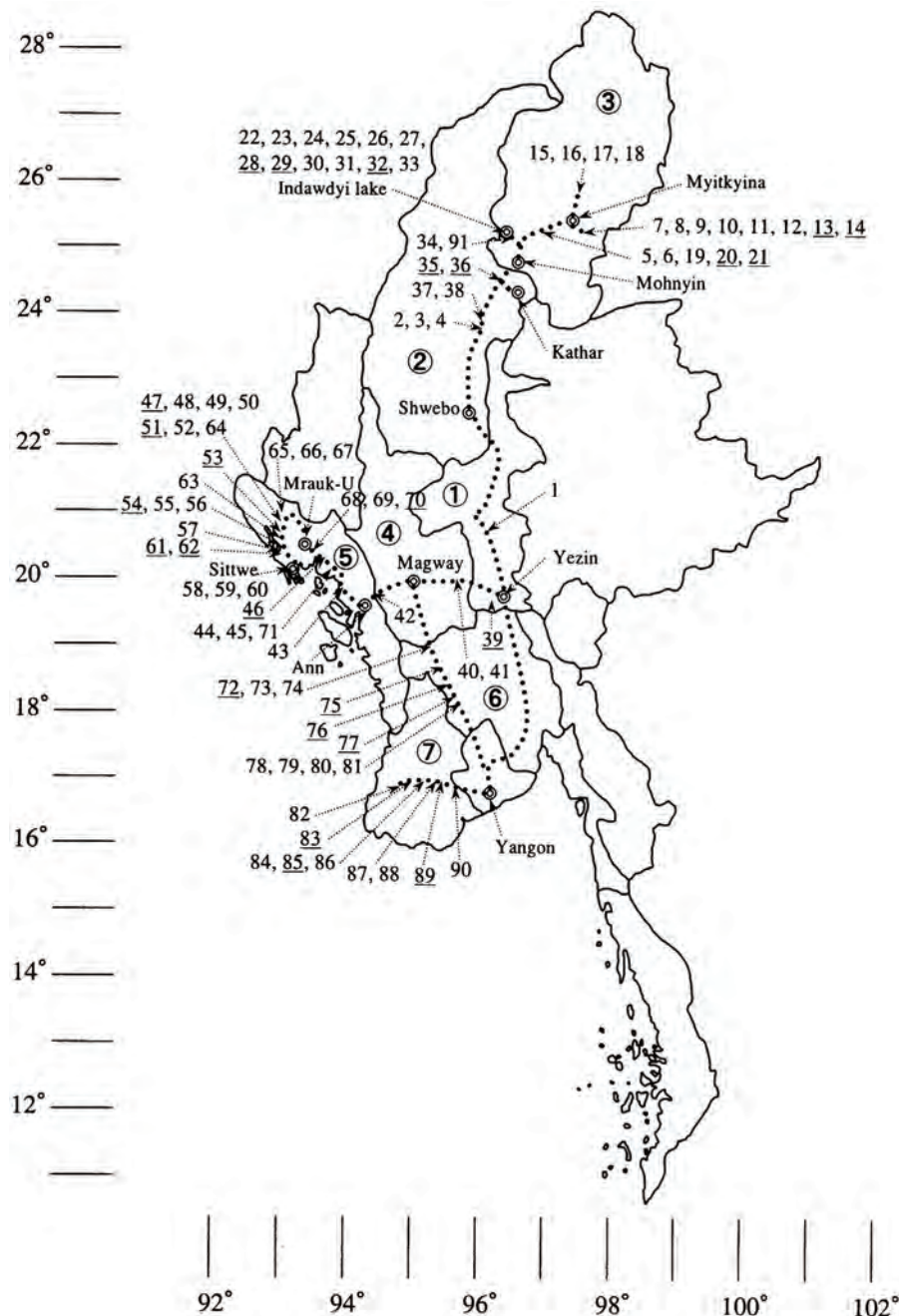


Fig. 1. Route of field survey and sites of material collected in Myanmar. Number indicates collection number. Number with underline mean that this material will be propagated and evaluated its traits at NIAS in 2005. Dotted line indicate route of field survey. ① : Mandalay Division, ② : Sagaing Division, ③ : Kachin State, ④ : Magway Division, ⑤ : Rakhine State, ⑥ : Bago Division, ⑦ : Ayeyarwady Division.

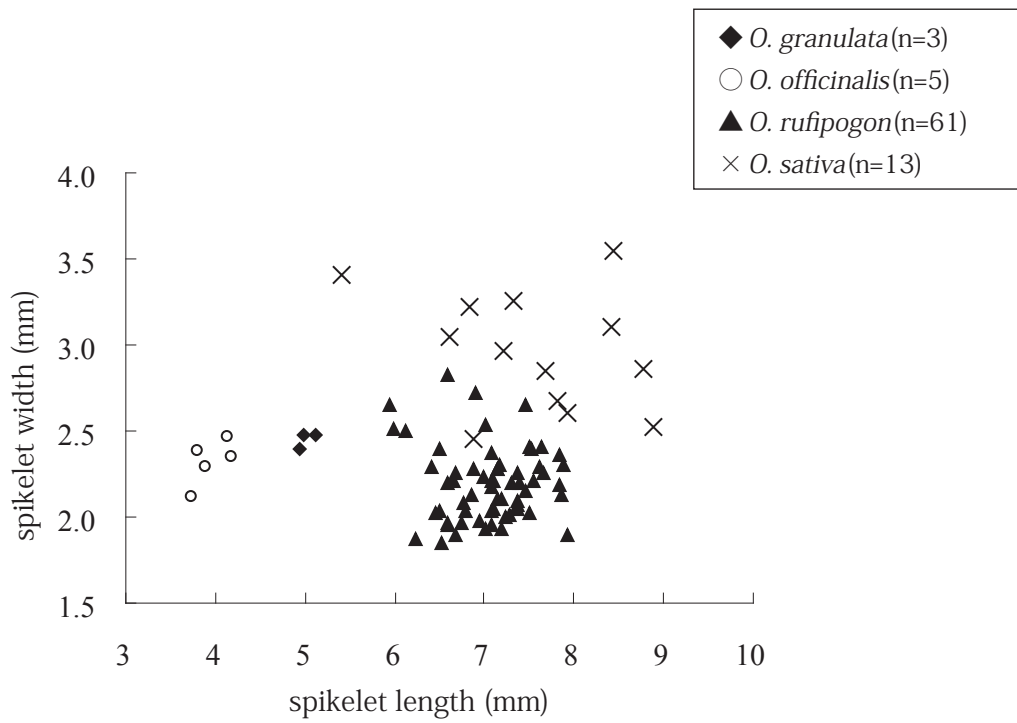


Fig. 2. The Distribution of 82 wild and cultivated rice accessions scattered according to the spikelet length and width.

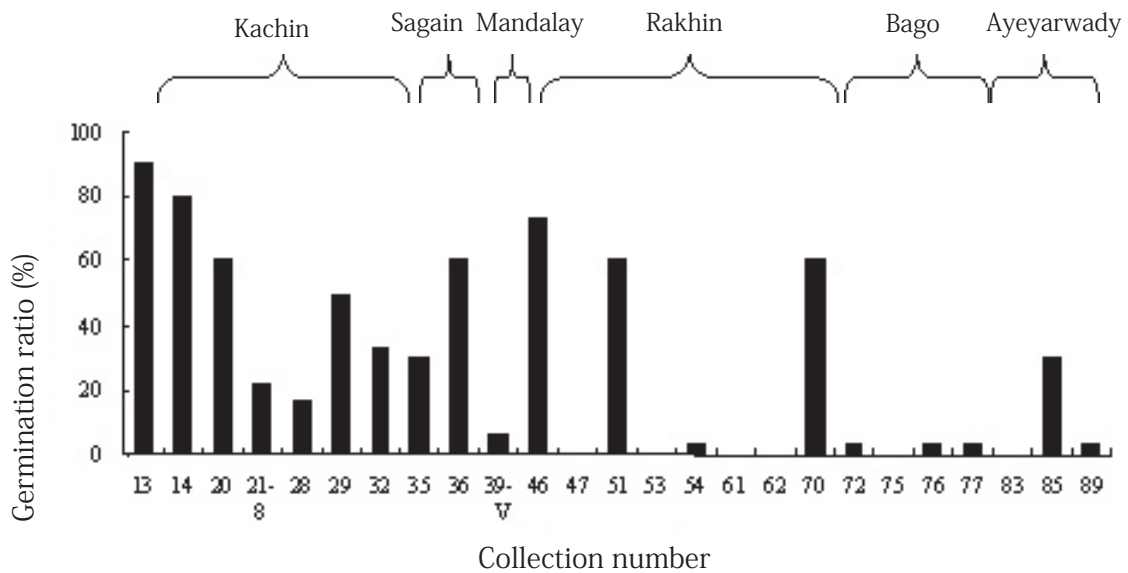


Fig. 3. Germination ratio of wild rice collected in Myanmar.

Table 1. Passport data of the collected materials in Manmar

Collection number	J P No.	Local name	Scientific Name	Collection date	Status	Locality (Vill., T/S, Prov.)	Latitude	Longitude	Altitude	Source	Topography	Site	Soil texture	Drainage	Remarks
1	223835	-	<i>Vigna stipulacea</i> (Lamarck) Tateishi	2004/Nov/13	wild	PYAWBWE, MANDALAY Division	N20° 39.736'	E96° 0.315'	193m	wild	plain level	level	clay	good	On a ridge between a paddy field and swamp.
2	223836	KYAIK-MAYAW	<i>Oryza sativa</i> L.	2004/Nov/14	landrace	PEGON, T/S KAWLIN, SAGAING Division	N23° 45.325'	E95° 52.190'	207m	farmland	hilly	undulating	clay	good	Glutinous rice.
3	223837	NGA-CHEIK	<i>Oryza sativa</i> L.	2004/Nov/14	landrace	T/S KAWLIN, SAGAING Division	N23° 48.382'	E95° 53.224'	205m	farmland	plain level	level	clay	good	Glutinous rice, purple plant.
4	223838	-	<i>Oryza granulata</i> Nees et Arn.	2004/Nov/14	wild	KYAUK-TAN, T/S KAWLIN, SAGAING Division	N23° 52.888'	E95° 56.216'	218m	wild	forest	slope	sand	good	Under a bamboo forest.
5	223839	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/15	wild	KANYIN-MYING, T/S MOKAUNG, KACHIN State	N25° 12.162'	E96° 45.479'	163m	wild	swamp	level	clay	moderate	Hybrid swarm formed beside of a paddy field and a canal.
6	223840	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/15	wild	MUN-YWET, T/S MOKAUNG, KACHIN State	N25° 18.102'	E96° 51.958'	147m	wild	plain level	level	clay	moderate	In a swamp near paddy field.
7	223841	LONE-THWE-HMWE	<i>Oryza sativa</i> L.	2004/Nov/16	landrace	MOKE-LWE, T/S VAING-MAW, KACHIN State	N25° 18.108'	E97° 24.875'	138m	farmland	plain level	level	clay	good	Aromatic rice, about 90 cm of culm length. Jun. - Jul. (T) - Nov.
8	223842	PIN-LAE-BU	<i>Oryza sativa</i> L.	2004/Nov/16	landrace	MOKE-LWE, T/S VAING-MAW, KACHIN State	N25° 18.108'	E97° 24.875'	138m	farmland	plain level	level	clay	good	About 120 cm of culm length. Jun. - Jul. (T) - Nov.
9	223843	MWAY-SWAE	<i>Oryza sativa</i> L.	2004/Nov/16	landrace	KHA-SHI, T/S VAING-MAW, KACHIN State	N25° 17.772'	E97° 25.105'	138m	farmland	plain level	level	clay	good	Tribe: LE-SU.
10	223844	-	<i>Oryza sativa</i> L.	2004/Nov/16	weedy	KHA-SHI, T/S VAING-MAW, KACHIN State	N25° 17.772'	E97° 25.105'	138m	bank of pond	swamp	level	clay	poor	Near a paddy field of sample No. 9, a few plants existed around pond.
11	223845	NGA-CHEIK	<i>Oryza sativa</i> L.	2004/Nov/16	landrace	KHA-SHI, T/S VAING-MAW, KACHIN State	N25° 17.772'	E97° 25.105'	138m	farmland	plain level	level	clay	poor	Glutinous rice.
12	223846	NGA-CHEIK	<i>Oryza sativa</i> L.	2004/Nov/16	landrace	KHA-SHI, T/S VAING-MAW, KACHIN State	N25° 17.772'	E97° 25.105'	138m	farmland	plain level	level	clay	poor	Glutinous rice.
13	223847	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/16	wild	KHA-SHI, T/S VAING-MAW, KACHIN State	N25° 18.89'	E97° 24.983'	145m	wild	bank of swamp	level	clay	poor	Open-type panicle.
14	223848	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/16	wild	KHA-SHI, T/S VAING-MAW, KACHIN State	N25° 18.89'	E97° 24.983'	145m	wild	bank of swamp	level	clay	poor	Compact-type panicle.
15	223849	KIN-HLAR	<i>Oryza sativa</i> L.	2004/Nov/16	landrace	TANFE, T/S ENJUNYAN, KACHIN State	N25° 48.542'	E97° 29.571'	250m	farmland	hilly	slope	loam	good	Upland rice in shifting cultivation field.
16	223850	YARGYI	<i>Eleusine coracana</i> (L.) Gaertn. ssp. <i>affricana</i> (Kennedy et O'Byrne) Hilu et de Wet	2004/Nov/16	landrace	TANFE, T/S ENJUNYAN, KACHIN State	N25° 48.542'	E97° 29.571'	250m	farmland	hilly	slope	loam	good	Inshifting cultivation field.
17	223851	HNANGYI	<i>Eleusine coracana</i> (L.) Gaertn. ssp. <i>affricana</i> (Kennedy et O'Byrne) Hilu et de Wet	2004/Nov/16	landrace	TANFE, T/S ENJUNYAN, KACHIN State	N25° 48.542'	E97° 29.571'	250m	farmland	hilly	slope	loam	good	Inshifting cultivation field.
18	223852	SANI-BAUNG	<i>Coix lacryma-jobi</i> L. var. <i>ma-yuen</i>	2004/Nov/16	landrace	TANFE, T/S ENJUNYAN, KACHIN State	N25° 48.542'	E97° 29.571'	250m	farmland	hilly	slope	loam	good	Inshifting cultivation field.
19	223853	-	<i>Oryza officinalis</i> Wall.ex Watt	2004/Nov/17	wild	KACHIN State	N25° 17.994'	E97° 11.854'	145m	wild	swamp	level	clay	moderate	At an edge of dried-up swamp.
20	223854	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	SHWE-WA-KWET-THIT, T/S MOKAUNG, KACHIN State	N25° 21.660'	E97° 0.903'	145m	wild	side of canal	level	clay	poor	
21-1	223855	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-2	223856	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-3A	223857	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-3B	223858	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-4	223859	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-5	223860	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	

Table 1 (continued).

21-6	223861	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-7	223862	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-8	223863	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-9	223864	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-10	223865	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-11	223866	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-12	223867	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-13	223868	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-14	223869	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-15	223870	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-16	223871	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-17	223872	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-18	223873	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-19	223874	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-20	223875	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-21	223876	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-22	223877	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-23	223878	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-24	223879	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-25	223880	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-26	223881	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-27	223882	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-28	223883	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-29	223884	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
21-30	223885	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/17	wild	T/S MOHNYIN, KACHIN State	N25° 20.274'	E96° 56.941'	143m	wild	swamp	level	clay	poor	
22	223886	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	HEPA, T/S MOHNYIN, KACHIN State	N25° 4.453'	E96° 21.58'	170m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 1.2 m.
23	223887	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	HEBU, T/S MOHNYIN, KACHIN State	N25° 5.314'	E96° 21.506'	168m	wild	lake	level	clay	poor	INDAWGYI lake.
24	223888	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	NUT-MAUK-KAN, T/S MOHNYIN, KACHIN State	N25° 8.498'	E96° 21.946'	171m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 2.0 m.
25	223889	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	NUT-MAUK-KAN, T/S MOHNYIN, KACHIN State	N25° 9.946'	E96° 21.210'	174m	wild	lake	level	clay	poor	INDAWGYI lake.
26	223890	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	LONE-SANT, T/S MOHNYIN, KACHIN State	N25° 11.885'	E96° 21.738'	172m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 1.7 m.
27	223891	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	SHWE-TAUNG, T/S MOHNYIN, KACHIN State	N25° 14.293'	E96° 24.429'	176m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: more than 1 m.
28	223892	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	SHWE-TAUNG, T/S MOHNYIN, KACHIN State	N25° 14.415'	E96° 24.381'	177m	wild	lake	level	clay	poor	INDAWGYI lake.
29	223893	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	NYAUNG-PIN, T/S MOHNYIN, KACHIN State	N25° 15.195'	E96° 21.202'	169m	wild	lake	level	clay	poor	INDAWGYI lake, beside village, water depth: about 2.0 m.
30	223894	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	NYAUNG-PIN, T/S MOHNYIN, KACHIN State	N25° 150.90'	E96° 21.199'	165m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 2.5 m.

Table 1 (continued).

31	223895	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	NYAUNG-PIN, T/S MOHNYIN, KACHIN State	N25° 14.490'	E96° 21.85'	165m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 2.2 m.
32	223896	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/18	wild	NUT-THAUNG-SE, T/S MOHNYIN, KACHIN State	N25° 13.896'	E96° 21.53'	166m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 3 m.
33	223897	-	<i>Coix</i> sp.	2004/Nov/18	wild	NUT-THAUNG-SE, T/S MOHNYIN, KACHIN State	N25° 13.896'	E96° 21.53'	166m	wild	lake	level	clay	poor	INDAWGYI lake, water depth: about 3 m.
34	223898	-	<i>Oryza officinalis</i> Wall.ex Watt	2004/Nov/20	wild	YWA-THIT, T/S MOHNYIN, KACHIN State	N24° 59.750'	E96° 26.854'	227m	wild	swamp	level	clay	moderate	
35	223899	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/20	wild	CEPAIN, T/S INDAW, SAGAING Division	N24° 26.724'	E96° 10.621'	138m	wild	swamp	level	loam	moderate	Swamp near paddy fields.
36	223900	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/20	wild	CEPAIN, T/S INDAW, SAGAING Division	N24° 26.724'	E96° 10.621'	138m	wild	swamp	level	loam	moderate	Side of a paddy field. Looks like a hybrid of the wild and cultivated types.
37	223901	-	<i>Oryza granulata</i> Nees et Arn.	2004/Nov/21	wild	T/S HTI-GAINT, SAGAING Division	N23° 55.227'	E96° 0.525'	210m	wild	forest	slope	clay	good	Along with a trail under a bamboo forest.
38	223902	-	<i>Oryza granulata</i> Nees et Arn.	2004/Nov/21	wild	SAGAING Division	N23° 53.964'	E95° 59.375'	355m	wild	forest	slope	clay	excessive	On a shaded cliff that was formed by cutting a hill to make a road.
39-I	223903	NUT-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/25	wild	BE-KONE, T/S PYINMANA, MANDALAY Division	N19° 46.534'	E96° 11.980'	93m	wild	lake	level	clay	poor	NAY-YAUNG-PYA-INN lake, water depth: 20 to 50 cm.
39-II	223904	NUT-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/25	wild	BE-KONE, T/S PYINMANA, MANDALAY Division	N19° 46.534'	E96° 11.980'	93m	wild	lake	level	clay	poor	NAY-YAUNG-PYA-INN lake.
39-III	223905	NUT-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/25	wild	BE-KONE, T/S PYINMANA, MANDALAY Division	N19° 46.534'	E96° 11.980'	93m	wild	lake	level	clay	poor	NAY-YAUNG-PYA-INN lake.
39-IV	223906	NUT-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/25	wild	BE-KONE, T/S PYINMANA, MANDALAY Division	N19° 46.534'	E96° 11.980'	93m	wild	lake	level	clay	poor	NAY-YAUNG-PYA-INN lake.
39-V	223907	NUT-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/25	wild	BE-KONE, T/S PYINMANA, MANDALAY Division	N19° 46.534'	E96° 11.980'	93m	wild	lake	level	clay	poor	NAY-YAUNG-PYA-INN lake.
40	223908	-	<i>Vigna</i> sp.	2004/Nov/26	wild	T/S TAUNG-DWIN-CYI, MAGWAY Division	N19° 56.596'	E95° 45.957'	378m	wild	mountainous	undulating	silt	excessive	Vine twining on a bush at the roadside in the Bago-yoma mountains
41	223909	-	<i>Vigna</i> sp.	2004/Nov/26	wild	T/S TAUNG-DWIN-CYI, MAGWAY Division	N19° 55.868'	E95° 44.455'	314m	wild	mountainous	undulating	silt	excessive	On a steep cliff that was formed by cutting a hill to make a road.
42	223910	-	<i>Vigna</i> sp.	2004/Nov/27	wild	GOAT-CYI, T/S NGA-PE, MAGWAY Division	N19° 50.978'	E94° 25.98'	307m	wild	mountainous	undulating	loam	good	At the roadside, some on a cliff and others near wet places.
43	223911	-	<i>Oryza officinalis</i> Wall.ex Watt	2004/Nov/28	wild	KYEIN-GYANG, T/S ANN, RAKHINE State	N19° 50.895'	E93° 55.221'	26m	wild	undulating	level	loam	poor	Near a small brigh on a stream.
44	223912	-	<i>Oryza officinalis</i> Wall.ex Watt	2004/Nov/28	wild	ZA-YAN, T/S MYAY-PON, RAKHINE State	N19° 58.84'	E93° 43.628'	24m	wild	plain level	level	loam	good	Near the road, disturbed by water buffalo.
45	223913	-	<i>Vigna tenuicaulis</i> N. Tomooka & N. Maxted	2004/Nov/28	wild	ZA-YAN, T/S MYAY-PON, RAKHINE State	N19° 58.84'	E93° 43.628'	24m	wild	plain level	level	loam	good	Vine twining up a tress.
46	223914	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/28	wild	KAN-NE(NI), T/S MIN-BYAR, RAKHINE State	N20° 12.766'	E93° 25.701'	22m	wild	swamp	level	clay	poor	Hybrid swarm. Awned (red and green) and awnless mixed, highly sterile.
47	223915	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	HTAIN-WA-PYIN, T/S MYAUK-U, RAKHINE State	N20° 46.763'	E93° 4.780'	12m	wild	swamp	level	clay	poor	Water depth: 30 to 50 cm. Plant type: dwarf (about 50cm), intermediate fertility, floating type.
48	223916	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	KYAUK-KYAT, T/S MYAUK-U, RAKHINE State	N20° 50.313'	E93° 4.435'	14m	wild	pond	level	clay	poor	Water depth: more than 1 m. Low fertility.
49	223917	TAUNG-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	KYAUK-TAW-LONE, T/S KYAUK-TAW, RAKHINE State	N20° 50.663'	E93° 1.737'	19m	wild	canal	level	clay	poor	Water depth: more than 1 m. Low fertility.

Table 1 (continued).

50	223918	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	SHAN-YWA quarter, T/S KYAUK-TAW, RAKHINE State	N20° 50.769'	E92° 58.274'	16m	wild	pond	level	clay	poor	Almost sterility.
51	223919	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	SHAN-YWA quarter, T/S KYAUK-TAW, RAKHINE State	N20° 50.726'	E92° 58.280'	13m	wild	pond	level	clay	poor	
52	223920	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	PYI-TAW-THA quarter, T/S KYAUK-TAW, RAKHINE State	N20° 50.48'	E92° 58.862'	17m	wild	pond	level	clay	poor	Fertility of individual is quite different.
53	223921	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	WAR-TAUNG, T/S KYAUK-TAW, RAKHINE State	N20° 39.435'	E92° 55.284'	20m	wild	swamp	level	clay	poor	A habitat disturbed by man and water buffalo, water depth: 40 to 50 cm. High fertility, plant type: dwarf.
54	223922	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	YOE-TA-YOKE, T/S PON-NA-KYUN, RAKHINE State	N20° 33.531'	E92° 58.326'	24m	wild	swamp	level	clay	moderate	Swamp near paddy fields. Medium fertility, plant type short.
55	223923	PAW-SAN-HMWE	<i>Oryza sativa</i> L.	2004/Nov/29	cultivated	YOE-TA-YOKE, T/S PON-NA-KYUN, RAKHINE State	N20° 33.531'	E92° 58.326'	24m	farmland	plain level	level	clay	good	
56	223924	SAR-PA-TI	<i>Oryza sativa</i> L.	2004/Nov/29	cultivated	YOE-TA-YOKE, T/S PON-NA-KYUN, RAKHINE State	N20° 33.531'	E92° 58.326'	24m	farmland	plain level	level	clay	good	
57	223925	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/29	wild	YOE-NGU, T/S PON-NA-KYUN, RAKHINE State	N20° 25.793'	E93° 0.672'	15m	wild	pond	level	clay	poor	
58	223926	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/30	wild	KAN-DAW-GYI quarter, T/S SITTWA, RAKHINE State	N20° 8.910'	E92° 52.248'	23m	wild	swamp	level	loam	poor	Presumed wild and cultivated hybrid derivative. Relative seed retention.
59	223927	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/30	wild	KAN-DAW-GYI quarter, T/S SITTWA, RAKHINE State	N20° 8.924'	E92° 52.163'	23m	wild	swamp	level	loam	poor	Relative seed retention, fertility: about 20%.
60	223928	-	<i>Oryza sativa</i> L.	2004/Nov/30	wild	KAN-DAW-GYI quarter, T/S SITTWA, RAKHINE State	N20° 8.924'	E92° 52.163'	23m	wild	swamp	level	loam	poor	Probably an escape.
61	223929	MYAUK-PIN	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/30	wild	YA-CHAUNG, T/S PON-NA-GYUN, RAKHINE State	N20° 19.223'	E92° 58.85	15m	wild	swamp	level	clay	poor	A habitat disturbed by water buffalo.
62	223930	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/30	wild	YA-CHAUNG, T/S PON-NA-GYUN, RAKHINE State	N20° 19.297'	E92° 58.526'	14m	wild	swamp	level	clay	moderate	A habitat disturbed by water buffalo, water depth: 5 to 10 cm. Plant type: short.
63	223931	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/30	wild	PAT-KHAT-SAUK, T/S PON-NA-KYUN, RAKHINE State	N20° 37.245'	E92° 56.189'	19m	wild	swamp	level	clay	poor	Water depth: 10to 15 cm. Plant type: short.
64	223932	-	<i>Oryza rufipogon</i> W.Griffith	2004/Nov/30	wild	LEN-MA-DAW, T/S KYAUK-TAW, RAKHINE State	N20° 50.464'	E93° 0.638'	9m	wild	swamp	level	clay	poor	Water depth: more than 1 m. Floating type.
65	223933	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/1	wild	LAUNG-KYAT, T/S MYAUK-U, RAKHINE State	N20° 32.193'	E93° 14.597'	27m	wild	swamp	level	clay	poor	A swamp between a road and paddy fields, water depth: 10 to 30 cm. Low fertility (around 10%).
66	223934	MYAUK-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/1	wild	MYAUNG-BWE-CHAY, T/S MYAUK-U, RAKHINE State	N20° 28.443'	E93° 16.611'	11m	wild	swamp	level	clay	poor	A swamp between a road and paddy fields, water depth: 10cm. Low fertility (around 5 %), floating tendency.
67	223935	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/1	wild	MYAUNG-BWE-CHAY, T/S MYAUK-U, RAKHINE State	N20° 28.560'	E93° 16.547'	5m	wild	pond	level	clay	poor	A pond covered by wild rice. Low fertility.
68	223936	MYAT-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/1	wild	BAR-KHAN quarter, T/S MIN-BYAR, RAKHINE State	N20° 21.705'	E93° 16.310'	10m	wild	pond	level	clay	poor	Water depth: 2.5 m. Low fertility (0 to 60%), floating type, compact-type panicle.
69	223937	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/1	wild	CHAUNG-LAUNG, T/S MIN-BYAR, RAKHINE State	N20° 23.540'	E93° 17.409'	5m	wild	pond	level	clay	poor	Water depth: 10 to 30 cm. Plant type: dwarf, low fertility (10%). Farmer suggested floating habit during raining season when water depth becomes nearly 1 m.
70	223938	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/1	wild	KAN-NE, T/S MIN-BYAR, RAKHINE State	N20° 13.16'	E93° 25.479'	12m	wild	swamp	level	clay	poor	Water depth: 60 cm.
71	223939	-	<i>Oryza officinalis</i> Wall.ex Watt	2004/Dec/1	wild	DA-HAT-WA, T/S ANN, RAKHINE State	N19° 58.578'	E93° 41.86'	15m	wild	undulating	level	clay	moderate	Under a bridge on a stream.
72	223940	NYAR-SAR	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	KAN-LAY, T/S PYI, BAGO Divison	N18° 58.413'	E95° 14.169'	75m	wild	pond	level	sand	poor	Water depth: 30 to 50 cm. Plobably floating during raining season.

Table 1 (Continued).

73	223941	OH-GYI	<i>Oryza sativa</i> L.	2004/Dec/3	landrace	T/S PYI, BAGO Divison	----	----	-	farmer's seed	-	-	-	-	Jun./Jul. - Jul./Aug. (T) - Nov. A little bit sticky.
74	223942	-	<i>Oryza officinalis</i> Wall.ex Watt	2004/Dec/3	wild	KAN-LAY, T/S PYI, BAGO Divison	N18° 58.413'	E95° 14.169'	75m	wild	road side	level	sand	good	Culm length: 1.2 m.
75	223943	SIN-KHO-MYAT	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	TOE-CHE-YAY quarter, T/S THEGON, BAGO Divison	N18° 31.731'	E95° 20.67'	35m	wild	swamp	level	sand	poor	A habitat disturbed by water buffalo and cattle. Fertility: 20 to 30%
76	223944	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	POTHAR-AUNG-TADAR, T/S NAT-TALIN, BAGO Divison	N18° 27.63'	E95° 32.43'	42m	wild	swamp	level	loam	poor	Water depth: 10 to 20 cm. Fertility: more than 50%
77	223945	DAUNG-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	WET-KAW, T/S ZEGONE, BAGO Divison	N18° 18.931'	E95° 37.638'	35m	wild	pond	level	loam	good	Many seed dropped, fertility: 30 to 40% (sometime more than 50 %).
78	223946	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	OAT-SHIT-KONE, T/S OAT-PO, BAGO Divison	N18° 5.658'	E95° 42.164'	29m	wild	swamp	level	loam	poor	Hybrid swarm. Compact-type panicle.
79	223947	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	OAT-SHIT-KONE, T/S OAT-PO, BAGO Divison	N18° 5.658'	E95° 42.164'	29m	wild	swamp	level	loam	poor	Hybrid swarm. Semi-open panicle.
80	223948	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	OAT-SHIT-KONE, T/S OAT-PO, BAGO Divison	N18° 5.658'	E95° 42.164'	29m	wild	swamp	level	loam	poor	Hybrid swarm. Weedy-like.
81	223949	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/3	wild	OAT-SHIT-KONE, T/S OAT-PO, BAGO Divison	N18° 5.658'	E95° 42.164'	29m	wild	swamp	level	loam	poor	Hybrid swarm (another swamp to #78, #79, and #80).
82	223950	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	A-PIN-NIT-SE, T/S KAN-GYI-DAUNT, AYEYARWADY Divison	N16° 50.459'	E94° 49.616'	10m	wild	pond	level	loam	poor	Water depth: 50 cm. Floating type.
83	223951	DAUNG-SABA	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	DA-KA, T/S KAN-GYI-DAUNT, AYEYARWADY Divison	N16° 57.771'	E94° 58.886'	6m	wild	swamp	level	clay	poor	fertility: 20 to 30%.
84	223952	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	KYAUNG-GONE-TA-DAR, T/S KYAUNG-GONE, AYEYARWADY Divison	N17° 4.939'	E95° 11.125'	12m	wild	swamp	level	clay	poor	Hybrid swarm. Weedy-like.
85	223953	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	KYAUNG-GONE-TA-DAR, T/S KYAUNG-GONE, AYEYARWADY Divison	N17° 4.939'	E95° 11.125'	12m	wild	swamp	level	clay	poor	compact-type panicle.
86	223954	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	KYAUNG-GONE-TA-DAR, T/S KYAUNG-GONE, AYEYARWADY Divison	N17° 4.939'	E95° 11.125'	12m	wild	swamp	level	clay	poor	open-type panicle.
87	223955	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	PA-THWE, T/S KYAUNG-GONE, AYEYARWADY Divison	N17° 1.61'	E95° 23.330'	14m	wild	swamp	level	clay	poor	Low fertility, compact-type panicle.
88	223956	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	PA-THWE, T/S KYAUNG-GONE, AYEYARWADY Divison	N17° 1.61'	E95° 23.330'	14m	wild	swamp	level	clay	poor	Low fertility, open-type panicle.
89	223957	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	YAW-THIT, T/S PAN-TA-NAW, AYEYARWADY Divison	N16° 58.960'	E95° 28.191'	6m	wild	swamp	level	clay	poor	A large population of several open-type panicle, floating habit.
90	223958	-	<i>Oryza rufipogon</i> W.Griffith	2004/Dec/4	wild	WAN-TA-YOE, T/S MYAUNG-DONE, AYEYARWADY Divison	N16° 57.480'	E95° 39.710'	11m	wild	swamp	level	clay	moderate	Near paddy fields. Fertility: 50%, open-type panicle.
91	223959	-	<i>Colocasia esculenta</i> (L.) Schott	2004/Nov/20	wild	YWA-THIT, T/S MOHNYIN, KACHIN State	-	-	-	wild	side of road	level	clay	moderate	



Photo 1. Floating type of *O. rufipogon* grew in the Indawdyi Lake (#26, Kachin State).



Photo 2. Hybrid swarm (arrow) formed near paddy field (#36, Sagaing Division).



Photo 3. *O. rufipogon* grew in the Nay-Yaung-Pya-Inn Lake and water buffalo were eating its population (#39 Mandalay Division).



Photo 4. Short grass-type *O. rufipogon* grew in the swamp beside road (#61, Rakhine State). Paddy field were observed over there.

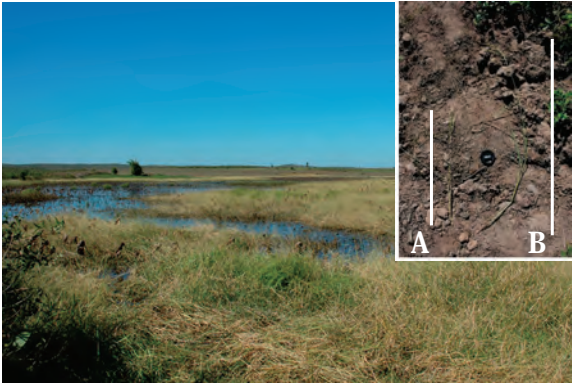


Photo 5. *O. rufipogon* grew in whole area of lake (A: short grass-type, B: tall grass-type) (#72, Bago Division).

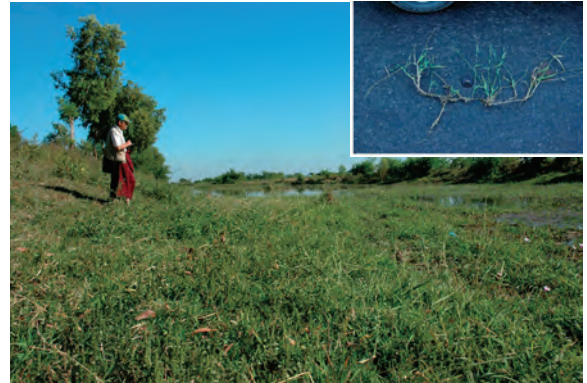


Photo 6. short grass-type *O. rufipogon* showed floating ability in shallow swamp beside road (#87, Ayeyarwady Division).



Photo 7. *O. officinalis* (arrow) found waterless stream near bridge (#43, Rakhine State).



Photo 8. *O. granulata* (arrow) grew near root of bamboo in bamboo bush (#37, Sagaing Division).