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Original Paper

Collaborative Exploration and Collection of Plant Genetic Resources in Cambodia November 2015

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Summary

This mission was conducted in northeastern Cambodia from the 8th to the 26th of November, 2015. In this region, there are many small villages of minorities, such as Phnong and Charai. In this survey, 28 genetic resources were collected, including 19 sorghum (*Sorghum bicolor* (L.) Moench) accessions, three erianthus (*Erianthus procerus* (Roxb.) Raizada) accessions, three foxtail millet (*Setaria italica* (L.) P. Beauv) accessions, one maize (*Zea mays* L.) accession, one rice (*Oryza sativa* L.) accession, and one sugarcane (*Saccharum officinarum* L.) accession.

KEY WORDS: Sorghum, Rice, Foxtail millet, Maize, Sugarcane, Erianthus

Introduction

Four previous surveys have been conducted in Cambodia based on the Letter of Agreement (LOA) by the National Institute of Agrobiological Sciences (NIAS) Genebank project (Tomooka *et al*., 2012; Tomooka *et al*., 2013; Takahashi *et al.,* 2014; Takahashi *et al.,* 2015). They targeted leguminous crops. Additionally, based on the Joint Research Agreement (JRA) between NIAS and Cambodian Agricultural Research and Development Institute (CARDI), the survey targeting vegetables was carried out in the western and the northwestern Cambodia in 2014 (Matsunaga *et al*., 2015). Although the area of the present survey overlaps with the areas explored during the previous surveys, the present survey was planned to target sorghum and millet. All obligations and rights of the NIAS under the JRA have been transferred to National Agriculture and Food Research Organization (NARO), owing to a merger between NARO and NIAS in April 2016.

Cambodia possesses a tropical monsoon climate. The dry season ranges from November to April,

whereas the rainy season is from May to October. However, there is still some rainfall during November. The relative humidity is generally high during the rainy season, owing to the heavy rains. The average daily temperature ranges from 21 to 35^{0}C, and the hottest month is April, during which temperatures may reach 40^{O}C. The day length ranges from 11 and 13h, with the shortest day length occurring in December and the longest occurring in June.

The Mondolkiri, Ratanakkiri, and Stung Treng provinces are in the northeast region of Cambodia, which is a hilly area in which the highest elevation is about 1500 m. In this region, there are many small villages of minorities, such as Phnong and Charai.

(1) Phnong tribe: Phnong are a minority ethnic group in Cambodia. They mostly live in the Mondolkiri province. The Phnong population is 20,000 (Filippi, 2009). In the past, the Phnong mainly lived in the forest, depended on hunting wild animals, and engaged in the slash-and-burn farming.

(2) Charai tribe: The Charai are an ethnic group that originated in Vietnam and later re-located to the highland area of Cambodia. They live in various areas, including the Ratanakkiri province, mainly in Borkeo, Ondoung Meaas, and O Yadav districts, and the northeast part of Cambodia-Vietnam border. There are currently 20,200 Charais living in Cambodia (Filippi, 2009), and the people typically live in small villages of 50 to 500 people.

(3) Proev tribe: The Proev are a tribal people who live in the east part of Cambodia, such as the Ratanakkiri province, mainly in the Taveng district, and the area along the Sesan river. There are only 7900 Proevs living in Cambodia (Filippi, 2009).

(4) Krung tribe: The Krung are Cambodian natives who live in the Stung Treng and Ratanakkiri provinces and along Cambodia-Laos border. There are 14,000 Krungs in total (Sokhom, 2015).

(5) Tompuan tribe: The Tompuan are an indigenous group who live in Ratanakkiri and the southern and western mountains of Cambodia. There are 24,000 Tompuan living in that area (Filippi 2009), and the people engage in the slash-and-burn farming, with upland rice as their major crop.

(6) Kouy tribe: The Kouy are indigenous people who live in many areas of Cambodia, including Preah Vihea, the east part of Siem Reap, the north part of Kampong Thom, the west part of Stung Treng, and Kratie. The Kouy are divided into two groups, the Kouy Ontor and Kouy Onor. However, because the Kouy practice Buddhism, as do the Khmer people, and possess a culture that is similar to other Cambodians, it is sometimes hard to distinguish them from the Khmer.

In the present survey, we visited the villages of minor tribes in the east part of Cambodia and collected plant genetic resources of various crops, including millets, sugarcane, and related species, for their conservation and characterization.

Methods

The survey was conducted from 8th to 26th of November, 2015 (Table 1). We collected samples from 20 sites (Fig. 1). A rental car was used for the whole trip. The survey group consisted of a Japanese researcher, a Cambodian researcher, and a Cambodian driver. For recording the landscapes of the survey sites, as well as data regarding the collected plant samples (e.g., plant height, panicle length, and local name) we also took photos. The alphabetic spelling of the locations in this report refer to the map (World mapping project, 2013).

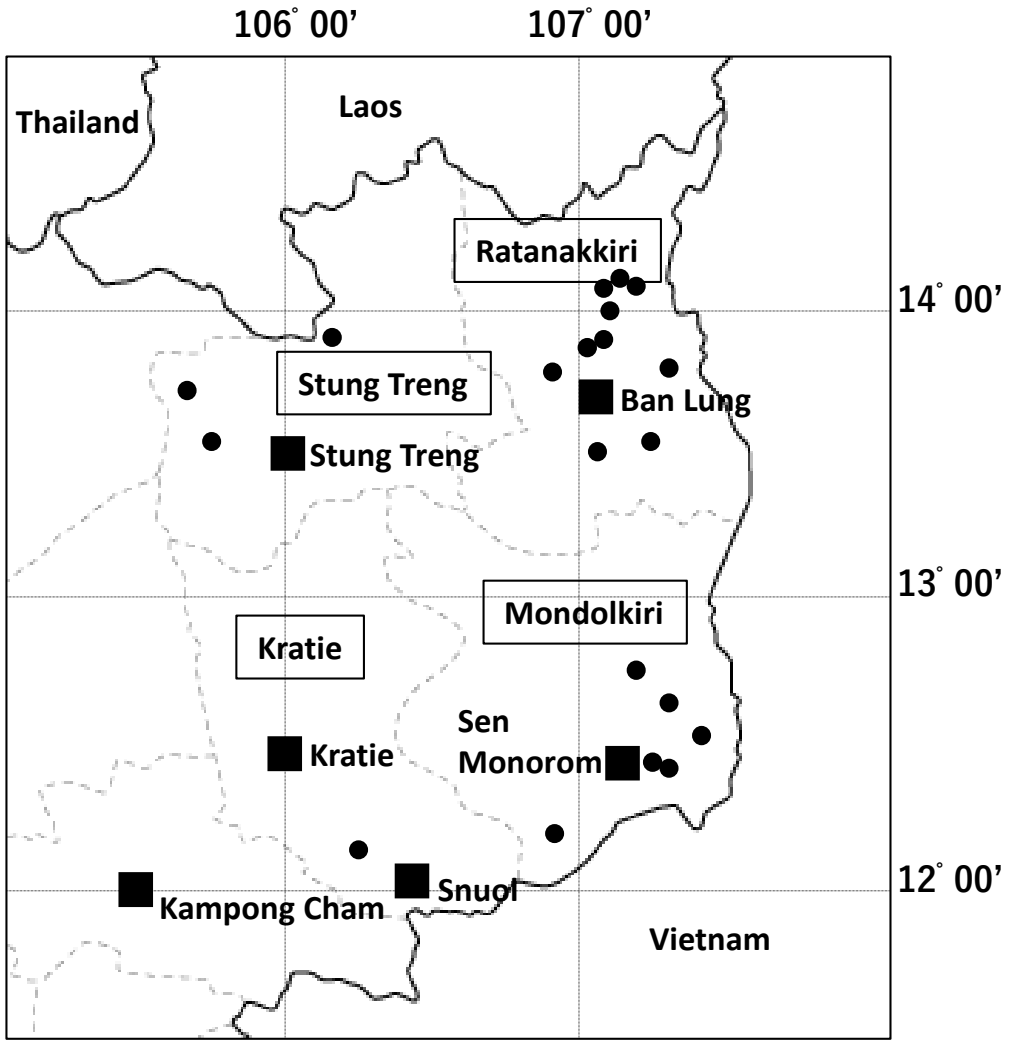

Fig.1. Map of Collection Sites

● ; collection site, ■ ; city

Table 1. Itinerary of the survey in Cambodia

Date	Day	Itinerary	Collection
10-Nov	Tue	Phnom Penh - Kratie Province	
11-Nov	Wed	Kratie Province - Mondolkiri Province	C1, C2
12-Nov	Thu	Mondolkiri Province	C3, C4, C5, C6
13-Nov	Fri	Mondolkiri Province	C7, C8, C9
14-Nov	Sat	Mondolkiri Province	C10, C11, C12
15-Nov	Sun	Mondolkiri Province - Ratanakkiri Province	C13
16-Nov	Mon	Ratanakkiri Province	C14, C15, C16, C17, C18, C19
17-Nov	Tue	Ratanakkiri Province	C20, C21
18-Nov	Wed	Ratanakkiri Province	C22, C23, C24
19-Nov	Thu	Ratanakkiri Province - Srung Treng Province	
20-Nov	Fri	Stung Treng Province	C25, C26
21-Nov	Sat	Stung Treng Province	C27, C28
22-Nov	Sun	Stung Treng Province - Phnom Penh	

Results

(1) Phnom Penh and Kratie province (10th November, 2015):

The survey was initiated on the 10th of November in Phnom Penh and progressed toward the northeast region. In the markets of Kampong Cham and Snoul, there was no sorghum or other millets, although sugarcane was seen on the roadside.

(2) Kratie and Mondolkiri provinces (11th November, 2015):

The survey continued to the northeast region. In the Kratie province, sugarcane was collected as collection number 2015-11-C1 (hereafter C1) from the roadside in front of a gas station. In the Mondolkiri province, *Erianthus longesetosus* and four colonies of *E. procerus* were found on the roadside. From one of them, two panicles and one stem were collected as C2. Accession C1 (sugarcane, *Saccharum officinarum*; Photo 1) was locally called 'Om Pov' and not yet reached the heading stage, whereas accession C2 (erianthus, *Erianthus procerus*; Photo 2) was locally called 'Om Pov Prey' and was collected during flowering.

(3) Mondolkiri province (12th-14th November, 2015):

On the 12th of November, 2015, we visited a morning market that included 20 booths that belonged to minorities and were selling vegetables, fruits, bananas, and potatoes. One of five interviewees reported that she had sorghum and upland rice at her home. Accordingly, we visited her home village, Treng (Phnong tribe), where Mr. Sroun provided us with two sorghum samples (C3 and C4), and Ms. Chean provided us with a sorghum sample (C6). In addition, Mr. Thou Rey, who was from the nearby village of Oroleh, also provided a sorghum sample (C5). These accessions (C3, C4, C5, and C6; sorghum, *Sorghum bicolor*; Photos 3 to 6) were locally called 'Borbor Ke'. All the accessions possessed durra-type panicles, and accessions C3 and C4 were collected from a the cassava field.

On the 13th of November, 2015, we visited the Phnong village of Krang Teh, where Mr. Chean provided a sorghum (C7); the village of Pou Rung, where Ms. Kory Rornh provided samples of sorghum (C8) and maize (C9); and three other Phnong villages *en route*, where the people reported that sorghum had disappeared 4 or 5 years before.Accessions C7 and C8 (sorghum, *Sorghum bicolor*; Photos 7 and 8) were both bicolor type and locally called 'Taryon' and 'Torkrak', respectively, whereas accession C9 (maize, *Zea mays*; Photo 9) was locally called 'Poutchon Cheat'. The stem of accession C9 also possessed three corncobs, which had mostly yellow grains and small proportions of purple (10 %) and pale purple (10 %) grains.

On the 14th of November, 2015, we found many sorghum plants growing in a cassava field, but they were too young to be collected. In addition, at the village of Pou Tang, relatively early ripening sorghums were provided by Mr. Samin (C10) and Mr. Nay Yel (C11 and C12). The accessions (C10-C12; sorghum, *Sorghum bicolor*; Photos 10 to 12) were all locally called 'Borbor Ke'. Furthermore, C10 and C11 were durra type, and C12 was bicolor type.

(4) Mondolkiri and Ratanakkiri provinces (15th-18th November, 2015):

On the 15th of November, 2015, the survey had reached the Ratanakkiri province. At the Charai village of Dal, Mr. Romas Svel provided a black-grain, bicolor-type sorghum sample (C13). Another white-grain sorghum sample was too young to be collected. Accession C13 (sorghum, *Sorghum bicolor*; Photo

13) was locally called ‘Ampov Tevy’.

On the 16th of November, 2015, we visited the Proev village of Pleu Thom, where Ms. Knher provided sorghum (C14) and rice (C15) samples; the Proev village of Dombouk village, where Ms. Chav provided a sorghum sample (C16); the Proev village of Kei Kourng, where Ms. Mong Heay provided a sorghum sample (C17); and the Krung village of Kam Cheoung, where Ms. Mony gave us the information of erianthus (C18) (local name and where we could find) and provided seeds of foxtail millet (C19). The three sorghum accessions (C14, C16, and C17; sorghum, *Sorghum bicolor*; Photos 14, 16, and 17) were all bicolor type and locally called ‘Ro Kouy’. Their stems were used to produce sweet juices, like sugarcane, and its seeds were used for snacks, like popcorn. Accession C15 (rice, *Oryza sativa*; Photo 15) was called locally ‘Ches Bluk’. We also collected accession C18 (erianthus, *Erianthus procerus*; Photo 18), which was locally called ‘Trang’, along the roadside. There was no panicle, so we collected the stem. Accession C19 (foxtail millet, *Setaria italica*; Photo 19) was locally called ‘Tov Vov’.

On the 17th of November, 2015, we visited the Krung village of Team Kroam, which is located on a riverside. There, Mr. Kam Chan Than provided a sorghum sample (C20). At the Kreong village of Ton, Mr. Seang Mern provided a sample of foxtail millet (C21). Accession C20 (sorghum, *Sorghum bicolor*; Photo 20) was bicolor type and locally called ‘Sra Kouy’, and accession C21 (foxtail millet, *Setaria italica*; Photo 21) possessed a whip-shaped panicle and was locally called ‘Tov Vov’, like accession C19.

On the 18th of November, 2015, we visited the Tompuan village of Kaleng, which is in southern Ratanakkiri. There, sorghum samples were provided by Mr. Samnang (C22) and Ms. Ring (C23), and at the Tompuan village of Samot Leu, Ms. Min provided a sorghum sample (C24). The three sorghum accessions (C22, C23, and C24; sorghum, *Sorghum bicolor*; Photos 22 to 24) were locally called ‘Ktao’, ‘Om Puv Krob’, and ‘Ktarv Ple’, respectively. Accession C22 was durra type, whereas accessions C23 and C24 were bicolor type.

(5) Ratanakkiri and Stung Treng provinces (19th November, 2015):

We obtained information that sorghum was cultivated on the island located in the middle of the Mekong River near the Lao border; however, it was impossible to get to that island.

(6) Stung Treng province (20th-21st November, 2015):

On the 20th of November, 2015, we crossed the river by the boat with a car. Villagers reported that they had sorghum in a remote village that was located 10 km away from where we met, but our car was unable to drive on the muddy road leading to the remote village in the north. Then, the survey progressed southward but found nothing. On the way back to Stung Treng, an erianthus sample (C25) was collected at the Khmer village of Na Oung. However, the villagers did not know about sorghum or millet. At the Kouy village of Veal Denh village, Ms. Ta La provided a sorghum sample (C26). Accession C25 (erianthus, *Erianthus procerus*; Photo 25) was locally called ‘Om Pov Prey’, and accession C26 (sorghum, *Sorghum bicolor*; Photo 26), which was bicolor type, was locally called ‘Om Pov Chey’.

On the 21st of November, 2015, we departed west across the Mekong River toward the village of Toal. On the way, we interviewed people at a Khmer village. The villagers had moved to the location 3 years prior and remembered that sorghum had been in a nearby field. However, the sorghum was removed because they did not know how to use it. At another village, Chamkar Leu, Mr. Pong Chang Lai provided sorghum (C27) and foxtail millet (C28) samples. After that, the planned survey had to be abandoned, owing

Table 2. Total number of collected genetic resources

Species Name	**Number**
Sorghum bicolor	19
Erianthus procerus	3
Setaria italica	3
Saccharum officinarum	1
Zea mays	1
Oryza sativa	1
Total	28

Table 3. Comparative pronunciation of villages in alphabet, Khumer and Japanese

Alphabet (in Khumer)	Khumer	Japanese
Treng	ត្រែង	トレィン
Oroleh	អូរលេះ	オーロレ（ス）
Krang The	ក្រង់តេះ	クロ（ン）テ
Pou Rung	ពូរ៉ាំង	プー　リャン
Pou Tang	ពូតាង	プー　タァン
Dal	ដាល	ダール
Pleu Thom	ភ្លឺធំ	プルー　トゥム
Dombouk	ដំបូក	ドァンボー
Kei Kourng	កីកួង	ケ　クーン
Kam Cheoung	កាន់ឈើង	カン　トゥーン
Team Krom	ទៀមក្រោម	ティーム　クラァム
Kaleng	កាលែង	カ　レァーン
Samot Leu	សមុទ្រលើ	サーモッ　ラゥー
Na Oung	ណាអូង	ナ　オゥン
Vealdenh	វាលដេញ	ウィアム　ドァン
Chamkar Leu	ចំការលើ	チャム　カァ　ルー

Table 4. Comparative pronunciation of tribes in alphabet, Khumer and Japanese

Alphabet (in Khumer)	Khumer	Japanese
Phnong	ព្នង	（プ）ノーン
Charai	ចារ៉ាយ	チャライ
Proev	ព្រៅ	プラウ
Krung	ក្រឹង	クラン
Tompuan	ទំពួន	トン　プーン
Kouy	កួយ	クゥーイ
Khmer	ខ្មែរ	クメール

to poor road conditions. Accession C27 (sorghum, *Sorghum bicolor*; Photo 27) was bicolor type and locally called ‘Om Pov Chey’, and accession C28 (foxtail millet, *Setaria italica*; Photo 28) was locally called ‘Ta Pov’.

Discussions

In the present survey, a total of 28 genetic resources were collected. It includes 19 seed samples of sorghum (*Sorghum bicolor*), three stem samples of erianthus (*Erianthus procerus*), three seed samples of foxtail millet (*Setaria italica*), one seed sample of maize (*Zea mays*), one seed sample of rice (*Oryza sativa*), and one stem sample of sugarcane (*Saccharum officinarum*; Tables 2-5). These genetic resources will be used for characteristic studies in Cambodia and Japan.

(1) Features of the collections

The sorghum samples collected in Cambodia were classified into two types (durra and bicolor), and the genetic diversity of these samples seemed small. In the present survey, seven durra-type and 12 bicolor-

type sorghum accessions were collected. The durra grain was used as popcorn and the bicolor stem was used as sugar juice. Plant height ranged from1.7 to 4 m (average 2.7 m) for the bicolor type and from 4 to 6 m (average 4.3 m) for the durra type. Panicle length ranged from 18 to 46 cm (average 30 cm) for the bicolor type and from 20 to 30 cm (average 27 cm) for the durra type.

There was no large-scale sorghum plantations. Villagers planted a few sorghum plants by their house or nearby field, sometimes in the cassava field. Meanwhile, foxtail millet was rarely found, and there were some farmers who reported terminating the cultivation of sorghum or foxtail millet some years before. In

Table 5. Comparative pronunciation of crops in alphabet, Khumer and Japanese

Species Name	Alphabet (in Khumer)	Khumer	Japanese	Tribe	
Sorghum bicolor	Borbor Ke	បរបរកេ	ボァボァ　ケー	Phnong	C3, C4, C5 C6, C10, C11, C12
	Taryon	តោយន់	タァオ　ヨン	Phnong	C7
	Torkrak	តោករ៉ាក	タァオ　ラン	Phnong	C8
	Ampov Tevy	អំពៅព្រៃ	アン　パゥ　ティビィ	Charai	C13
	Ro Kouy	រគួយ	ロ　クイ	Proev	C14, C16, C17
	Sra Koury	ស្រាគួយ	スラァ　クゥイ	Krung	C20
	Ktao	ក្តាវ	クタウ	Tompuan	C22
	Ampov Krob	អំពៅគ្រាប់	アン　パゥ　クロァ	Tompuan	C23
	Katav Plae	កាតាវផ្លែ	カタゥ　プライ	Tompuan	C24
	Ampov Chey	អំពៅជ័យ	アン　パゥ　チャイ	Kouy	C26, C27
Saccharum officinarum	Om pov	អំពៅ	アン　パゥン		C1
Erianthus procerus	Om Pov Prey	អំពៅព្រៃ	アン　パゥン　プレイ		C2
	Trang	ត្រែង	トライング	Krung	C18
	Om Pov Prey	អំពៅព្រៃ	アン　パゥン　プレイ	Khmer	C25
Zea Mays	Poutchon Cheat	ពោតជនជាតិ	ポゥチョン　チィト	Phnong	C9
Oryza sativa	Ches Bluk	ចេះប្លក់	チェ（ス）　プラク	Proev	C15
Setaria italica	Tov Vov	តូវ្វូវ	パゥ　ヴォウ	Krung	C19
	Tov Vov	តូវ្វូវ	パゥ　ヴォウ	Krung	C21
	Ta Pov	តាពៅ	タ　パゥン		C28

Cambodia, sorghum, foxtail millet, maize, rice, and sugarcane are planted for food. In contrast, erianthus is not used as food but regarded as a weed. However, in Japan, erianthus is recognized as a potential energy crop.

(2) Difficulties of present survey

Some of the small rivers that we encountered were not spanned by bridges; generally the Cambodian people took a small boat over a big river, but, our car could not get on the boat. In another case, the road conditions were too poor for us to drive so the survey had to be abandoned to visit more distant villages. Accordingly, we infer that there are many areas that have not been explored by foreign teams, and in these areas, it is likely that additional genetic resources remain to be discovered.

Some villagers reported that they had terminated the cultivation of foxtail millet 5 to 20 years prior. This means that local low-yield varieties, which requires relatively more time and effort to cultivate, are in decline, and the exploration and collection of the local varieties face the critical issues. We need to collect them before the extinction.

This mission was carried out from the 8th to the 26th of November, 2015, which was supposed to be after the end of the rainy season but when rainfall was still occurring. Accordingly, some of the sorghum plants that we found were not collected, owing to their immature stage. This means that the next survey for millet should be scheduled after the full onset of the dry season, which starts in December.

Acknowledgment

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References

Filippi, J. M. (2009) Primary research on language of ethnic people in Cambodia. Editions Funan: Phnom Penh, Cambodia. (in Khmer)

Matsunaga, H., K. Matsushima, K. Tanaka, S. Theavy, S. Lay Heng, T. Channa, Y. Takahashi, N. Tomooka (2015) Collaborative Exploration of the Solanaceae and Cucurbitaceae Vegetable Genetic Resources in Cambodia, 2014. *AREIPGR*, 31: 169-187.

Sokhom, H. (2015) Ethnic people in Cambodia. Center for advance study: Phnom Penh, Cambodia. (in Khmer)

Takahashi, Y., U. Peou, S. Lay Heng. T. Channa, O. Makara, N. Tomooka (2014) Collection and Conservation of Leguminous Crops and Their Wild Relatives in Cambodia, 2013. *AREIPGR*, 30: 109-143.

Takahashi Y., S. Lay Heng, T. Channa, O. Makara, N. Tomooka (2015) Exploration of Leguminous Crops and Their Wild Relatives in Western Regions of Cambodia, 2014. *AREIPGR*, 31: 121-149.

Tomooka N., T. Ra, T. Vathany, T. Channa, O. Makara (2012) Collection and Conservation of Leguminous Crops and Their Wild Relatives in Cambodia, 2011. *AREIPGR*, 28: 125-137.

Tomooka N., P. Phal, S. Lay Heng, T. Channa, O. Makara (2013) Collection and Conservation of Leguminous Crops and Their Wild Relatives in Cambodia, 2012. *AREIPGR*, 29: 135-159.

World mapping project (2013) *Kambodscha-Cambodia*, 1:500000. Reise Know-How Verlag Peter Rump GmbH; Bielefeld, Germany.

カンボジアにおける植物遺伝資源の探索・収集
2015 年 11 月

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和文摘要

本研究報告は，独立行政法人農業生物資源研究所（生物研）とカンボジア農業開発研究所 (CARDI) との間で 2011 年に締結した共同研究に係る覚え書き (LOA) および 2014 年に締結した共同研究契約書 (JRA) に基づき，2015 年 11 月 8 日から 26 日にかけ，カンボジア北東部で行われた植物遺伝資源の探索･収集に関するものである．生物研と CARDI との間の JRA については，2016 年 4 月より農業・食品産業技術総合研究機構に引き継がれている．本探索では，カンボジア北東部の少数民族の村を対象に，ソルガムをはじめとする雑穀類の探索を行った．その結果，ソルガム 19 点，エリアンサス 3 点，アワ 3 点，トウモロコシ，イネ，サトウキビそれぞれ 1 点，合計 28 点の植物遺伝資源を収集した．

Appendix A passport data of collected materials

No.	Coll. No.	JP No.	Coll. Date	Species name	Status[*1)]	Local name	Sample[*2)]	Locality (Province, Village)	Latitude	Longitude	Altitude (m)	Condition[*3)]	Remarks	Photo No.
1	2015-11-C1	256208	Nov 11	*Saccharum officinarum* L.	In	Om Pov	2	Kratie Prov.	N12-08-27.0	E106-42-35.6	114	3-2-3-2-2	Stem length : 2 m, Stem diameter : 4 cm, Length of plant w/o panicle : 3 m	#1 / 1308
2	2015-11-C2	256209	Nov 11	*Erianthus procerus* (Roxb.) Raizada	P	Om Pov Prey	1	Mondolkiri prov.	N12-09-58.0	E106-57-24.5	180	5-2-0-2-3	Panicle length : 80 cm, Stem diameter : 2 cm, Plant height : 4.5 m	#2 / 1321
3	2015-11-C3	256210	Nov 12	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Treng Vill., Mondolkiri Prov.	N12-24-53.5	E107-19-33.8	750	6-2-3-2-3	Mr. Sroun, Ponong tribe Panicle length : 20 cm, Plant height : 4 m, Grain color : white, durra type	#3 / 1402
4	2015-11-C4	256211	Nov 12	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Treng Vill., Mondolkiri Prov.	N12-24-53.5	E107-19-33.8	750	6-2-3-2-3	Mr. Sroun, Ponong tribe durra type	#4 / 1403
5	2015-11-C5	256212	Nov 12	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Oroleh Vill., Mondolkiri Prov.	N12-25-10.0	E107-18-49.0	825	6-2-3-2-3	Mr. Thou Rey Panicle length : 30 cm, Plant height : 4 m, durra type	#5 / 1413
6	2015-11-C6	256213	Nov 12	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Treng Vill., Mondolkiri Prov.	N12-25-31.7	E107-18-56.4	830	6-2-3-2-3	Ms. Chean, Ponong tribe Panicle length : 30 cm, Plant height : 6 m, durra type	#6 / 1417
7	2015-11-C7	256214	Nov 13	*Sorghum bicolor* (L.) Moench	P	Taryon	4	Krang Teh Vill., Mondolkiri Prov.	N12-37-35.9	E107-20-54.8	458	5-1-3-2-2	Mr. Veoung Ek Panicle length : 25 cm, Plant height : 2.5 m, Seed cort : black, Grain color : brown, bicolor type	#7 / 1433
8	2015-11-C8	256215	Nov 13	*Sorghum bicolor* (L.) Moench	In	Torkrak	4	Pou Rung Vill., Mondolkiri Prov.	N12-32-27.1	E107-25-52.0	541	5-1-3-2-2	Ms. Kory Rornh Panicle length : 30 cm, Stem diameter : 2 cm, Plant height : 3 m, Seed cort : black, Grain color : brown, bicolor type	#8 / 1451
9	2015-11-C9	256216	Nov 13	*Zea mays* L.	In	Poutchon Cheat	4	Pou Rung Vill., Mondolkiri Prov.	N12-32-27.1	E107-25-52.0	541	5-1-3-2-2	Ms. Kory Rornh Plant height : 2 m, Corn cob : 13 cm, 3 fruits per stem, Grain color : Yellow 80 %, Purple 10 %, Light purple 10 %	#9 / 1456
10	2015-11-C10	256217	Nov 14	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Pou Tang Vill, Mondolkiri prov.	N12-40-31.3	E107-13-52.8	378	3-1-3-2-2	Mr. Samin Panicle length : 30 cm, Stem diameter : 3 cm, Plant height : 4 m, durra type	#10 / 1483
11	2015-11-C11	256218	Nov 14	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Pou Tang Vill, Mondolkiri prov.	N12-44-20.3	E107-12-18.5	363	3-1-3-2-2	Mr. Nay Yel Panicle length : 26 cm, Plant height : 4 m, durra type	#11 / 1496
12	2015-11-C12	256219	Nov 14	*Sorghum bicolor* (L.) Moench	In	Borbor Ke	4	Pou Tang Vill, Mondolkiri prov.	N12-44-20.3	E107-12-18.5	363	3-1-3-2-2	Mr. Nay Yel Panicle length : 31 cm, Plant height : 3 m, bicolor type	#12 / 1497
13	2015-11-C13	256220	Nov 15	*Sorghum bicolor* (L.) Moench	P	Ampov Tevy	4	Dal Vill., Ratanakiri Prov.	N13-51-23.0	E107-20-28.8	127	5-1-3-2-2	Mr. Romas Svel, Chai Rai tribe Panicle length : 22 cm, Plant height : 3 m, bicolor type	#13 / 1527
14	2015-11-C14	256221	Nov 16	*Sorghum bicolor* (L.) Moench	In	Ro Kouy	4	Pleu Thom Vill., Ratanakkiri Prov.	N14-04-32.6	E107-08-14.2	110	5-1-2-2-2	Ms. Knher, Proev tribe Panicle length : 42 cm, Plant height : 2.5 m, bicolor type	#14 / 1535
15	2015-11-C15	256222	Nov 16	*Oryza sativa* L.	P	Ches Bluk	4	Pleu Thom Vill., Ratanakkiri Prov.	N14-04-32.6	E107-08-14.2	110	5-1-2-2-2	Ms. Knher, Proev tribe Panicle length : 20 cm, Plant height : 1.3 m	#15 / 1536

Appendix (Continued).

No.	Coll. No.	JP No.	Coll. Date	Species name	Status*1)	Local name	Sample*2)	Locality (Province, Villege)	Latitude	Longitude	Altitude (m)	Condition*3)	Remarks	Photo No.
16	2015-11-C16	256223	Nov 16	*Sorghum bicolor* (L.) Moench	In	Ro Kouy	4	Dombouk Vill., Ratanakkiri Prov.	N14-03-36.1	E107-09-54.0	111	3-1-1-2-2	Ms. Chav, Proev tribe Panicle length : 46 cm, Stem diameter : 1.5 cm, Plant height : 2 m, bicolor type	#16 / 1546
17	2015-11-C17	256224	Nov 16	*Sorghum bicolor* (L.) Moench	In	Ro Kouy	4	Kei Kourng Vill., Ratanakkiri Prov.	N14-04-35.7	E107-04-05.3	118	5-2-2-2-2	Ms. Mong Heay, Proev tribe Panicle length : 37 cm, Plant height : 1.7 m, bicolor type	#17 / 1563
18	2015-11-C18	256225	Nov 16	*Erianthus procerus* (Roxb.) Raizada	P	Trang	1	Kam Cheoung Vill., Ratanakkiri prov.	N14-00-07.6	E107-05-15.9	114	5-1-2-2-2	Ms. Mony, Kreong tribe Stem length : 2 m, Length of plant w/o panicle : 3.5 m	#18 / 1567
19	2015-11-C19	256226	Nov 16	*Setaria italica* (L.) P.Beauv.	P	Tov Vov	4	Kam Cheoung Vill., Ratanakkiri prov.	N13-55-47.0	E107-02-38.3	345	5-2-2-2-2	Ms. Mony, Kreong tribe Panicle length : 18 cm, Plant height : 1.5 m	#19 / 1572
20	2015-11-C20	256227	Nov 17	*Sorghum bicolor* (L.) Moench	In	Sra koury	4	Team Krom Vill., Ratanakiri Prov.	N13-53-59.0	E106-45-40.7	90	5-1-2-2-2	Mr. Kam Chan Than, Kreong tribe Panicle length : 35 cm, Plant height : 3 m, bicolor type	#20 / 1577
21	2015-11-C21	256228	Nov 17	*Setaria italica* (L.) P.Beauv.	P	Tov Vov	4	Ton Vill., Ratanakkiri Prov.	N13-57-41.9	E107-03-11.4	180	5-1-2-2-2	Mr. Seang Mern, Kreong tribe Panicle length : 30 cm, Plant height : 1.5 m	#21 / 1621
22	2015-11-C22	256229	Nov 18	*Sorghum bicolor* (L.) Moench	In	Ktao	4	Kaleng Vill., Ratanakkiri Prov.	N13-30-01.5	E107-02-33.0	120	3-1-2-2-2	Mr. Samnang, Tom Poun tribe Panicle length : 28 cm, Stem diameter : 3 cm, Plant height : 4 m, durra type	#22 / 1644
23	2015-11-C23	256230	Nov 18	*Sorghum bicolor* (L.) Moench	In	Ampov Krob	4	Kaleng Vill., Ratanakiri Prov.	N13-29-38.9	E107-12-34.8	113	3-1-2-2-2	Ms. Ring, Tom Poun tribe Panicle length : 28 cm, Plant height : 4 m, bicolor type	#23 / 1650
24	2015-11-C24	256231	Nov 18	*Sorghum bicolor* (L.) Moench	In	Katav Plae	4	Samot Leu Vill., Ratanakkiri prov.	N13-31-59.4	E107-12-48.2	148	3-1-2-2-2	Ms. Min, Tom Poun tribe Panicle length : 27 cm, Plant height : 3 m, bicolor type	#24 / 1660
25	2015-11-C25	256232	Nov 20	*Erianthus procerus* (Roxb.) Raizada	In	Om Pov Prey	1	Na Oung Vill., Stung Treng Prov.	N13-56-39.2	E106-10-01.9	96	3-1-1-2-1	Stem length : 1.9 m, Length of plant w/o panicle : 2.8 m	#25 / 1739
26	2015-11-C26	256233	Nov 20	*Sorghum bicolor* (L.) Moench	In	Ampov Chey	4	Vealdenh Vill., Stung Treng Prov.	N13-45-36.0	E105-38-34.9	106	3-1-1-2-1	Ms. Ta La, Kouy tribe Panicle length : 18 cm, Plant height : 2 m, bicolor type	#26 / 1762
27	2015-11-C27	256234	Nov 21	*Sorghum bicolor* (L.) Moench	P	Ampov Chey	4	Chamkar Leu Vill., Stung Treng Prov.	N13-30-45.8	E105-44-01.9	71	3-1-2-2-2	Mr. Pong Chang Lai, Cambodian tribe Panicle length : 22 cm, Plant height : 2.5 m, bicolor type	#27 / 1794
28	2015-11-C28	256235	Nov 21	*Setaria italica* (L.) P.Beauv.	P	Ta Pov	4	Chamkar Leu Vill., Stung Treng Prov.	N13-30-45.8	E105-44-01.9	71	3-1-2-2-2	Mr. Pong Chang Lai, Cambodian tribe Panicle length : 28 cm, Plant height : 1.5 m	#28 / 1769

*1) In; Individual, P; Population (seeds)

*2) 1; Wild, 2; Weedy, 4; Landrace

*3) Topography-Site-Stoniness-Soil texture-Drainage

Topography 1; swamp, 2; flood plain, 3; plain level, 4; undulation, 5; hilly, 6; mountainous, 7; other (specify)

Site 1; level, 2; slope, 3; summit, 4; depression

Stoniness 1; none, 2; low, 3; medium, 4; rocky

Soil texture 1; sand, 2; loam, 3; clay, 4; silt, 5; highly organic

Drainage 1; poor, 2; moderate, 3; good, 4; excessive

Photo 1. *Saccharum officinarum* (C1)

Photo 2. *Erianthus procerus* (C2)

Photo 3. *Sorghum bicolor* (C3)

Photo 4. *Sorghum bicolor* (C4)

Photo 5. *Sorghum bicolor* (C5)

Photo 6. *Sorghum bicolor* (C6)

Photo 7. *Sorghum bicolor* (C7)

Photo 8. *Sorghum bicolor* (C8)

Photo 9. *Zea mays* (C9)

Photo 10. *Sorghum bicolor* (C10)

Photo 11. *Sorghum bicolor* (C11)

Photo 12. *Sorghum bicolor* (C12)

Photo 13. *Sorghum bicolor* (C13)

Photo 14. *Sorghum bicolor* (C14)

Photo 15. *Oryza sativa* (C15)

Photo 16. *Sorghum bicolor* (C16)

Photo 17. *Sorghum bicolor* (C17)

Photo 18. *Erianthus procerus* (C18)

Photo 19. *Setaria italica* (C19)

Photo 20. *Sorghum bicolor* (C20)

Photo 21. *Setaria italica* (C21)

Photo 22. *Sorghum bicolor* (C22)

Photo 23. *Sorghum bicolor* (C23)

Photo 24. *Sorghum bicolor* (C24)

Photo 25. *Erianthus procerus* (C25)

Photo 26. *Sorghum bicolor* (C26)

Photo 27. *Sorghum bicolor* (C27)

Photo 28. *Setaria italica* (C28)