

Original Paper

Collection and Conservation of Wild Leguminous Crop Relatives on Iki and Hirado Islands, Nagasaki Prefecture, Japan, 2013

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Summary

We conducted a field survey for collecting and conserving the wild leguminous crop relatives on Iki and Hirado Islands from 21st to 24th October, 2013. A total of 64 accessions, including *Glycine soja* Sieb. & Zucc., *Vigna angularis* (Willd.) Ohwi & Ohashi var. *nipponensis* (Ohwi) Ohwi & Ohashi, *Vigna nakashimae* (Ohwi) Ohwi & Ohashi and *Vigna umbellata* (Thunb.) Ohwi & Ohashi, was collected. The collected seeds were conserved in the National Institute of Agrobiological Sciences (NIAS) genebank. We plan to multiply the seeds and to evaluate their growth traits in 2014. The multiplied seeds of the collected accessions will become available upon request from NIAS genebank for research and educational purposes.

KEYWORDS : *Glycine*, *Vigna*, genetic resources

Introduction

The NIAS genebank has been conducting collecting trips for the conservation of wild *Glycine* and *Vigna* germplasm distributed in Japan (Vaughan *et al.*, 2010). The genus *Glycine* and *Vigna* belongs to the legume family (Leguminosae), and includes crop plants such as soybean (*Glycine max* (L.) Merr.), cowpea (*Vigna unguiculata* (L.) Walp.), mung bean (*Vigna radiata* (L.) Wilczek), and azuki bean (*Vigna angularis* (Willd.) Ohwi & Ohashi). Their wild relatives might have favorable characters for breeding biotic and abiotic stress tolerant crops. This is a report of the field survey for collecting wild *Glycine* and *Vigna* plants on Iki and Hirado Islands of Nagasaki Prefecture in Kyushu District, Japan (Fig.1). Iki Island has an area of 133.8 km² located on the Genkai Sea at about 20 km distant from Kyushu mainland. Iki Island is a relatively flat island with the highest locality of 212.8 m above sea level. It has a warm climate influenced by a warm current (Tsushima Kairyu) and lowland paddy rice production was traditionally abundant. Hirado Island has an area of 163.4 km² located in the northern part of Nagasaki Prefecture. It has a warm climate influenced by Tsushima Kairyu. The island has a hilly topography with a famous rice terrace landscape. Potato production for making “shochu” (a distilled beverage) is also famous here. It was connected with Kyushu mainland by Hirado-Ohashi (bridge) in 1977.

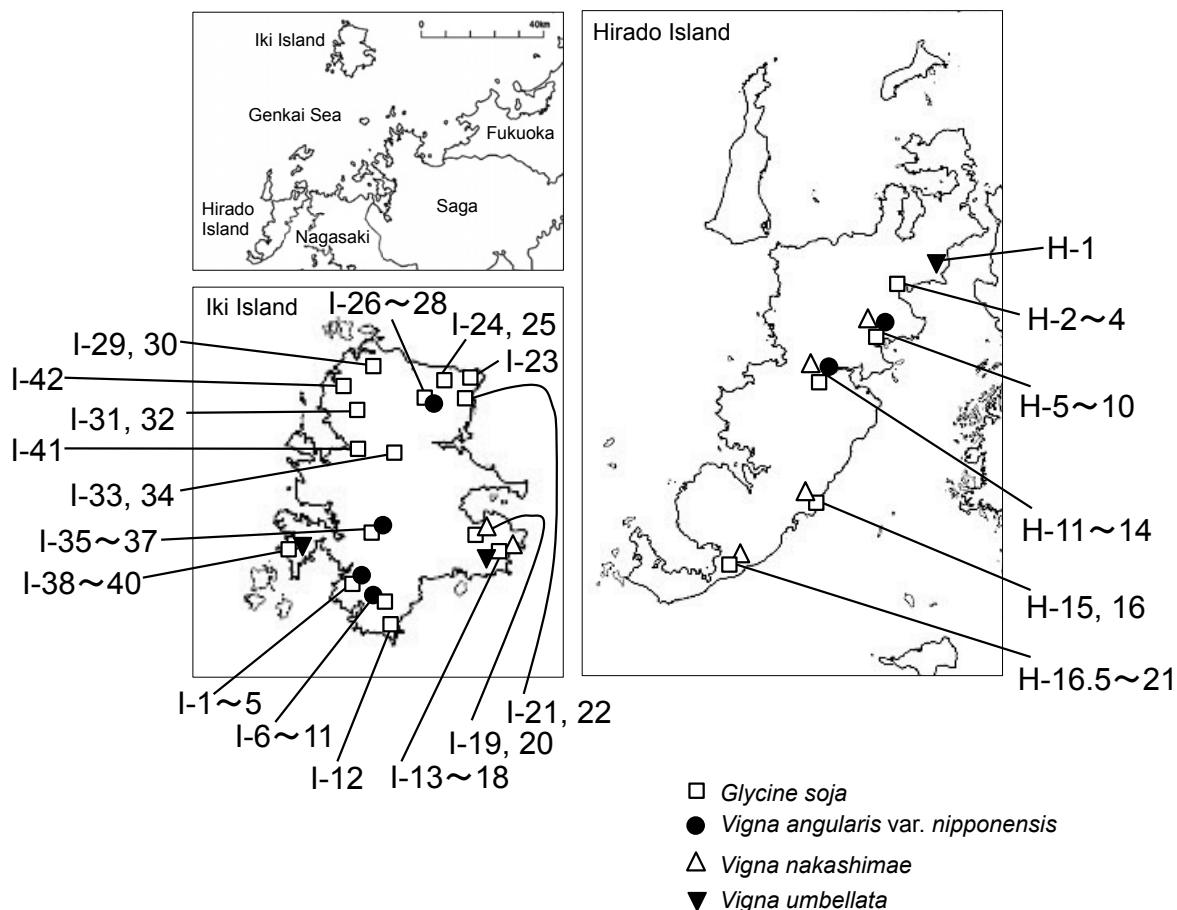


Fig. 1. Collection sites of each accession on Iki and Hirado Islands, Nagasaki Prefecture.

壱岐島および平戸島における各系統の収集地点

Methods

A field survey was conducted on Iki and Hirado Islands, Nagasaki Prefecture, Japan from 21th to 24th October, 2013 (Table 1). We went to Iki Island by high-speed boat from Hakata Port. On Iki Island, we rent a car for the survey. From Iki Island, we used ferry boat to Karatsu port, Saga Prefecture and went to Hirado Island, Nagasaki Prefecture by car over Hirado Ohashi Bridge. When we saw wild legumes from the car or saw the environment where wild legume seemed to grow, we stopped our car and searched the area in order to collect seeds from natural population. Identification of the *Vigna* species was done based on a taxonomic key (Tomooka *et al.* 2002). As a passport data, the collection site name, latitude, longitude, altitude and special characteristics of the site and plants we noticed were recorded. The latitude and longitude were measured by Garmin GPSmap 60CSx using WGS84 world geodetic system.

Results and discussion

A total of 64 accessions were collected from 2 genera (Table 2). These included 43 accessions of *Glycine soja*, 10 accessions of *Vigna angularis* var. *nipponensis*, 8 accessions of *V. nakashimae* and 3 accessions of *V. umbellata*. Passport information of each accession is summarized in Table 3. Location of the collection site of each accession is shown in Fig. 1. The characteristics of some selected accessions belonging to each species are described below.

Table 1. Itinerary of the field survey on Iki and Hirado Islands, Nagasaki Prefecture, 2013

Date	Itinerary	Stay
10/21	Tsukuba --(train)-- Haneda 11:25 --(JAL313)-- 13:10 Fukuoka 15:15 --(high speed boat)-- 16:25 Iki Island	Iki Island
10/22	Iki Island (car)	Iki Island
10/23	Iki Island 8:20 --(ferry boat)-- 10:00 Karatsu --(car)-- Hirado Island - -(car)-- Imari	Imari, Saga Prefecture
10/24	Imari --(car)-- Fukuoka 13:00 --(JAL316)-- 14:30 Haneda -- (train)-- Tsukuba	

Table 2. A summary of collected samples on Iki and Hirado Islands, Nagasaki Prefecture, 2013.

Species	Iki	Hirado	Total
<i>Glycine soja</i>	32	11	43
<i>Vigna angularis</i> var. <i>nipponensis</i>	6	4	10
<i>Vigna nakashimae</i>	2	6	8
<i>Vigna umbellata</i>	2	1	3
Total	42	22	64

***Vigna angularis* (Willd.) Ohwi & Ohashi var. *nipponensis* (Ohwi) Ohwi & Ohashi (Wild azuki bean)**

V. angularis includes wild form (var. *nipponensis*) and domesticated form called azuki bean (var. *angularis*) which was believed to be domesticated in East Asia most probably in Japan (Isemura *et al.*, 2010). The azuki bean seeds have been found from the old remains in Japan, China and Korea, suggesting that this species has been used since ancient times in East Asia (Yano *et al.* 2004, Crawford 2006). The wild form is distributed widely in Japan, except for Hokkaido District, Aomori Prefecture, and Okinawa Prefecture (Tomooka *et al.* 2002). The NIAS Genebank has been conducting systematic collecting survey of this species in Japan. However, collecting survey has not been conducted on Iki and Hirado Islands. By this survey, 6 accessions of wild azuki bean were collected from Iki Island (Table 2, Photo 1-6), and 4 accessions were collected from Hirado Island (Table 2). They were found growing at road side grassland, paddy field area and wet sites near the stream.

***Vigna umbellata* (Thunb.) Ohwi & Ohashi (Rice bean)**

Rice bean had been cultivated widely as a food crop in southwest Japan (Tomooka *et al.* 2002). It is said by the farmers that rice bean has high yielding potential and have high levels of tolerance to biotic and abiotic stresses (Tomooka *et al.*, 2000, Kashiwaba *et al.*, 2003, Somta *et al.*, 2006, Isemura *et al.*, 2010, Pandiyan *et al.*, 2010). Based on the genetic diversity analysis using East, Southeast and South Asian rice bean materials, genetic structure of Japanese rice bean was revealed to be unique with a small seeded and very early flowering habit (Tian *et al.*, 2013). However, its cultivation in Japan became very rare at present. Until now, the NIAS Genebank has conserved 19 Japanese rice bean accessions including cultivated and naturally growing (probably escaped) populations collected from Nara (Katsuta and Nakayama 1998), Yamaguchi (Vaughan *et al.*, 1999), Tokushima, Fukuoka, Saga (Kuroda *et al.*, 2005, 2006), Nagasaki (Fukuoka *et al.*, 1994, Nakayama and Bhati, 1994), Miyazaki and Kagoshima (Tomooka,

1996) Prefectures. In the present survey, we found 3 naturally growing rice bean populations that appeared to have been escaped from cultivation (Photo 7-12). All of these were found in or near the farmer's field, and had red seed coat, which is a characteristic of domesticated form.

***Vigna nakashimae* (Ohwi) Ohwi & Ohashi (Himetsuru azuki in Japanese)**

V. nakashimae is a rare wild species ranked as “endangered Ib (EN)” in Japan. Therefore, ex-situ conservation of this species is of high priority (Tomooka *et al.*, 2013). In addition, this species could be used as breeding materials for azuki bean (*V. angularis*) and rice bean (*V. umbellata*), since these two cultivated species can be artificially crossed with *V. nakashimae* (Tomooka *et al.* 2002). By this collecting survey, we have found several natural habitat of this species on both Iki and Hirado Islands. As far as we know, this is the first site record of this species on these 2 islands.

On Iki Island, we found an accession ‘I-15’ at the edge of rice paddy fields near the airport (Photo 13, 14). The population size was small, and the plants were twining around weed grass stems. ‘I-20’ was found on a rice paddy edge, twining around stems of *Solidago canadensis* (Photo 15, 16).

On Hirado Island, accessions ‘H-5’ and ‘H-8’ were found near Houki Bridge, which crossed over the Ohta River (Photo 17, 18). Their population sizes were particularly large, and the plant heights were more than 1 m. ‘H-12’ was found in a fallow paddy field in Himosashi area, as a creeper under the grasses (Photo 19, 20). ‘H-17’ and ‘H-20’ were found in Shijiki area. ‘H-17’ was twining around stems of *S. canadensis* in a fallow paddy field and the plant height was about 1 m (Photo 21-23), while the plant height of ‘H-20’ was about 10 cm (Photo 24) growing on a ridge of upland terrace field. Two populations were growing at sites of only several meters away. At this site, we noticed that the habitat and growth habit of ‘H-17’ was somewhat different from those of other *V. nakashimae* accessions. So we grew the collected accessions after return to Tsukuba in a vinyl house under 12 hrs day length (Photo 25). Most of the *V. nakashimae* accessions including ‘H-20’ had red stems and took about a month to start flowering, hence the plant size of ‘H-20’ was smaller (Photo 25 right, Photo 26). However, only ‘H-17’ had a green stem and took 2 months to start flowering, hence the plant size became larger (Photo 25 left, Photo 27). The shape of leaflets of ‘H-17’ was ovate, while that of ‘H-20’ was lanceolate. Therefore, it was shown that ‘H-17’ was genetically different from the other *V. nakashimae* accessions.

***Glycine soja* Sieb. & Zucc. (Wild soybean)**

Soybean (*Glycine max*) is thought to have been domesticated from its wild form *G. soja* in East Asia (Harlan 1975). These two species can be crossed, so the wild form could be used as breeding materials for soybeans (Vaughan *et al.* 2010). Wild form is distributed throughout Japan, except for Okinawa Prefecture (Oki and Kono 2012). However, the NIAS Genebank did not have wild soybean accessions collected from Iki and Hirado Islands. This is the first survey of the wild soybean collection on these two islands. By the survey, it was clarified that wild soybean was abundantly distributed on both islands. A total of 43 accessions (32 from Iki and 11 from Hirado Islands) were collected. The habitat and plant morphology is similar to wild form growing in other parts of Japan (Photo 28, 29). One point that should be noted is that the accessions ‘I-6’ and ‘I-7’ were growing along the sea side embankment (Photo 30, 31). Therefore, these samples might have high levels of salt tolerance.

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長崎県壱岐島および平戸島におけるマメ科作物近縁野生種 遺伝資源の収集と保全，2013年

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和文摘要

本報告は、長崎県壱岐島および平戸島におけるマメ科作物近縁野生種の調査報告である。調査は2013年10月21-24日にかけて行った。その結果、ダイズ野生種 (*Glycine soja*) 43点、アズキ野生種 (*Vigna angularis* var. *nipponensis*) 10点、アズキ近縁野生種：ヒメツルアズキ (*Vigna nakashimae*) 8点、ツルアズキ (*Vigna umbellata*) 3点、計64点の遺伝資源を収集した。ヒメツルアズキは、環境省レッドデータ絶滅危惧IB類に分類されている種である。ヒメツルアズキは、作物であるアズキやツルアズキと交雑可能である。ヒメツルアズキが壱岐および平戸島に分布していることは、今回の調査で初めて明らかになった。これらの遺伝資源は、つくば市にある農業生物資源研究所で栽培し、特性評価と種子増殖を行う計画である。増殖種子は、農業生物資源研究所のジーンバンクで保存するとともに、研究や教育目的で利用するために配布可能な遺伝資源とする。

Table 3. A passport data of the collected materials
 収集品のパスポートデータ

JP No.	Coll. No.	Map ID No.	Coll. Date	Species name	Status	Collection Site	収集地点	Latitude	Longitude	Altitude (m)	Soil	Seed	Remarks
251169	2013lki-1	l-1	22 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	Tsubofure, Gounouracho, Iki, Nagasaki	長崎県 壱岐市 郷ノ浦町 坪触	N33-44-00.3	E129-41-12.4	33	clay	bulk	Beside fallow paddy field, past maturity.
251170	2013lki-2	l-2	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-44-00.61	E129-41-13.33	33	clay	bulk	In a roadside grassland beside fallow paddy field, past maturity.
251171	2013lki-3	l-3	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-43-58.65	E129-41-11.79	33	clay	bulk	In a roadside grassland, south of irrigation pond.
251172	2013lki-4	l-4	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-44-00.26	E129-41-15.26	33	clay	bulk	In a roadside grassland, east of irrigation pond.
251173	2013lki-5	l-5	22 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-43-59.68	E129-41-14.79	33	clay	bulk	In a roadside grassland, east of irrigation pond, past maturity.
251174	2013lki-6	l-6	22 Oct., 2013	<i>Glycine soja</i>	wild	Tsubofure, Gounouracho, Iki, Nagasaki	長崎県 壱岐市 郷ノ浦町 坪触	N33-43-31.16	E129-41-49.98	3	clay	bulk	Grassland between sea and paddy field, small pod size.
251175	2013lki-7	l-7	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-43-28.75	E129-41-49.48	3	clay	bulk	Grassland between sea and paddy field.
251176	2013lki-8	l-8	22 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-43-37.42	E129-41-50.52	3	clay	bulk	Edge of a harvested paddy field, near the sea.
251177	2013lki-9	l-9	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-43-37.32	E129-41-50.95	13	clay	bulk	Edge of a harvested paddy field, near the sea.
251178	2013lki-10	l-10	22 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-43-36.39	E129-41-52.11	10	clay	bulk	Edge of a harvested paddy field, near the sea.
251179	2013lki-11	l-11	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-43-36.23	E129-41-52.49	11	clay	bulk	Edge of a harvested paddy field, near the sea.
251180	2013lki-12	l-12	22 Oct., 2013	<i>Glycine soja</i>	wild	Wakamatsufure, Gounouracho, Iki, Nagasaki	長崎県 壱岐市 郷ノ浦町 若松触	N33-43-18.4	E129-43-05.6	110	clay	bulk	Beside fallow paddy.
251181	2013lki-13	l-13	22 Oct., 2013	<i>Glycine soja</i>	wild	Higashifure, Tsutsuki, Ishidacho, Iki, Nagasaki	長崎県 壱岐市 石田町 筒城 東触	N33-45-09.41	E129-46-55.50	10	clay	bulk	Beside paddy, in a paddy field area near the airport.
251182	2013lki-14	l-14	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-45-10.63	E129-46-55.52	13	clay	bulk	Beside paddy, in a paddy field area near the airport.
251183	2013lki-15	l-15	22 Oct., 2013	<i>Vigna nakashimae</i>	wild	"	"	N33-45-09.05	E129-46-56.76	11	clay	bulk	Beside paddy, in a paddy field area near the airport.
251184	2013lki-16	l-16	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-45-10.16	E129-46-57.60	14	clay	bulk	Beside paddy, in a paddy field area near the airport.
251185	2013lki-17	l-17	22 Oct., 2013	<i>Vigna umbellata</i>	escaped	"	"	N33-45-10.16	E129-46-57.60	14	clay	bulk	Beside irrigation pond, in a paddy field area near the airport. Probably escaped from cultivation. Red seeds.
251186	2013lki-18	l-18	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-45-09.76	E129-46-54.57	10	clay	bulk	Beside paddy, in a paddy field area near the airport.
251187	2013lki-19	l-19	22 Oct., 2013	<i>Glycine soja</i>	wild	Nishifure, Tsutsuki, Ishidacho, Iki, Nagasaki	長崎県 壱岐市 石田町 筒城 西触	N33-45-30.41	E129-46-10.96	13	clay	bulk	Beside canal in paddy field area.
251188	2013lki-20	l-20	22 Oct., 2013	<i>Vigna nakashimae</i>	wild	"	"	N33-45-32.46	E33-45-32.46	19	clay	bulk	Beside harvested paddy near primary school, paddy field area.
251189	2013lki-21	l-21	22 Oct., 2013	<i>Glycine soja</i>	wild	Morotsufure, Hakozaiki, Ashibecho, Iki, Nagasaki	長崎県 壱岐市 芦辺町 箱崎 諸津触	N33-50-05.10	E129-45-43.19	30	clay	bulk	Beside paddy.
251190	2013lki-22	l-22	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-50-04.1	E129-45-47.5	20	clay	bulk	Beside paddy, climbing on a stone wall.

Table 3 (Continued).

JP No.	Coll. No.	Map ID No.	Coll. Date	Species name	Status	Collection Site	収集地点	Latitude	Longitude	Altitude (m)	Soil	Seed	Remarks
251191	2013Iki-23	I--23	22 Oct., 2013	<i>Glycine soja</i>	wild	Morotsufure, Hakozaiki, Ashibecho, Iki, Nagasaki	長崎県 壱岐市 芦辺町 箱崎 諸津触	N33-50-37.02	E129-45-58.22	70	clay	bulk	Grassland beside road.
251192	2013Iki-24	I--24	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-50-39.22	E129-45-26.67	53	clay	bulk	Beside road near the windmill.
251193	2013Iki-25	I--25	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-50-37.74	E129-45-28.06	59	clay	bulk	Beside paddy field.
251194	2013Iki-26	I--26	22 Oct., 2013	<i>Glycine soja</i>	wild	Honmurafure, Hakozaiki, Ashibecho, Iki, Nagasaki	長崎県 壱岐市 芦辺町 箱崎 本村触	N33-49-43.97	E129-44-12.02	15	clay	bulk	Along ridges in paddy field area.
251195	2013Iki-27	I--27	22 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-49-49.2	E129-44-20.4	15	clay	bulk	Edge of a harvested paddy field.
251196	2013Iki-28	I--28	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-49-49.23	E129-44-21.33	16	clay	bulk	Beside stream along a road.
251197	2013Iki-29	I--29	22 Oct., 2013	<i>Glycine soja</i>	wild	Saidofure, Katsumotocho, Iki, Nagasaki	長崎県 壱岐市 勝本町 西戸触	N33-50-45.56	E129-41-52.81	60	clay	bulk	Beside ditch along small path in paddy field area.
251198	2013Iki-30	I--30	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-50-44.5	E129-41-51.3	60	clay	bulk	Beside ditch along small path in paddy field area.
251199	2013Iki-31	I--31	22 Oct., 2013	<i>Glycine soja</i>	wild	Honguuhigashifure, Katsumotocho, Iki, Nagasaki	長崎県 壱岐市 勝本町 本宮東触	N33-49-16.00	E129-41-42.60	72	clay	bulk	Along ridges in paddy field area.
251200	2013Iki-32	I--32	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-49-16.02	E129-41-47.63	70	clay	bulk	Along ridges in paddy field area.
251201	2013Iki-33	I--33	22 Oct., 2013	<i>Glycine soja</i>	wild	Nishifure, Nakanogou, Ashibecho, Iki, Nagasaki	長崎県 壱岐市 芦辺町 中野郷 西触	N33-47-46.50	E129-43-05.20	92	clay	bulk	Along irrigation stream in harvested paddy field.
251202	2013Iki-34	I--34	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-47-46.32	E129-43-02.85	98	clay	bulk	Along irrigation stream in harvested paddy field.
251203	2013Iki-35	I--35	22 Oct., 2013	<i>Glycine soja</i>	wild	Tanakafure, Gounouracho, Iki, Nagasaki	長崎県 壱岐市 郷ノ浦町 田中触	N33-45-44.16	E129-42-09.35	22	clay	bulk	Grassland beside harvested paddy field along a stream.
251204	2013Iki-36	I--36	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-45-43.19	E129-42-11.68	20	clay	bulk	Grassland beside harvested paddy field along a stream.
251205	2013Iki-37	I--37	22 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-45-43.0	E129-42-12.3	20	clay	bulk	Grassland beside harvested paddy field along a stream.
251206	2013Iki-38	I--38	22 Oct., 2013	<i>Glycine soja</i>	wild	Watararanishifure, Gounouracho, Iki, Nagasaki	長崎県 壱岐市 郷ノ浦町 渡良西触	N33-45-11.96	E129-39-05.02	15	clay	bulk	Grassland beside road.
251207	2013Iki-39	I--39	22 Oct., 2013	<i>Vigna umbellata</i>	escaped	"	"	N33-45-13.83	E129-39-07.18	17	clay	bulk	<i>V. umbellata</i> population growing beside small road in a village. Probably escaped from old cultivation. Red seeds.
251208	2013Iki-40	I--40	22 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-45-15.18	E129-39-08.65	19	clay	bulk	Grassland beside road.
251209	2013Iki-41	I--41	22 Oct., 2013	<i>Glycine soja</i>	wild	Oourafure, Gounouracho, Iki, Nagasaki	長崎県 壱岐市 郷ノ浦町 大浦触	N33-46-35.4	E129-41-05.3	24	clay	bulk	Grassland beside small road near harvested paddy field.
251210	2013Iki-42	I--42	22 Oct., 2013	<i>Glycine soja</i>	wild	Tateishinishifure, Katsumotocho, Iki, Nagasaki	長崎県 壱岐市 勝本町 立石西触	N33-48-04.8	E129-40-35.3	40	clay	bulk	Grassland beside harvested paddy field.
251211	2013Hirado-1	H--1	23 Oct., 2013	<i>Vigna umbellata</i>	escaped	Oonocho, Hirado, Nagasaki	長崎県 平戸市 大野町	N33-20-30.60	E129-32-19.79	75	clay	bulk	Beside a path in terrace upland field near the sea. Red seeds. Probably escaped from old cultivation.
251212	2013Hirado-2	H--2	23 Oct., 2013	<i>Glycine soja</i>	wild	Nakano-Ookubocho, Hirado, Nagasaki	長崎県 平戸市 中野 大久保町	N33-19-55.4	E129-30-44.7	7	clay	bulk	Grassland beside ditch in paddy field area.

Table 3 (Continued).

JP No.	Coll. No.	Map ID No.	Coll. Date	Species name	Status	Collection Site	収集地点	Latitude	Longitude	Altitude (m)	Soil	Seed	Remarks
251213	2013Hirado-3	H--3	23 Oct., 2013	<i>Glycine soja</i>	wild	Nakano-Ookubocho, Hirado, Nagasaki	長崎県 平戸市 中野 大久保町	N33-19-56.88	E129-30-47.48	5	clay	bulk	Beside ridge in paddy field area.
251214	2013Hirado-4	H--4	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-19-53.13	E129-30-47.52	5	clay	bulk	Grassland beside ditch in paddy field area.
251215	2013Hirado-5	H--5	23 Oct., 2013	<i>Vigna nakashimae</i>	wild	Houkicho, Hirado, Nagasaki	長崎県 平戸市 宝亀町	N33-18-26.83	E129-30-21.38	14	clay	bulk	Fallow paddy field. Paddy field area beside Houki bridge.
251216	2013Hirado-6	H--6	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-18-26.83	E129-30-21.38	14	clay	bulk	Fallow paddy field. Paddy field area beside Houki bridge.
251217	2013Hirado-7	H--7	23 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-18-26.58	E129-30-23.23	17	clay	bulk	Fallow paddy field. Paddy field area beside Houki bridge.
251218	2013Hirado-8	H--8	23 Oct., 2013	<i>Vigna nakashimae</i>	wild	"	"	N33-18-26.58	E129-30-23.23	17	clay	bulk	Fallow paddy field. Paddy field area beside Houki bridge.
251219	2013Hirado-9	H--9	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-18-26.58	E129-30-23.23	17	clay	bulk	Fallow paddy field. Paddy field area beside Houki bridge.
251220	2013Hirado-10	H--10	23 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-18-26.19	E129-30-24.00	19	clay	bulk	Fallow paddy field. Paddy field area beside Houki bridge.
251221	2013Hirado-11	H--11	23 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	Mukaehimosashicho, Hirado, Nagasaki	長崎県 平戸市 迎紐差町	N33-17-24.6	E129-28-40.6	2	clay	bulk	Grassland beside harvested paddy field along a river near Himosashi bridge.
251222	2013Hirado-12	H--12	23 Oct., 2013	<i>Vigna nakashimae</i>	wild	"	"	N33-17-20.53	E129-28-40.99	1	clay	bulk	Grassland beside harvested paddy field along a river near Himosashi bridge.
251223	2013Hirado-13	H--13	23 Oct., 2013	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	"	N33-17-19.63	E129-28-41.45	1	clay	bulk	Grassland beside harvested paddy field along a river near Himosashi bridge.
251224	2013Hirado-14	H--14	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-17-19.63	E129-28-41.45	1	clay	bulk	Grassland beside harvested paddy field along a river near Himosashi bridge.
251225	2013Hirado-15	H--15	23 Oct., 2013	<i>Vigna nakashimae</i>	wild	Funagicho, Hirado, Nagasaki	長崎県 平戸市 船木町	N33-13-22.2	E129-28-02.1	5	clay	bulk	Along a small path in harvested paddy field.
251226	2013Hirado-16	H--16	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-13-24.59	E129-28-02.33	5	clay	bulk	Along a small path in harvested paddy field.
251227	2013Hirado-16.5	H--16.5	23 Oct., 2013	<i>Glycine soja</i>	wild	Shijikicho, Hirado, Nagasaki	長崎県 平戸市 志々伎町	N33-11-57.62	E129-24-39.02	12	clay	bulk	Beside a ditch in harvested paddy field area.
251228	2013Hirado-17	H--17	23 Oct., 2013	<i>Vigna nakashimae</i>	wild	"	"	N33-12-01.25	E129-24-41.31	12	clay	bulk	Abundantly growing in a Solidago altissima dominated fallow paddy field.
251229	2013Hirado-18	H--18	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-12-01.12	E129-24-41.15	12	clay	bulk	Growing in a Solidago altissima dominated fallow paddy field.
251230	2013Hirado-19	H--19	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-12-01.15	E129-24-41.89	12	clay	bulk	Growing beside a ditch at opposite side of a Solidago altissima dominated fallow paddy field.
251231	2013Hirado-20	H--20	23 Oct., 2013	<i>Vigna nakashimae</i>	wild	"	"	N33-12-00.01	E129-24-42.24	13	clay	bulk	Growing beside ridge of upper terrace paddy field.
251232	2013Hirado-21	H--21	23 Oct., 2013	<i>Glycine soja</i>	wild	"	"	N33-11-50.20	E129-24-31.43	10	clay	bulk	Beside paddy field.



Photo 1. Habitat of *Vigna angularis* var. *nipponensis*, I-5, JP251173, Tsubofure, Gounouracho, Iki



Photo 2. *Vigna angularis* var. *nipponensis*, I-1, JP251169, Tsubofure, Gounouracho, Iki



Photo 3. Habitat of *Vigna angularis* var. *nipponensis*, I-27, JP251195, Honmurafure, Hakozaeki, Ashibecho, Iki



Photo 4. *Vigna angularis* var. *nipponensis*, I-27, JP251195, Honmurafure, Hakozaeki, Ashibecho, Iki



Photo 5. Habitat of *Vigna angularis* var. *nipponensis*, I-37, JP251205, Tanakafure, Gounouracho, Iki

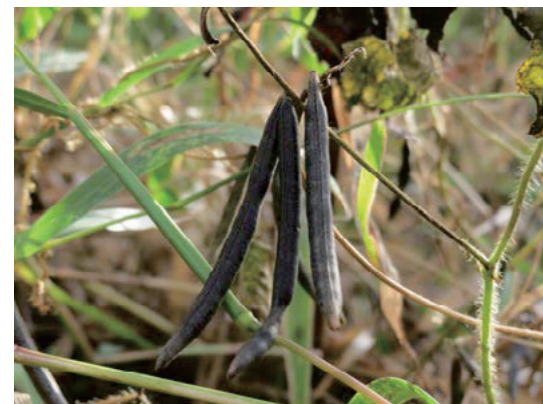


Photo 6. *Vigna angularis* var. *nipponensis*, I-37, JP251205, Tanakafure, Gounouracho, Iki



Photo 7. Habitat of *Vigna umbellata*, I-17, JP251185, Higashifure, Tsutsuki, Ishidacho, Iki



Photo 8. *Vigna umbellata*, I-17, JP251185, Higashifure, Tsutsuki, Ishidacho, Iki



Photo 9. Habitat of *Vigna umbellata*, I-39, JP251207, Watararanishifure, Gounouracho, Iki



Photo 10. *Vigna umbellata*, I-39, JP251207, Watararanishifure, Gounouracho, Iki



Photo 11. Habitat of *Vigna umbellata*, H-1, JP251211, Oonocho, Hirado



Photo 12. *Vigna umbellata*, H-1, JP251211, Oonocho, Hirado



Photo 13. Habitat of *Vigna nakashimae*, I-15, JP251183, Higashifure, Tsutsuki, Ishidacho, Iki



Photo 14. *Vigna nakashimae*, I-15, JP251183, Higashifure, Tsutsuki, Ishidacho, Iki



Photo 15. Habitat of *Vigna nakashimae*, I-20, JP251188, Nishifure, Tsutsuki, Ishidacho, Iki



Photo 16. *Vigna nakashimae*, I-20, JP251188, Nishifure, Tsutsuki, Ishidacho, Iki



Photo 17. Habitat of *Vigna nakashimae*, H-8, JP251218, Houkicho, Hirado



Photo 18. *Vigna nakashimae*, H-8, JP251218, Houkicho, Hirado



Photo 19. Habitat of *Vigna nakashimae*, H-12, JP251222, Mukaehimosashicho, Hirado



Photo 20. *Vigna nakashimae*, H-12, JP251222, Mukaehimosashicho, Hirado



Photo 21. Habitat of *Vigna nakashimae*, H-17, JP251228, Shijikicho, Hirado, Iki



Photo 22. *Vigna nakashimae*, H-17, JP251228, Shijikicho, Hirado



Photo 23. *Vigna nakashimae*, H-17, JP251228, Shijikicho, Hirado



Photo 24. Habitat of *Vigna nakashimae*, H-20, JP251231, Shijikicho, Hirado



Photo 25. Growth habit of H-17 (left) and H-20 (right), *Vigna nakashimae* collected from the same site, Shijikicho, Hirado



Photo 26. Leaf morphology and stem color of H-20, *Vigna nakashimae*



Photo 27. Leaf morphology and stem color of H-17, *Vigna nakashimae*



Photo 28. Habitat of *Glycine soja*, I-3, JP251171, Tsubofure, Gounouracho, Iki

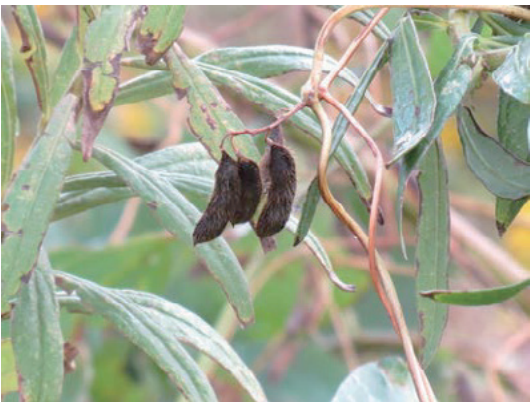


Photo 29. *Glycine soja*, I-3, JP251171, Tsubofure, Gounouracho, Iki



Photo 30. Habitat of *Glycine soja*, I-6, JP251174, Tsubofure, Gounouracho, Iki



Photo 31. *Glycine soja*, I-6, JP251174, Tsubofure, Gounouracho, Iki



H-1, JP251211, *Vigna umbellata*



H-2, JP251212, *Glycine soja*



H-3, JP251213, *Glycine soja*



H-4, JP251214 *Glycine soja*



H-5, JP251215, *Vigna nakashimae*



H-6, JP251216, *Glycine soja*



H-7, JP251217, *Vigna angularis*
var. *nipponensis*



H-8, JP251218, *Vigna nakashimae*



H-9, JP251219, *Glycine soja*



H-10, JP251220, *Vigna angularis*
var. *nipponensis*



H-11, JP251221, *Vigna angularis*
var. *nipponensis*



H-12, JP251222, *Vigna nakashimae*



H-13, JP251223, *Vigna angularis*
var. *nipponensis*



H-14, JP251224, *Glycine soja*



H-15, JP251225, *Vigna nakashimae*



H-16, JP251226, *Glycine soja*



H-16.5, JP251227, *Glycine soja*



H-17, JP251228, *Vigna nakashimae*



H-18, JP251229, *Glycine soja*



H-19, JP251230, *Glycine soja*



H-20, JP251231, *Vigna nakashimae*



H-21, JP251232, *Glycine soja*



I-1, JP251169, *Vigna angularis*
var. *nipponensis*



I-2, JP251170, *Glycine soja*



I-3, JP251171, *Glycine soja*



I-4, JP251172, *Glycine soja*



I-5, JP251173, *Vigna*
angularis var. *nipponensis*



I-6, JP251174, *Glycine soja*



I-7, JP251175, *Glycine soja*



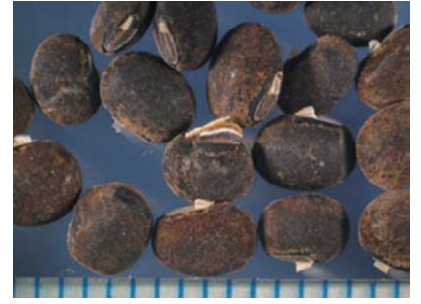
I-8, JP251176, *Vigna*
angularis var. *nipponensis*



I-9, JP251177, *Glycine soja*



I-10, JP251178, *Vigna angularis* var. *nipponensis*



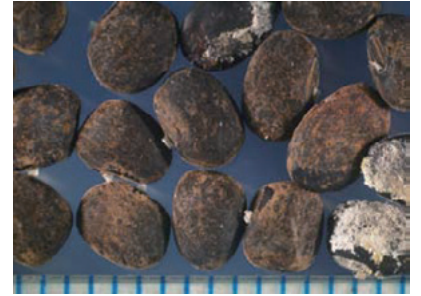
I-11, JP251179, *Glycine soja*



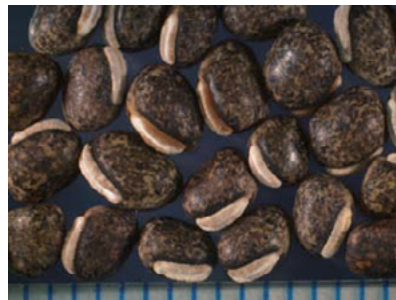
I-12, JP251180, *Glycine soja*



I-13, JP251181, *Glycine soja*



I-14, JP251182, *Glycine soja*



I-15, JP251183, *Vigna nakashimae*



I-16, JP251184, *Glycine soja*



I-17, JP251185, *Vigna umbellata*



I-18, JP251186, *Glycine soja*



I-19, JP251187, *Glycine soja*



I-20, JP251188, *Vigna nakashimae*



I-21, JP251189, *Glycine soja*



I-22, JP251190, *Glycine soja*



I-23, JP251191, *Glycine soja*



I-24, JP251192, *Glycine soja*



I-25, JP251193, *Glycine soja*



I-26, JP251194, *Glycine soja*



I-27, JP251195, *Vigna angularis* var. *nipponensis*



I-28, JP251196, *Glycine soja*



I-29, JP251197, *Glycine soja*



I-30, JP251198, *Glycine soja*



I-31, JP251199, *Glycine soja*



I-32, JP251200, *Glycine soja*



I-33, JP251201, *Glycine soja*



I-34, JP251202, *Glycine soja*



I-35, JP251203, *Glycine soja*



I-36, JP251204, *Glycine soja*



I-37, JP251205, *Vigna angularis* var. *nipponensis*



I-38, JP251206, *Glycine soja*



I-39, JP251207, *Vigna umbellata*



I-40, JP251208, *Glycine soja*



I-41, JP251209, *Glycine soja*



I-42, JP251210, *Glycine soja*