

Collection of wild Leguminous Crop Relatives on Goto islands, Nagasaki, Japan, 2012

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Summary

A field survey was conducted on Goto islands, Nagasaki prefecture, Japan, from 21st to 26th October, 2012. As a result, 89 accessions of leguminous plants consisting of 49 accessions of *Glycine soja*, 15 of *Vigna angularis* (1 cultivated, 12 weedy, 2 wild), 19 of *Vigna nakashimae*, 1 of *Vigna radiata* (1 escaped), and 5 of *Vigna unguiculata* (2 cultivated and 3 escaped) were recorded and seed samples were collected. All the seed samples collected are conserved at the NIAS genebank, Japan. These accessions will be grown and evaluated in 2013 and will become available for research, breeding and educational purposes.

KEY WORDS : Goto islands, Nagasaki prefecture, wild legumes, *Glycine*, *Vigna*

Introduction

In order to conserve genetic diversity of leguminous crops and their wild relatives, genetic resources center of National Institute of Agrobiological Sciences, has been conducting domestic and overseas exploration under the NIAS genebank project (Tomooka *et al.* 2011). The previous exploration reports are available from the NIAS genebank web page.

<http://www.gene.affrc.go.jp/publications.php?section=plant>. (List of Annual Report on exploration, some are written in English)

[http://www.gene.affrc.go.jp/pdf/publications/plant-exp_2011\(28\)_p1.pdf](http://www.gene.affrc.go.jp/pdf/publications/plant-exp_2011(28)_p1.pdf) (a report of 2011 domestic exploration written in English, listed as an example)

This is the first report of a field survey on wild relatives of leguminous crops on Goto islands except Nakadorijima and Wakamatsujima islands, Nagasaki prefecture, Japan (Tomooka *et al.*, 1999). Goto islands are located ca. 100 km west of mainland Nagasaki prefecture. Natural populations of *Vigna nakashimae* have only been recorded from the Goto islands in Japan, and collection of this species was the main objective of this survey.

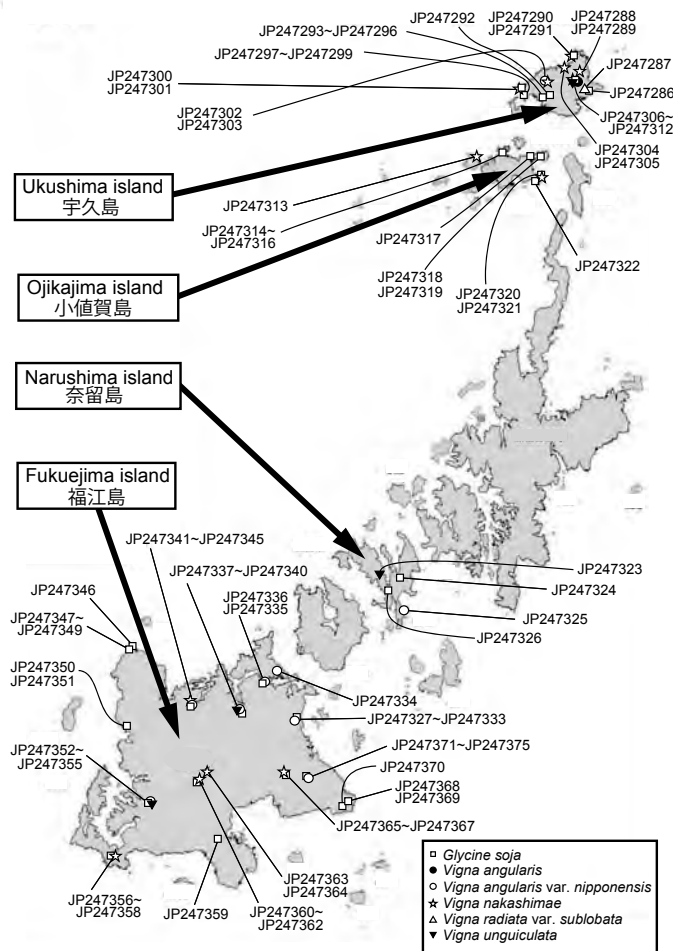


Fig. 1. A map of Goto islands, Nagasaki prefecture, Japan.

Collection sites are indicated by (□) for *Glycine soja*, (●) for *Vigna angularis* var. *angularis*, (○) for *Vigna angularis* var. *nipponensis*, (☆) for *Vigna nakashimae*, (△) for *Vigna radiata* var. *sublobata* and (▽) for *Vigna unguiculata*. For each collection site, JP number of each accession is listed.

Methods

We surveyed Goto islands by car from 21st to 26th October, 2012 (Table 1, Fig. 1). Four islands, i.e., Ukushima, Ojikajima, Narushima and Fukuejima were surveyed. We used ferry boats to move between islands. Seeds, herbarium specimens and root nodules (if available) were collected. Information on collection sites including village name, altitude, latitude, longitude, habitat sketch map and other ecological data were recorded on passport data sheets as summarized (Tables 2 & 3). Latitude and longitude were measured using WGS84 world geodetic system.

Results and Discussion

A total of 89 accessions of leguminous plants consisting of 49 accessions of *Glycine soja*, 15 of *Vigna angularis* (1 cultivated, 12 weedy, 2 wild), 19 of *Vigna nakashimae*, 1 of *Vigna radiata* (escaped), and 5 of *Vigna unguiculata* (2 cultivated and 3 escaped) were recorded and seed samples were collected (Tables 2 & 3). Collected seed samples are conserved at NIAS genebank, Tsukuba, Japan and will be multiplied and evaluated in 2013. Multiplied seed samples will become available for research, breeding and educational purposes upon request. Searching (http://www.gene.affrc.go.jp/databases-plant_search_en.php) and requesting

Table 1. Itinerary of the field survey in Goto islands, Nagasaki Prefecture, Japan.

日程表 (五島列島)

Date	Itinerary	Stay
2012/10/21	Tsukuba -- (Tsukuba Express train / JR) -- Haneda Airport 15:00 -- (ANA 259) -- Fukuoka Airport 16:45	Fukuoka
2012/10/22	Hakata (Fukuoka) 10:22 -- (express Train) -- Sasebo (Nagasaki) 12:11 -- (walk) -- Sasebo Port 13:00 -- (Jet Boat) -- Uku Port (Ukushima Island) 14:30 -- (Ukushima Island EXPLORATION)	Ukushima Island (Nagasaki)
2012/10/23	(Ukushima Island EXPLORATION) -- Ukudaira Port 13:10 -- (Ferryboat) -- Ojikajima Island Port 13:50 -- (Ojikajima Island EXPLORATION)	Ojikajima Island (Nagasaki)
2012/10/24	Ojikajima Island Port 05:00 -- (Ferry boat) -- Narushima Island Port 08:10 -- (Narushima Islands EXPLORATION) -- Narushima Island Port 14:20 -- (Jet Boat) -- Fukuejima Island Port 14:50 -- (Fukuejima Island EXPLORATION)	Fukuejima Island (Nagasaki)
2012/10/25	(Fukuejima Island EXPLORATION)	Fukuejima Island (Nagasaki)
2012/10/26	(Fukuejima Island EXPLORATION) -- Fukue Airport (Goto, Nagasaki) 11:10 -- (ANA4634) -- Fukuoka Airport 11:55, Fukuoka Airport 12:30 -- (ANA252) -- Haneda Airport 14:10 -- (JR / Tsukuba Express train) -- Tsukuba	

accessions (http://www.gene.affrc.go.jp/distribution_en.php?section=plant) can be done through NIAS genebank web site.

***Glycine soja* (Wild soybean, Tsuru-mame in Japanese)**

The NIAS genebank has been conducting comprehensive collecting survey of wild soybean throughout Japan, and genetic structure of wild soybean has been clarified (Kuroda *et al.*, 2006, 2008, 2009, 2010). However, this is the first survey by the NIAS genebank for collecting wild soybean in Goto (Ukushima, Ojikajima, Narushima and Fukuejima) islands.

Wild soybean was common on Goto islands and 49 accessions were collected (Table 2, Fig. 1). Some of the habitats of wild soybean are shown on Photos 1, 2, 3 and 4. Among the collection sites of wild soybean, these 4 sites, i.e., Goto-7-2 (JP247298, Ukushima, Photo 1, Fig. 1), Goto-14 (JP247317, Ojimajima, Photo 2, Fig. 1), Goto 16-1 (JP247320, Ojikajima, Photo 3, Fig. 1), and Goto 27 (JP247346, Fukuejima, Photo 4, Fig. 1) are noteworthy because their habitats are very close to the sea shore. Therefore, it is expected that these accessions may have high level of salinity tolerance.

***Vigna angularis* (Wild, weedy and cultivated azuki bean)**

Weedy and wild azuki bean populations were not so common on Goto islands (Photos 5, 6, 7 and 8). Among 14 naturally growing (= not planted by farmers) azuki bean populations found, 12 populations (86%) were classified as weedy azuki bean based on their seed size, pod and stem color (Table 2). Wide phenotypic variations were observed for weedy populations. A weedy azuki bean population found on Fukuejima island (JP247355, Photos 6 & 7) showed nearly erect plant type growing in an abandoned small field beside sea. This population may be an escaped population derived from old cultivation. One cultivated azuki bean (JP247311, red seed) was collected in Ootae village on Ukushima island. The azuki bean cultivated field was located in an area of paddy fields.

Table 2. A summary of collected samples in Goto islands, Nagasaki Prefecture, Japan.

五島列島における収集品の内訳

Species	Cultivated	Not cultivated			Total
		Escaped ¹⁾	Weedy ²⁾	Wild ³⁾	
<i>Glycine soja</i>				49	49
<i>Vigna angularis</i>	1		12	2	15
<i>Vigna nakashimae</i>				19	19
<i>Vigna radiata</i>		1			1
<i>Vigna unguiculata</i>	2	3			5
Total	3	4	12	70	89

1)Escaped: naturally growing population presumably escaped from cultivation.

2)Weedy: naturally growing population with intermediate morphology or growth characteristics between domesticated and wild form.

3)Wild: naturally growing population with typical wild characteristics. (small seed, shattering pod, twining stem etc.)

Vigna nakashimae (Himetsuru azuki in Japanese)

Vigna nakashimae is a wild species that is cross compatible with azuki bean (*Vigna angularis*) (Tomooka *et al.*, 2002). The geographic distribution of this species in Japan seems to be limited only on Goto islands. Before the present survey, only one accession of *V. nakashimae* (JP107879) had been collected on Ukushima island and was conserved in the NIAS genebank. Based on the screening using 342 accessions of 8 *Vigna* species, JP107879 was one of the four most promising resistant accessions against 4 races of soybean cyst nematode (Kushida *et al.*, 2013). Another 30 accessions of *V. nakashimae* collected in the Republic of Korea did not show high level of resistance against soybean cyst nematode.

In this survey, 19 accessions of *V. nakashimae* (8 from Ukushima, 2 from Ojikajima and 9 from Fukuejima) were collected (Table 2). Among them, JP247291 (near Tsushimase light house, Ukushima, Photo 9), JP247305 (Otomegahana, Ukushima, Photo 10) and JP247313 (Gyokusekihana, Madarashimagou, Ojikajima) were found growing in grass land near the sea where sea winds are very strong. These accessions are expected to have adapted to the sea wind affected habitat. Other populations were found growing inland. In most cases, they were found in grass land beside paddy field (Photos 11 - 14).

Vigna radiata (escaped mungbean)

A naturally growing population of *Vigna radiata* (JP247287) was found in grass land between harvested maize field and small farm road at hilly upland field on Ukushima island (Photos 15 &16). Plants have long stems and were twining on the ground. Leaves were dried out. They had shattering pods and small brown seeds (see seeds photo). Although it is generally believed that Japan is out of natural distribution range of wild *V. radiata*, seed size of JP247287 is very small (even smaller than most of other wild *Vigna* accessions collected in this survey). It needs to be determined if this accession is a true wild *V. radiata* or an escaped natural weedy population from cultivation.

***Vigna unguiculata* (cultivated and escaped cowpea)**

Two accessions of cultivated cowpea were collected from farmer's field in Ootae village on Ukushima island. JP247310 have purple stems and relatively small red seeds, while JP247312 have green stems and much larger seeds. Three populations of naturally growing cowpea were found and collected. These populations are considered to be naturalized populations escaped from cultivated fields. JP247323 was growing in a small kitchen garden beside river in Shirobae village on Narushima island. It has small black seeds and shattering pods. JP247339 was growing in grass land between road (R384) and harvested paddy field near Yanagino bus stop on Fukuejima island. Weedy azuki bean and wild soybean were also growing at this site. JP247353 was growing between village road and sorghum field in paddy fields area on Fukuejima island. It has black seeds. Weedy azuki bean (JP247352) was also growing near this site.

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長崎県五島列島におけるマメ科植物遺伝資源の探索収集 2012年

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和文摘要

本報告は、長崎県五島列島（宇久島，小値賀島，奈留島，福江島）におけるマメ科植物遺伝資源の調査報告である。調査は、2012年10月21日～10月26日にかけて行った。調査の結果、野生ダイズ49点，栽培アズキ1点，雑草アズキ12点，野生アズキ2点，ヒメツルアズキ19点，栽培からのエスケープ由来と思われる自生リョクトウ1点，栽培ササゲ2点，栽培からのエスケープ由来と思われる自生ササゲ3点，合計89点の植物遺伝資源を収集保存した。これらの遺伝資源は、2013年度に茨城県つくば市の農業生物資源研究所圃場において栽培し，特性評価，種子増殖を行い配布可能なアクティブコレクションとして生物研ジーンバンクにおいて保存する計画である。

Table 3. A passport data of collected samples.

収集品のパスポートデータ

JP No.	Coll. No. 2012	Coll. Date 2012	Species name	Status	Collection site	Latitude	Longitude	Altitude (m)	Soil	Sample	Herbarium	Nodule	Remarks
247286	Goto-1	22 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Taira (平), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-16-00.3	E129-08-32.8	24	sandy	bulk	no	no	slope 0°, beside paddy, climbing on reed like plants, leaves already dried up maybe because of salty wind by typhoon
247287	Goto-2	22 Oct.	<i>Vigna radiata</i> var. <i>sublobata</i>	weedy	Ukumachi-Taira, Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-16-06.2	E129-08-27.0	34	sandy	bulk	no	no	slope 0°, beside maize field, already dried out, small brown seed, pod shattering, maybe escaped from old cultivation
247288	Goto-3-1	22 Oct.	<i>Vigna nakashimae</i>	wild	Ukumachi-Nogata (野方), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-17-01.0	E129-07-53.8	38	silt	bulk	no	no	slope 0°, beside forage field, already dried out, powdery mildew occurred, large seeds
247289	Goto-3-2	22 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-17-01.0	E129-07-53.8	38	silt	bulk	no	yes	slope 0°, roadside
247290	Goto-4-1	22 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Nogata (野方), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-17-57.8	E129-07-32.3	9	silt	bulk	no	no	slope 0°, beside paddy field near Tsushimase light house (対馬瀬灯台)
247291	Goto-4-2	22 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-17-57.8	E129-07-32.3	9	silt	bulk	no	no	slope 0°, grass land, heavy wind from the sea, seems to be salt affected habitat, <i>Canavalia rosea</i> also growing, near Tsushimase light house (対馬瀬灯台)
247292	Goto-5	23 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Kounoura (神浦), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-15-50.4	E129-06-13.9	72	silt	bulk	no	no	slope 0°, beside abandoned paddy field
247293	Goto-6-1	23 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Iira (飯良), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-15-38.8	E129-05-36.5	16	silt	bulk	no	no	slope 30°, beside paddy field
247294	Goto-6-2	23 Oct.	<i>Glycine soja</i>	wild	"	N33-15-38.8	E129-05-36.5	16	silt	bulk	no	no	slope 30°, beside paddy field
247295	Goto-6-3	23 Oct.	<i>Glycine soja</i>	wild	"	N33-15-38.8	E129-05-36.5	16	silt	bulk	no	no	slope 0°, beside paddy field
247296	Goto-6-4	23 Oct.	<i>Glycine soja</i>	wild	"	N33-15-38.8	E129-05-36.5	16	silt	bulk	no	no	slope 0°, beside paddy field
247297	Goto-7-1	23 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Motoiira (本飯良), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-15-53.8	E129-04-35.3	22	silt	bulk	no	no	slope 5°, grass land, strong wind from sea, sea wind affected habitat, beside Yakujinja shrine (厄神社)
247298	Goto-7-2	23 Oct.	<i>Glycine soja</i>	wild	"	N33-15-53.8	E129-04-35.3	17	silt	bulk	no	no	slope 5°, grass land, strong wind from sea, sea wind affected habitat, beside Yakujinja shrine (厄神社)

Table 3 (Continued).

JP No.	Coll. No. 2012	Coll. Date 2012	Species name	Status	Collection site	Latitude	Longitude	Altitude (m)	Soil	Sample	Herbarium	Nodule	Remarks
247299	Goto-7-3	23 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Motoiira (本飯良), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-15-53.8	E129-04-35.3	31	silt	bulk	no	no	slope 5°, grass land, strong wind from sea, sea wind affected habitat, beside Yakujinja shrine (厄神社)
247300	Goto-8-1	23 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-16-11.5	E129-04-23.6	17	silt	bulk	yes	yes	slope 0°, road side, near Hitakizaki (火炊崎)
247301	Goto-8-2	23 Oct.	<i>Glycine soja</i>	wild	"	N33-16-11.5	E129-04-23.6	17	silt	bulk	no	no	slope 0°, road side, near Hitakizaki (火炊崎)
247302	Goto-9-1	23 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	Ukumachi-Ookubo (大久保), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-16-38.1	E129-05-53.5	93	silt	bulk	no	no	A lot of weedy azuki bean growing on fallow paddy field, called "Neko-enzu" by a farmer
247303	Goto-9-2	23 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-16-38.1	E129-05-53.5	93	silt	bulk	no	no	several <i>V. nakashimae</i> plants growing at the edge of fallow-paddy field
247304	Goto-10-1	23 Oct.	<i>Vigna nakashimae</i>	wild	Ukumachi-Koba (木場), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-17-18.0	E129-07-02.1	23	red silt	bulk	no	yes	slope 10°, strong wind from sea, sea wind affected habitat, Otomegahana (乙女が鼻)
247305	Goto-10-2	23 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-17-18.0	E129-07-02.1	23	silt	bulk	no	no	slope 5°, strong wind from sea, sea wind affected habitat, Otomegahana (乙女が鼻)
247306	Goto-11-1	23 Oct.	<i>Glycine soja</i>	wild	Ukumachi-Ootae (太田江), Sasebo, Nagasaki (Ukushima island) (宇久島)	N33-16-40.4	E129-07-24.5	30	red silt	bulk	no	no	slope 0°, growing in wide paddy fields area
247307	Goto-11-2	23 Oct.	<i>Glycine soja</i>	wild	"	N33-16-40.4	E129-07-24.5	30	red silt	bulk	no	no	slope 0°, growing in wide paddy fields area
247309	Goto-11-3	23 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-16-40.4	E129-07-24.5	30	red silt	bulk	no	no	slope 0°, growing in wide paddy fields area
247310	Goto-11-4	23 Oct.	<i>Vigna unguiculata</i>	cultivated	"	N33-16-40.4	E129-07-24.5	30	red silt	bulk	no	no	slope 0°, small pod cowpea, red stem, small red seeds, wide paddy fields area
247311	Goto-11-5	23 Oct.	<i>Vigna angularis</i> var. <i>angularis</i>	cultivated	"	N33-16-40.4	E129-07-24.5	30	red silt	bulk	no	no	slope 0°, red seeds, wide paddy fields area
247312	Goto-11-6	23 Oct.	<i>Vigna unguiculata</i>	cultivated	"	N33-16-40.4	E129-07-24.5	30	red silt	bulk	no	no	slope 0°, large pod cowpea, green stem, large red seeds, wide paddy fields area
247313	Goto-12	23 Oct.	<i>Vigna nakashimae</i>	wild	Madarashimagou (斑島郷), Ojika-cho, Kitamatsuura-gun, Nagasaki (Ojikajima island) (小値賀島)	N33-12-39.9	E129-01-30.4	21	silt	bulk	no	no	slope 0°, strong wind from sea, sea wind affected habitat, near Gyokusekihana (玉石鼻)

Table 3 (Continued).

JP No.	Coll. No. 2012	Coll. Date 2012	Species name	Status	Collection site	Latitude	Longitude	Altitude (m)	Soil	Sample	Herbarium	Nodule	Remarks
247314	Goto-13-1	23 Oct.	<i>Glycine soja</i>	wild	Yanagigou (柳郷), Ojika-cho, Kitamatsuura-gun, Nagasaki (Ojikajima island) (小値賀島)	N33-12-47.8	E129-03-08.7	20	red silt	bulk	no	no	slope 0°, beside paddy field
247315	Goto-13-2	23 Oct.	<i>Glycine soja</i>	wild	"	N33-12-47.8	E129-03-08.7	20	red silt	bulk	no	no	slope 0°, beside paddy field
247316	Goto-13-3	23 Oct.	<i>Glycine soja</i>	wild	"	N33-12-47.8	E129-03-08.7	20	red silt	bulk	no	no	slope 0°, beside paddy field
247317	Goto-14	23 Oct.	<i>Glycine soja</i>	wild	Maegatagou (前方郷), Ojika-cho, Kitamatsuura-gun, Nagasaki (Ojikajima island) (小値賀島)	N33-12-38.6	E129-04-51.7	4	gravel	bulk	no	no	slope 0°, growing very near to the sea. sea water affected habitat
247318	Goto-15-1	23 Oct.	<i>Glycine soja</i>	wild	Maegatagou (前方郷), Ojika-cho, Kitamatsuura-gun, Nagasaki (Ojikajima island) (小値賀島)	N33-12-38.6	E129-05-34.5	0	silt	bulk	no	no	slope 0°, grass land (abandoned field), Toumizaki (唐見崎)
247319	Goto-15-2	23 Oct.	<i>Glycine soja</i>	wild	"	N33-12-38.6	E129-05-34.5	0	silt	bulk	no	no	slope 0°, grass land (abandoned field), Toumizaki (唐見崎)
247320	Goto-16-1	23 Oct.	<i>Glycine soja</i>	wild	Maegatagou (前方郷), Ojika-cho, Kitamatsuura-gun, Nagasaki (Ojikajima island) (小値賀島)	N33-11-39.9	E129-05-32.8	0	silt	bulk	no	no	slope 0°, grass land (abandoned field), sea water affected habitat, northern edge of Ojika airport (小値賀空港)
247321	Goto-16-2	23 Oct.	<i>Vigna nakashimae</i>	wild	"	N33-11-39.9	E129-05-32.8	6	silt	bulk	no	no	slope 0°, beside field (grass land), beside Ojika airport (小値賀空港)
247322	Goto-17	23 Oct.	<i>Glycine soja</i>	wild	Maegatagou (前方郷), Ojika-cho, Kitamatsuura-gun, Nagasaki (Ojikajima island) (小値賀島)	N33-11-19.4	E129-05-23.9	12	silt	bulk	no	no	slope 10°, beside Ojika airport (小値賀空港)
247323	Goto-18	24 Oct.	<i>Vigna unguiculata</i>	weedy	Narushimamachi-Ura (浦), Goto, Nagasaki (Narushima island) (奈留島)	N32-50-52.8	E128-55-24.5	11	gravel	bulk	no	no	slope 0°, small black seeds, pod shattering, Shirobae village (白這)
247324	Goto-19	24 Oct.	<i>Glycine soja</i>	wild	Narushimamachi-Funemawari (船廻), Goto, Nagasaki (Narushima island) (奈留島)	N32-50-47.1	E128-56-39.0	16	silt	bulk	no	no	slope 2°.
247325	Goto-20	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	Narushimamachi-Tomari (泊), Goto, Nagasaki (Narushima island) (奈留島)	N32-49-01.1	E128-56-52.8	21	silt	bulk	no	no	slope 0°, Nagi village (奈木)
247326	Goto-21	24 Oct.	<i>Glycine soja</i>	wild	Narushimamachi-Ura (浦), Goto, Nagasaki (Narushima island) (奈留島)	N32-50-01.1	E128-55-57.8	15	gravel	bulk	no	no	slope 0°, behind main street of Ura-town, north of Ura port
247327	Goto-22-1	24 Oct.	<i>Glycine soja</i>	wild	Hirazou-cho (平蔵町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-43-04.8	E128-50-11.0	16	silt	bulk	no	no	near swamp, paddy
247328	Goto-22-2	24 Oct.	<i>Glycine soja</i>	wild	"	N32-43-04.8	E128-50-11.0	16	gravel	bulk	no	no	near swamp, grass land

Table 3 (Continued).

JP No.	Coll. No. 2012	Coll. Date 2012	Species name	Status	Collection site	Latitude	Longitude	Altitude (m)	Soil	Sample	Herbarium	Nodule	Remarks
247329	Goto-22-3	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	Hirazou-cho (平蔵町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-43-04.8	E128-50-11.0	16	gravel	bulk	no	no	near swamp, grass land
247330	Goto-22-4	24 Oct.	<i>Glycine soja</i>	wild	"	N32-43-04.8	E128-50-11.0	16	silt	bulk	no	no	near swamp, beside harvested paddy
247331	Goto-22-5	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-43-04.8	E128-50-11.0	16	silt	bulk	no	no	near swamp, beside harvested paddy
247332	Goto-22-6	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-43-04.8	E128-50-11.0	16	gravel	bulk	no	no	near swamp, grass land, black pod
247333	Goto-22-7	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-43-04.8	E128-50-11.0	16	gravel	bulk	no	no	near swamp, grass land, brown pod
247334	Goto-23	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	Togi-cho (戸岐町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-45-50.5	E128-48-53.2	12	silt	bulk	no	no	slope 0°, grass land (beside fallow paddy)
247335	Goto-24-1	24 Oct.	<i>Glycine soja</i>	wild	Kishikumachi-Toginokubi (岐宿町戸岐之首), Goto, Nagasaki (Fukuejima island) (福江島)	N32-45-11.1	E128-48-00.5	4	silt	bulk	no	no	slope 0°, grass land (vast abandoned field)
247336	Goto-24-2	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-45-11.1	E128-48-00.5	4	gravel	bulk	no	no	slope 0°, grass land (vast abandoned field)
247337	Goto-25-1	24 Oct.	<i>Glycine soja</i>	wild	Kishikumachi-Koumu (岐宿町河務), Goto, Nagasaki (Fukuejima island) (福江島)	N32-43-49.4	E128-46-44.3	17	silt	bulk	no	no	slope 20°, grass land (beside harvested paddy)
247338	Goto-25-2	24 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-43-49.4	E128-46-44.3	17	silt	bulk	no	no	slope 20°, grass land (beside harvested paddy)
247339	Goto-25-3	24 Oct.	<i>Vigna unguiculata</i>	weedy	"	N32-43-49.4	E128-46-44.3	17	silt	bulk	no	no	slope 20°, grass land (beside harvested paddy)
247340	Goto-25-4	24 Oct.	<i>Glycine soja</i>	wild	"	N32-43-49.4	E128-46-44.3	17	silt	bulk	no	no	slope 20°, grass land (beside harvested paddy)
247341	Goto-26-1	25 Oct.	<i>Vigna nakashimae</i>	wild	Kishikumachi-Kawara (岐宿町川原), Goto, Nagasaki (Fukuejima island) (福江島)	N32-43-59.2	E128-43-47.4	10	sandy	bulk	no	no	large paddy area near Kanzakibashi bus stop, slope 30°, beside paddy
247342	Goto-26-2	25 Oct.	<i>Vigna nakashimae</i>	wild	"	N32-43-59.2	E128-43-47.4	10	sandy	bulk	yes	no	large paddy area near Kanzakibashi bus stop, slope 30°, beside paddy
247343	Goto-26-3	25 Oct.	<i>Glycine soja</i>	wild	"	N32-43-59.2	E128-43-47.4	10	sandy	bulk	no	no	large paddy area near Kanzakibashi bus stop, slope 30°, beside paddy
247344	Goto-26-4	25 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	wild	"	N32-43-59.2	E128-43-47.4	10	gravel	bulk	no	no	large paddy area near Kanzakibashi bus stop, slope 30°, beside paddy
247345	Goto-26-5	25 Oct.	<i>Glycine soja</i>	wild	"	N32-43-59.2	E128-43-47.4	10	gravel	bulk	no	no	large paddy area near Kanzakibashi bus stop, slope 30°, beside paddy
247346	Goto-27	25 Oct.	<i>Glycine soja</i>	wild	Miirakumachi-Kashiwa (三井楽町柏), Goto, Nagasaki (Fukuejima island) (福江島)	N32-47-02.9	E128-39-54.4	14	silt	bulk	no	no	sea side of seawall near Kashiwazaki light house, slope 3°, grass land, sea water affected habitat (柏崎灯台)

Table 3 (Continued).

JP No.	Coll. No. 2012	Coll. Date 2012	Species name	Status	Collection site	Latitude	Longitude	Altitude (m)	Soil	Sample	Herbarium	Nodule	Remarks
247347	Goto-28-1	25 Oct.	<i>Glycine soja</i>	wild	Miirakumachi-Kashiwa (三井楽町柏), Goto, Nagasaki (Fukuejima island) (福江島)	N32-46-54.4	E128-39-39.6	16	silt	bulk	no	no	sea side of seawall near Kashiwazaki light house, slope 3 °, grass land, sea water affected habitat (柏崎灯台)
247348	Goto-28-2	25 Oct.	<i>Glycine soja</i>	wild	"	N32-46-54.4	E128-39-39.6	16	silt	bulk	no	no	sea side of seawall near Kashiwazaki light house, slope 3 °, grass land, sea water affected habitat (柏崎灯台)
247349	Goto-28-3	25 Oct.	<i>Glycine soja</i>	wild	"	N32-46-54.4	E128-39-39.6	16	silt	bulk	no	no	sea side of seawall near Kashiwazaki light house, slope 3 °, grass land, sea water affected habitat (柏崎灯台)
247350	Goto-29-1	25 Oct.	<i>Glycine soja</i>	wild	Miirakumachi-Kaitsu (三井楽町貝津), Goto, Nagasaki (Fukuejima island) (福江島)	N32-42-52.0	E128-39-32.6	26	silt	bulk	no	no	abandoned paddy field just N of Takahama tunnel, slope 1 °, grass land
247351	Goto-29-2	25 Oct.	<i>Glycine soja</i>	wild	"	N32-42-52.0	E128-39-32.6	26	gravel	bulk	no	no	abandoned paddy field just N of Takahama tunnel, slope 1 °, grass land
247352	Goto-30-1	25 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	Tamanouramachi-Nunoura (玉之浦町布浦), Goto, Nagasaki (Fukuejima island) (福江島)	N32-39-04.4	E128-40-23.6	24	silt	bulk	no	no	beside sorghum field in paddy area, slope 0 °
247353	Goto-30-2	25 Oct.	<i>Vigna unguiculata</i>	weedy	"	N32-39-04.4	E128-40-23.6	24	silt	bulk	no	no	beside sorghum field in paddy area, slope 0 °
247354	Goto-30-3	25 Oct.	<i>Glycine soja</i>	wild	"	N32-39-04.4	E128-40-23.6	24	silt	bulk	no	no	slope 0 °, beside road along sea shore
247355	Goto-30-4	25 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-39-04.4	E128-40-23.6	24	silt	bulk	no	no	slope 0 °, in an abandoned small field beside sea
247356	Goto-31-1	25 Oct.	<i>Glycine soja</i>	wild	Tamanouramachi-Tachiya (玉之浦町立谷), Goto, Nagasaki (Fukuejima island) (福江島)	N32-36-14.4	E128-38-27.1	20	silt	bulk	no	no	slope 0 °, paddy area in Tachiya (立谷)
247357	Goto-31-2	25 Oct.	<i>Glycine soja</i>	wild	"	N32-36-14.4	E128-38-27.1	20	silt	bulk	no	no	slope 0 °, paddy area in Tachiya (立谷)
247358	Goto-31-3	25 Oct.	<i>Vigna nakashimae</i>	wild	"	N32-36-14.4	E128-38-27.1	20	silt	individual	no	no	slope 0 °, paddy area in Tachiya (立谷), only 2 immature seeds collected
247359	Goto-32	25 Oct.	<i>Glycine soja</i>	wild	Tomiemachi-Matsuo (玉之浦町松尾), Goto, Nagasaki (Fukuejima island) (福江島)	N32-36-49.3	E128-45-27.5	38	silt	bulk	no	no	slope 0 °, paddy area in Matsuo (松尾), beside paddy
247360	Goto-33-1	25 Oct.	<i>Glycine soja</i>	wild	Kishikumachi-Nihongusu (玉之浦町二本楠), Goto, Nagasaki (Fukuejima island) (福江島)	N32-40-17.8	E128-43-32.9	74	silt	bulk	no	no	slope 0 °, paddy area in Nihongusu (二本楠), center of Fukue island, beside paddy
247361	Goto-33-2	25 Oct.	<i>Vigna nakashimae</i>	wild	"	N32-40-17.8	E128-43-32.9	74	silt	bulk	no	no	slope 0 °, paddy area in Nihongusu (二本楠), center of Fukue island, beside paddy

Table 3 (Continued).

JP No.	Coll. No. 2012	Coll. Date 2012	Species name	Status	Collection site	Latitude	Longitude	Altitude (m)	Soil	Sample	Herbarium	Nodule	Remarks
247362	Goto-33-3	25 Oct.	<i>Vigna nakashimae</i>	wild	Kishikumachi-Nihongusu (玉之浦町二本楠), Goto, Nagasaki (Fukuejima island) (福江島)	N32-40-17.8	E128-43-32.9	74	silt	bulk	no	no	slope 0°, paddy area in Nihongusu (二本楠), center of Fukue island, beside paddy
247363	Goto-34-1	25 Oct.	<i>Vigna nakashimae</i>	wild	Kishikumachi-Nakadake (岐宿町中嶽), Goto, Nagasaki (Fukuejima island) (福江島)	N32-40-30.4	E128-44-07.7	67	silt	bulk	no	no	slope 0°, paddy area in Nakadake (中嶽), center of Fukue island, beside paddy
247364	Goto-34-2	25 Oct.	<i>Vigna nakashimae</i>	wild	"	N32-40-30.4	E128-44-07.7	67	silt	bulk	no	no	slope 0°, paddy area in Nakadake (中嶽), center of Fukue island, beside paddy
247365	Goto-35-1	25 Oct.	<i>Vigna nakashimae</i>	wild	Yoshida-cho (吉田町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-40-52.4	E128-48-08.3	43	silt	bulk	no	no	slope 0°, vast paddy area in Yoshida (吉田), east of Fukue island, beside paddy
247366	Goto-35-2	25 Oct.	<i>Vigna nakashimae</i>	wild	"	N32-40-52.4	E128-48-08.3	43	silt	bulk	no	no	slope 0°, vast paddy area in Yoshida (吉田), east of Fukue island, beside paddy
247367	Goto-35-3	25 Oct.	<i>Glycine soja</i>	wild	"	N32-40-52.4	E128-48-08.3	43	silt	bulk	no	no	slope 0°, vast paddy area in Yoshida (吉田), east of Fukue island, beside paddy
247368	Goto-36-1	26 Oct.	<i>Glycine soja</i>	wild	Mukae-cho (向町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-39-05.2	E128-53-28.2	37	silt	bulk	no	no	slope 0°, beside road near Ushinarinohana (牛成の鼻), east of Fukue island, beside field
247369	Goto-36-2	26 Oct.	<i>Glycine soja</i>	wild	"	N32-39-05.2	E128-53-28.2	37	silt	bulk	no	no	slope 0°, beside road near Ushinarinohana (牛成の鼻), east of Fukue island, beside field
247370	Goto-37	26 Oct.	<i>Glycine soja</i>	wild	Kamisakiyama-cho (上崎山町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-39-01.0	E128-51-47.8	62	silt	bulk	no	no	slope 0°, beside upland field near Hinotake (火ノ岳)
247371	Goto-38-1	26 Oct.	<i>Glycine soja</i>	wild	Yoshida-cho (吉田町), Goto, Nagasaki (Fukuejima island) (福江島)	N32-40-32.7	E128-49-33.1	31	silt	bulk	no	no	slope 15°, along Muta river (牟田川), west of Fukue airport, grass land
247372	Goto-38-2	26 Oct.	<i>Glycine soja</i>	wild	"	N32-40-32.7	E128-49-33.1	31	silt	bulk	no	no	slope 15°, along Muta river (牟田川), west of Fukue airport, grass land
247373	Goto-38-3	26 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-40-32.7	E128-49-33.1	31	silt	bulk	no	no	slope 15°, along Muta river (牟田川), west of Fukue airport, grass land
247374	Goto-38-4	26 Oct.	<i>Vigna angularis</i> var. <i>nipponensis</i>	weedy	"	N32-40-32.7	E128-49-33.1	31	silt	bulk	no	no	slope 15°, along Muta river (牟田川), west of Fukue airport, grass land
247375	Goto-38-5	26 Oct.	<i>Glycine soja</i>	wild	"	N32-40-32.7	E128-49-33.1	31	silt	bulk	no	no	slope 15°, along Muta river (牟田川), west of Fukue airport, grass land



Photo 1. *Glycine soja*, JP247298 (Ukushima)



Photo 2. *Glycine soja*, JP247317 (Ojikajima)



Photo 3. *Glycine soja*, JP247320 (Ojikajima)



Photo 4. *Glycine soja*, JP247346 (Fukuejima)



Photo 5. *Vigna angularis*, JP247302 (Ukushima)



Photo 6. *Vigna angularis*, JP247355 (Fukuejima)



Photo 7. *Vigna angularis*, JP247355 (Fukuejima)



Photo 8. *Vigna angularis*, JP247373 (Fukuejima)



Photo 9. *Vigna nakashimae*, JP247291 (Ukushima)



Photo 10. *Vigna nakashimae*, JP247305 (Ukushima)



Photo 11. *Vigna nakashimae*, JP247309 (Ukushima)



Photo 12. *Vigna nakashimae*, JP247309 (Ukushima)



Photo 13. *Vigna nakashimae*, JP247342 (Fukuejima)



Photo 14. *Vigna nakashimae*, JP247363 (Fukuejima)



Photo 15. *Vigna radiata*, JP247287 (Ukushima)



Photo 16. *Vigna radiata*, JP247287 (Ukushima)



JP247286, *G. soja*, 2012Goto-01



JP247287, *V. radiata*, 2012Goto-02



JP247288, *V. nakashimae*, 2012Goto-03-1



JP247289, *V. nakashimae*, 2012Goto-03-2



JP247290, *G. soja*, 2012Goto-04-1



JP247291, *V. nakashimae*, 2012Goto-04-2



JP247292, *G. soja*, 2012Goto-05



JP247293, *G. soja*, 2012Goto-06-1



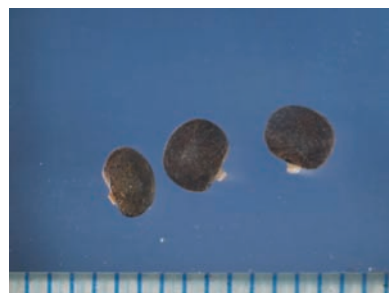
JP247294, *G. soja*, 2012Goto-06-2



JP247295, *G. soja*, 2012Goto-06-3



JP247296, *G. soja*, 2012Goto-06-4



JP247297, *G. soja*, 2012Goto-07-1



JP247298, *G. soja*, 2012Goto-07-2



JP247299, *G. soja*, 2012Goto-07-3



JP247300, *V. nakashimae*, 2012Goto-08-1



JP247301, *G. soja*, 2012Goto-08-2



JP247302, *V. angularis*, 2012Goto-09-1



JP247303, *V. nakashimae*, 2012Goto-09-2



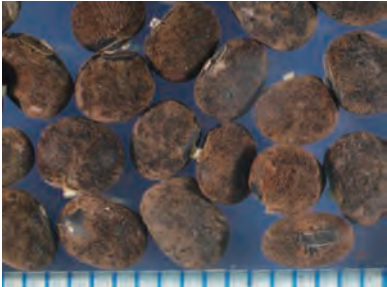
JP247304, *V. nakashimae*, 2012Goto-10-1



JP247305, *V. nakashimae*, 2012Goto-10-2



JP247306, *G. soja*, 2012Goto-11-1



JP247307, *G. soja*, 2012Goto-11-2



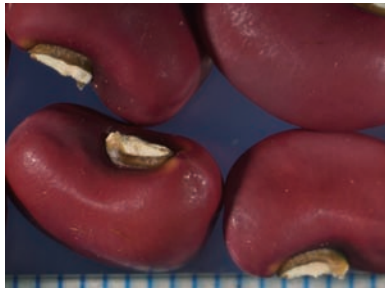
JP247309, *V. nakashimae*, 2012Goto-11-3



JP247310, *V. unguiculata*, 2012Goto-11-4



JP247311, *V. angularis*, 2012Goto-11-5



JP247312, *V. unguiculata*, 2012Goto-11-6



JP247313, *V. nakashimae*, 2012Goto-12



JP247314, *G. soja*, 2012Goto-13-1



JP247315, *G. soja*, 2012Goto-13-2



JP247316, *G. soja*, 2012Goto-13-3



JP247317, *G. soja*, 2012Goto-14



JP247318, *G. soja*, 2012Goto-15-1



JP247319, *G. soja*, 2012Goto-15-2



JP247320, *G. soja*, 2012Goto-16-1



JP247321, *V. nakashimae*, 2012Goto-16-2



JP247322, *G. soja*, 2012Goto-17



JP247323, *V. unguiculata*, 2012Goto-18



JP247324, *G. soja*, 2012Goto-19



JP247325, *V. angularis*, 2012Goto-20



JP247326, *G. soja*, 2012Goto-21



JP247327, *G. soja*, 2012Goto-22-1



JP247328, *G. soja*, 2012Goto-22-2



JP247329, *V. angularis*, 2012Goto-22-3



JP247330, *G. soja*, 2012Goto-22-4



JP247331, *V. angularis*, 2012Goto-22-5



JP247332, *V. angularis*, 2012Goto-22-6



JP247333, *V. angularis*, 2012Goto-22-7



JP247334, *V. angularis*, 2012Goto-23



JP247335, *G. soja*, 2012Goto-24-1



JP247336, *V. angularis*, 2012Goto-24-2



JP247337, *G. soja*, 2012Goto-25-1



JP247338, *V. angularis*, 2012Goto-25-2



JP247339, *V. unguiculata*, 2012Goto-25-3



JP247340, *G. soja*, 2012Goto-25-4



JP247341, *V. nakashimae*, 2012Goto-26-1



JP247342, *V. nakashimae*, 2012Goto-26-2



JP247343, *G. soja*, 2012Goto-26-3



JP247344, *V. angularis*, 2012Goto-26-4



JP247345, *G. soja*, 2012Goto-26-5



JP247346, *G. soja*, 2012Goto-27



JP247347, *G. soja*, 2012Goto-28-1



JP247348, *G. soja*, 2012Goto-28-2



JP247349, *G. soja*, 2012Goto-28-3



JP247350, *G. soja*, 2012Goto-29-1



JP247351, *G. soja*, 2012Goto-29-2



JP247352, *V. angularis*, 2012Goto-30-1



JP247353, *V. unguiculata*, 2012Goto-30-2



JP247354, *G. soja*, 2012Goto-30-3



JP247355, *V. angularis*, 2012Goto-30-4



JP247356, *G. soja*, 2012Goto-31-1



JP247357, *G. soja*, 2012Goto-31-2



JP247358, *V. nakashimae*, 2012Goto-31-3



JP247359, *G. soja*, 2012Goto-32



JP247360, *G. soja*, 2012Goto-33-1



JP247361, *V. nakashimae*, 2012Goto-33-2



JP247362, *V. nakashimae*, 2012Goto-33-3



JP247363, *V. nakashimae*, 2012Goto-34-1



JP247364, *V. nakashimae*, 2012Goto-34-2



JP247365, *V. nakashimae*, 2012Goto-35-1



JP247366, *V. nakashimae*, 2012Goto-35-2



JP247367, *G. soja*, 2012Goto-35-3



JP247368, *G. soja*, 2012Goto-36-1



JP247369, *G. soja*, 2012Goto-36-2



JP247370, *G. soja*, 2012Goto-37



JP247371, *G. soja*, 2012Goto-38-1



JP247372, *G. soja*, 2012Goto-38-2



JP247373, *V. angularis*, 2012Goto-38-3



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