

長野県における *Vigna*, *Vicia*, *Glycine* 属野生種の調査と収集

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Exploration and Collection of Wild *Vigna*, *Vicia* and *Glycine* Species in Nagano Prefecture, Japan 9th -12th October 2001

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要約

日本に自生するマメ科作物近縁野生種遺伝資源を調査収集する目的で、2001年10月9日から12日にかけて長野県の探索を行った。長野県は日本のほぼ中央に位置し、日本アルプスに囲まれた複雑な生態環境を持つ地域である。今回の探索調査によって、17の収集地点から53点の遺伝資源を収集することができた。収集品は *Vigna* (ササゲ) 属, *Glycine* (ダイズ) 属, *Vicia* (ソラマメ) 属を含む合計9種の作物近縁野生種から構成されていた。その内訳は、野生ダイズ (*Glycine soja*) 13点、野生アズキ (*Vigna angularis* var. *nipponensis*) および雑草アズキ 12点、ソラマメ属野生種 28点である。ソラマメ属野生種には、*Vicia amoena* (ツルフジバカマ) 9点、*V. cracca* (クサフジ) 6点、*V. pseudo-orobus* (オオバクサフジ) 5点、*V. unijuga* (ナンテンハ

ギ) 2, *V. japonica* (ヒロハクサフジ) 2点, *V. nipponica* (ヨツバハギ) 2点が含まれていた。調査では、種子サンプルの他に、標本のサンプルも合わせて収集した。

野生ダイズは長野県内に広く分布していた。ソラマメ属野生種の中の *V. unijuga*, *V. amoena*, *V. cracca* など県内に広く分布していた。その他の種は、分布域が限られていたり、分布密度がやや低かったりするようで *V. pseudo-orobus* は長野県北部だけで、*V. nipponica* は長野県東部だけで見つけることができた。野生アズキ (*V. angularis* var. *nipponensis*) は、松本市の北部から東北部の標高 600~700m の地域に分布していた。特に上田市から丸子町にかけての水田地帯では、雑草アズキ集団も見出された。

Summary

An international group visited Nagano prefecture to explore and collect Japanese wild legumes from 9th to 12th October 2001. Nagano is the center of the southern Japan Alps with mountain ranges going north to south through the prefecture. It is thus a prefecture with diverse habitats. During the collecting trip a total of 53 seed samples were collected at 17 different sites in Nagano prefecture. Seed samples belonging to 9 different legume species in three different genera (*Vigna*, *Vicia*, and *Glycine*) were collected. Seed samples collected include 13 of wild soyabean (*Glycine soja*), 12 of wild and weedy *Vigna* (*V. angularis*), and 28 of wild *Vicia*. Seed samples of *Vicia* collected included 9 of *V. amoena*, 6 of *V. cracca*, 5 of *V. pseudo-orobus*, 4 of *V. unijuga*, 2 of *V. japonica*, and 2 of *V. nipponica* (Table 1). For each collected sample herbarium specimens were also collected.

Wild soybean, *Glycine soja*, is well distributed throughout the prefecture. Some species of *Vicia* were also found widely such as *Vicia unijuga*, *V. amoena* and *Vicia cracca*. Other *Vicia* species were not as frequently found. *Vicia pseudo-orobus* was found only in the north of the prefecture. *Vicia nipponica* was found in the eastern part of Nagano. Wild azuki, *Vigna angularis* var. *nipponensis* was found only in areas north and northeast of Matsumoto city at altitudes of 600-700m. In the Maruko and Ueda town area both wild and weedy azuki were found. This exploration revealed that wild azuki is more common than previously realized in parts of Nagano.

KEYWORDS: *Glycine*, *Vicia*, *Vigna*, Japanese native legumes, genetic resources

1. Introduction (目的)

In 1999 an international group including experts on the genus *Vicia* visited Nagano to collect and observe *Vicia* diversity in that prefecture (Vaughan et al., 2000). As a result of that trip 6 species of *Vicia* were collected. Nagano prefecture can be considered a center of species diversity for the genus *Vicia* in Japan. In 1997 a brief visit in Nagano resulted in only one population of *Vigna angularis* var. *nipponensis* being found (Tomooka et al., 1998). Further efforts to find this wild relative of azuki bean in Nagano seemed warranted. Consequently, from the 9th to 12th October an international team of scientists from Japan, China, Korea and Sri Lanka visited Nagano to collect wild legumes related to crops with an emphasis on the genera *Glycine*, *Vicia* and *Vigna*.

2. Field observations (現地調査)

As a result of field survey in Nagano, a total of 53 population consist of 12 of *Vigna*, 13 of *Glycine* and 28 of *Vicia* was collected (Table 1). Collection site numbers were listed on Fig. 1.

Northeast of Matsumoto City (松本北東部)

Site. 1 (altitude 1000 to 1050m) 調査地点 1 (標高 1000m~1050m)

At this location we found different species growing in a range of different habitats. At lower elevations in a disturbed roadside/riverside habitats and abandoned fields, *Glycine soja*, *V. amoena*, *V. cracca*, *V. japonica* were found. Climbing a forest path up the surrounding mountains *Vicia unijuga* and a few plants of *Vicia nipponica* were found. *V. nipponica* was in deep shade under conifer trees (Fig. 1).

Table 1. Samples collected on the trip of Nagano prefecture

長野県における調査で収集された種と系統数

Species	No. of populations
<i>Vigna</i>	12
a) <i>V. angularis</i> var. <i>nipponensis</i>	10
b) Weedy <i>Vigna</i>	2
<i>Glycine soja</i>	13
<i>Vicia</i>	28
a) <i>V. amoena</i>	9
b) <i>V. cracca</i>	6
c) <i>V. pseudo-orobus</i>	5
d) <i>V. unijuga</i>	4
e) <i>V. nipponica</i>	2
f) <i>V. japonica</i>	2

Site 2 (altitude 600m) 調査地点 2 (標高 600m)

On a riverside plain of farmland several species were found. Both *Vicia amoena* and *V. unijuga* were found on terrace banks surrounding paddy fields. *V. unijuga* appears to be adapted to a range of habitats and is commonly found both in open disturbed and shaded relatively undisturbed habitats. *V. amoena* appears always in open disturbed habitats and often is growing with *V. cracca* which has a very similar appearance. *V. cracca* was found growing in a disturbed area where abandoned machines were deposited.

In the same location a large population of *Glycine soja* was found growing at the edge of the river. This population would be partly inundated if the river flooded. Near by in small patches of *V. angularis* var. *nipponensis* were growing on embankments and paddy field terraces. In this area various crops including azuki bean are grown the possibility of gene exchange between wild and cultivated azuki in this area cannot be ruled out.

Site 3 (altitude 770m) 調査地点 3 (標高 770m)

In the middle of mountain village a small population of *Glycine soja* and *Vicia unijuga* were found at an altitude of 770m.

Site 4 (altitude 700m) 調査地点 4 (標高 700m)

On a terraced mountainside wild soybean, wild azuki bean and wild *Vicia* (*V. cracca*) were growing sympatrically (Fig. 2). Both wild soybean and wild azuki covered a large area. In one part of the population wild azuki bean was growing adjacent to a field of cultivated azuki. Ten individual plant samples were collected of wild azuki and the seed size is compared to cultivated azuki collected from the same location. It is not very common to find a mixed population of *Glycine soja* and *Vigna angularis* var. *nipponensis*. Of the two species *G. soja* seems to be adapted to more highly disturbed habitats and the

more aggressive of the two species. It may be that at this high altitude both species were equally well adapted to the same habitat.

Site 9 (610m) 調査地点 9 (標高 610m)

At this site *Glycine soja*, *V. angularis* var. *nipponensis* and *Vicia cracca* were found growing together. All three species were growing widely over an area beside an irrigation channel and rice fields. Individual plant samples of *V. angularis* var. *nipponensis* were collected and the seed size is shown in Table 3.

About 500m from where we collected these wild species there was a field of cultivated azuki beans being harvested. The farmer commented that wild azuki was only at the top of the hill and not in the area where cultivated azuki was being grown. There was a small graveyard near the azuki field. In front of one of the graves was a 2m² patch of cultivated azuki.

Site 17 (altitude 585m) 調査地点 1 7 (標高 585m)

This site is a paddy area on a broad plain and wild *Vigna*, *Glycine* and *Vicia* were growing together at the edge of harvested paddy. Wild *Vigna angularis* var. *nipponensis* as well as weedy *Vigna angularis* were found at this site. *Vicia amoena* and *V. pseudo-orobus* grew sporadically in several places. 15 accessions were collected at this location over a wide area.

North of Matsumoto (松本北部)

Site 10 (altitude 1235m) 調査地点 1 0 (標高 1235m)

At this high elevation site, we found 2 species of *Vicia* (*V. cracca* and *V. amoena*) in the roadside grass and around vegetable fields. Here *Glycine* and *Vigna* were not found maybe because of high elevation.

Site 11 (altitude 890m) 調査地点 1 1 (標高 890m)

On the roadside near Jigatake ski field (Omachi), *Vicia pseudo-orobus* was found at the edge of tree plantation. This site was rather shady. We explored the roadside, edge of paddy field, riverbank around this site, but wild *Vicia*, *Vigna*, *Glycine* were not found.

Site 12 (altitude 495m) 調査地点 1 2 (標高 495m)

In an abandoned paddy field, several relatively large populations of *Vigna angularis* var. *nipponensis* and *Glycine soja* were found. Some of the abandoned paddy fields were very wet and there both *Vigna* and *Glycine* were the dominant species. Wild *Vigna* was also found on the riverbank where the habitat seems to be flooded after heavy rain. *Vigna* and *Glycine* may well adapt at relatively low elevation and wet areas in Nagano.

Site 13 (altitude 550m) 調査地点 1 3 (標高 550m)

On the bank of terraced paddy field, *Vicia amoena* was found. On the roadside above the terrace paddy, *Glycine soja* was also found sporadically.

South of Matsumoto along South Alps Mountain Range (松本南部：南アルプス山麓)

Site 5-8 (altitude 650 - 920m) 調査地点 5 - 8 (標高 650m~920m)

Exploration in southern Nagano was less rewarding in terms of diversity of species collected than northern Nagano. This may reflect the level of development and the very steep terrain of the area. *Vicia unijuga*, *V. amoena* and *Glycine soja* were found at scattered locations.

Site 14 (altitude 715m) 調査地点 1 4 (標高 715m)

At the riverside paddy area of Oshika village, we explored carefully but only several *Glycine soja* populations could be found in the abandoned paddy field.

Site 15 (altitude 875m) 調査地点 1 5 (標高 875m)

About 30km north of site 14, we explored hilly terrace field area. At this site *Vicia cracca* and *Vicia unijuga* were found at the edge of paddy field. On the steep slope beside small irrigation canal, *Vicia nipponica* was found. This population of *Vicia nipponica* had many pods but almost all seeds in the pods were shriveled and aborted. The plants have rhizomes and seem to propagate by means of rhizomes rather than seeds.

Site 16 (altitude 795m) 調査地点 16 (標高 795m)

Vicia japonica population was found growing on the riverbank. This site seems to be disturbed by weeding regularly.

a. *Vicia* (ソラマメ属)

There are 17 species of *Vicia* in Japan (Ohwi, 1965). Of these we were able to collect six species. The species collected fall into two of the three groups of *Vicia* in Japan. The three groups are the introduced *Vicia* species, the *Vicia* of the Japan-Chinese-Siberian floristic zone and the Orobooid species. Of the species collected during this trip three are the *Vicia* of the Japan-Chinese-Siberian floristic zone, *V. amoena*, *V. cracca* and *V. japonica* and three species are Orobooid species *V. nipponica*, *V. pseudo-orobus* and *V. unijuga*. Samples of *Vicia* were collected between 585 and 1020m. Variation among species in leaflet size and number that constitute two of the key characters for *Vicia* are shown (Table 2).

Nagano is particularly rich in *Vicia* and this visit only collected a small portion of the diversity of the genus in Nagano. It seems that more information is needed on the ecological adaptation of the Orobooid species. It is often not clear whether a species is found grow in a particular location because it is a remnant of a previous habitat, introduced into a site by for example soil movement during road construction or the 'typical' habitat of the species.

Table 2. Leaflet number, leaflet length and breadth from herbarium specimens collected of *Vicia* in Nagano prefecture, 2001

長野県において収集されたソラマメ属野生種の小葉の数, 長さ, 幅

Species	Leaflet no	Leaflet length (mm)	Leaflet breadth (mm)
<i>V. amoena</i>	12-14	28-35	8-14
<i>V. cracca</i>	22-26	18-22	5-7
<i>V. japonica</i>	12-14	22-26	8-12
<i>V. unijuga</i>	2	65-70	30-35
<i>V. pseudo-orobus</i>	6-8	35-40	20-25
<i>V. nipponica</i>	5-6	60-70	30-40

b. *Vigna* (ササゲ属)

During this trip we were able to find many populations of wild *Vigna* and some weedy *Vigna*. These populations were not evenly spread around Nagano but mainly found to the north and northeast of Matsumoto city (Fig. 2). *Vigna* were collected at altitudes ranging from 495 to 700m. Based on pod size it seems that there is inter-population genetic variation among the samples collected (Table 3). These populations of wild azuki within the mountain ranges of the southern Japan Alps may have variation not found in other parts of Japan and represent a useful addition to the germplasm of this wild species in the genebank collections.

Table 3. Pod length and seed weight of individual plant samples in two populations of
Vigna angularis var. *nipponensis* collected in Nagano.

長野県において収集されたふたつのヤブツルアズキ集団における
個体別の莢長と 100 粒重

Population 2001-23		
Plant no	Pod length (mm)	100 seed weight (g)
01-23-1	68	3.0
01-23-2	59	2.3
01-23-3	62	2.2
01-23-4	71	2.4
01-23-5	72	2.5
01-23-6	56	2.0
01-23-7	50	1.8
01-23-8	60	2.2
01-23-9	65	2.3
01-23-10	71	2.4
Mean	63	2.31
Cultigen	105	17.3
Population 2001-29		
Plant no	Pod length (mm)	100 seed weight (g)
01-29-1	55	2.0
01-29-2	54	1.9
01-29-3	53	1.4
01-29-4	56	2.1
01-29-5	56	2.2
01-29-6	58	2.3
01-29-7	55	2.0
01-29-8	50	1.9
01-29-9	58	2.4
01-29-10	63	3.0
Mean	55.8	2.12

3. References (引用文献)

- 1) Ohwi, J. (1965) Flora of Japan. Smithsonian Institution, Washington D.C. 1067 pages.
- 2) Vaughan, D.A., N. Tomooka, E. Potokina, N. Maxted, D. Jarvis, M.S.Yoon, A. Kaga, M. Akiba and Y. Tsubokura. (2000). Exploration and collection of wild *Vicia* species in Nagano and Niigata Prefectures, Japan (17th -19th October 1999). Crop Collecting Reports 16:59-65.
- 3) Tomooka, N., D. A. Vaughan, A. Konarev and S. Tsukamoto. 1998. Collection of the wild relatives of crops, 1997. 2. The azuki bean (*Vigna angularis* var. *angularis*) genepool and soybean (*Glycine max*) genepool in the central region of Honshu, Japan. 15-24th October. Crop Collecting Reports 14:71-83 (in Japanese with English summary).

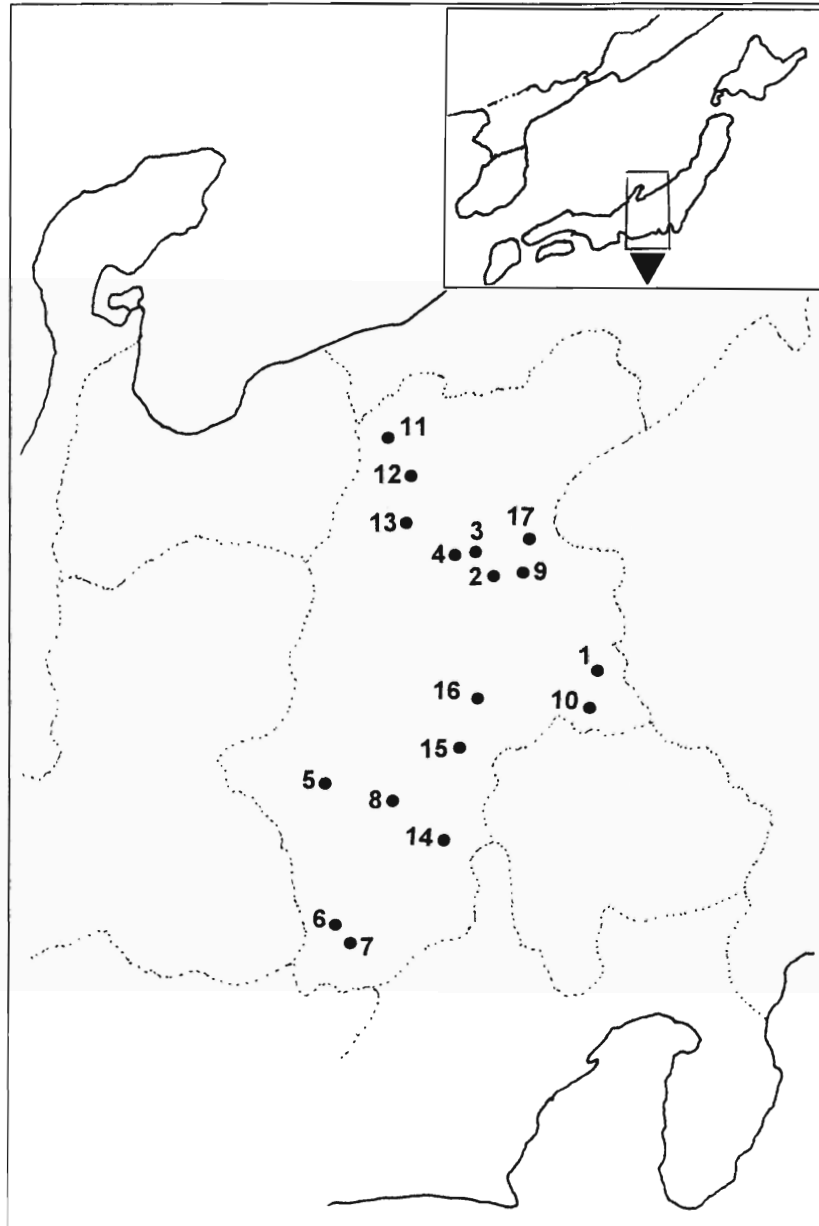


Fig. 1. Collection site numbers in Nagano
長野県における収集地点番号

Table 4. A list of collected sample in Nagano prefecture, Japan, 2001
長野県で収集した作物近縁野生種遺伝資源, 2001

No.	Coll. Date	Coll. No.	JP No.	Passport No.	Species	Status	Collection Site	Latitude /Longitude	Altitude (m)	Habitat
1	10/9	CED2001-10	211792	30006027	<i>Glycine soja</i> 5420170005	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1000	grassland
2	10/9	CED2001-11	211799	30006028	<i>Vicia amoena</i> 5420440001	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1000	grassland
3	10/9	CED2001-12	211800	30006029	<i>Vicia japonica</i> 5420440023	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1000	grassland
4	10/9	CED2001-13	211801	30006030	<i>Vicia cracca</i> 5420440011	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1010	cultivated
5	10/9	CED2001-14	211802	30006031	<i>Ampelopsis brevipedunculata</i> 5710030001	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1010	cultivated
6	10/9	CED2001-15	211803	30006032	<i>Vicia unijuga</i> 5420440039	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1020	forest back
7	10/9	CED2001-16	211804	30006033	<i>Vicia nipponica</i> 5420440025	wild	北相木村字通り岩 846	N36-03-26 E138-33-32	1020	forest back
8	10/10	CED2001-17	211805	30006034	<i>Vicia amoena</i> 5420440001	wild	丸子、長野	N36-20-05 E138-16-41	600	
9	10/10	CED2001-18	211806	30006035	<i>Vicia unijuga</i> 5420440039	wild	丸子、長野	N36-20-05 E138-16-41	600	cultivated
10	10/10	CED2001-19	211807	30006036	<i>Glycine soja</i> 5420170005	wild	丸子、長野	N36-20-05 E138-16-41	600	grassland
11	10/10	CED2001-20	211808	30006037	<i>V.angularis var. nipponensis</i> 5420610025	wild	丸子、長野	N36-20-05 E138-16-41	600	cultivated
12	10/10	CED2001-21	211809	30006038	<i>Vicia cracca</i> 5420440011	wild	丸子、長野	N36-20-05 E138-16-41	600	grassland
13	10/10	CED2001-22	211810	30006039	<i>Glycine soja</i> 5420170005	wild	上田市野倉 (別所温泉)	N36-19-35 E138-09-22	770	grassland
14	10/10	CED2001-23	211811	30006040	<i>V.angularis var. nipponensis</i> 5420610025	wild	上田市青木村沓掛	N36-20-22 E138-06-56	700	cultivated
15	10/10	CED2001-24	211812	30006041	<i>Glycine soja</i> 5420170005	wild	上田市青木村沓掛	N36-20-22 E138-06-56	700	grassland
16	10/11	CED2001-25	211813	30006042	<i>Vicia unijuga</i> 5420440039	wild	Agematsu-cho, Hagiwara, Nagano	N35-47-00 E137-00-00	650	grassland
17	10/11	CED2001-26	211814	30006043	<i>Glycine soja</i> 5420170005	wild	下伊那、清内路村	N35-30-58 E137-42-53	860	
18	10/11	CED2001-27	211815	30006044	<i>Glycine soja</i> 5420170005	wild	阿智村駒場	N35-30-25 E137-48-39		grassland
19	10/11	CED2001-28	211816	30006045	<i>Vicia amoena</i> 5420440001	wild	駒ヶ根の光前寺の前	N35-44-03 E137-54-59	920	cultivated
20	10/12	CED2001-29	211817	30006046	<i>V.angularis var. nipponensis</i> 5420610025	wild	丸子町宮原	N36-20-35 E138-18-19	610	grassland
21	10/12	CED2001-30	211818	30006047	<i>Glycine soja</i> 5420170005	wild	丸子町宮原	N36-20-35 E138-18-19	610	grassland
22	10/12	CED2001-31	211819	30006048	<i>Vicia cracca</i> 5420440011	wild	丸子町宮原	N36-20-35 E138-18-19	610	grassland

Shading	Disturbance	Population size	Growth stage	Soil	Seed	Herbarium	Rhizobium	Remarks
open	high	10 m ²	mature		yes	no	no	land use: waste past harvesting, few mature pods
open	high	100 m ²	mature		yes	yes	no	land use: waste land beside river had dentate stipules and hairy stem. Larger leaflets than 2001-12
open	high	100 m ²	mature		yes	yes	no	land use: waste Had small stipules, smaller leaflets + pods (than 2001-11). stem not hairy.
light	high	30 m ²	mature		yes	yes	no	land use: abandoned terraced field flower color: purple blue
light	high	10 m ²	mature		yes	yes	no	land use: edge of terraced field
medium → heavy	low	1000 m ² +	mature		yes	yes	no	scattered over uncle area common 1000m ² + flower color: purple blue 2 type of pod - one green, one purple, seemed other variation - e.g. Leaf size
heavy	medium	2 m ²	mature		yes	yes	no	very few plants 2 or 3 Abundant mature large pods.
open	high	5 m ²	mature		yes	no	no	collected in heavy rain, evening identified a <i>V. amoena</i> . Not flowering. fewer leaflets than 2001-21,
open	high	20 m ²	mature		yes	no	no	collected in heavy rain.
open	high	1 ha	early mature		yes	no	no	
		± 100 m ²	mature		yes	no	yes	scattered but main pop plus minus 100m ² .
open	high	10 m ²	flowering		yes	yes	no	see 2001-17 different *This one has more leaflets x2 ± 18 *not dentate stipule *flowering
open	high	100 m ²	early mature		yes	yes	yes	land use: road side- waste land
open	high	1000m	mature		yes	yes	yes	cultivated and abandoned fields collected 10 individual plant samples plus seeds of <i>V. angularis</i> cultivar growing within 3m of wild plants.
open	high		early mature		yes	no	yes	land use: abandoned field.
open	high	100 m ²	flowering		yes	yes	no	side of railroad. Grasses mainly beside path by rail track in cultivated area
open	high	200 m ²	mature		yes	yes	yes	roadside back - little vegetation
open	high	200 m ²	mature (young)		yes	yes	yes	land use: waste land
open	high	20 m ²	past maturity		yes	no	no	land use: fence by river climbing on fence
open	high	1000 m ²	mature		yes	yes	yes	land use: side of road + waste land
open	high	1000 m ²	mature		yes	yes	yes	land use: side of road + waste land
open	high	20 m ²	flowering		yes	yes	yes	road side edge

23	10/12	CED2001-32	211820	30006049	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	cultivated	丸子町宮原	N36-20-35 E138-18-19	590	cultivated
24	10/9	CED2001-101	211821	30006050	<i>Vicia cracca</i> 5420440011	wild	Kawakami(川上), Nagano	N35-57-58 E138-33-23	1235	bushes
25	10/9	CED2001-102	211822	30006051	<i>Vicia amoena</i> 5420440001	wild	Kawakami(川上), Nagano	N35-57-58 E138-33-23	1235	grassland
26	10/9	CED2001-103	211823	30006052	<i>Vicia amoena</i> 5420440001	wild	Kawakami(川上), Nagano	N35-57-58 E138-33-23		grassland
27	10/9	CED2001-104	211824	30006053	<i>Vicia cracca</i> 5420440011	wild	Kawakami(川上), Nagano	N35-57-58 E138-33-23		grassland
28	10/10	CED2001-105	211825	30006054	<i>Vicia pseudo</i> <i>oribis</i> 5420440029	wild	Oomachi(大町), Nagano	N36-33-17 E137-48-24	890	forest
29	10/10	CED2001-106A	211826	30006055	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	wild	Ikusaka(生坂村), Nagano	N36-28-11 E137-51-14	495	grassland
30	10/10	CED2001-106B	211827	30006056	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	wild	Ikusaka(生坂村), Nagano	N36-28-11 E137-51-14	490	grassland
31	10/10	CED2001-106C	211828	30006057	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	wild	Ikusaka(生坂村), Nagano	N36-28-11 E137-51-14	480	grassland
32	10/10	CED2001-107	211829	30006058	<i>Glycine soja</i> 5420170005	wild	Ikusaka(生坂村), Nagano	N36-28-11 E137-51-14	490	grassland
33	10/10	CED2001-108	211830	30006059	<i>Vicia amoena</i> 5420440001	wild	Akeshina(明科町), Nagano	N36-22-28 E137-56-15	550	grassland
34	10/10	CED2001-109	211831	30006060	<i>Glycine soja</i> 5420170005	wild	Akeshina(明科町), Nagano	N36-22-28 E137-56-15	530	grassland
35	10/11	CED2001-110	211832	30006061	<i>Glycine soja</i> 5420170005	wild	Oshika(大鹿村), Nagano	N35-34-10 E138-03-06	715	
36	10/11	CED2001-111	211833	30006062	<i>Vicia cracca</i> 5420440011	wild	Hiji(非持), Nagano	N35-48-34 E138-05-15	875	grassland
37	10/11	CED2001-112	211834	30006063	<i>Vicia unijuga</i> 5420440039	wild	Hiji(非持), Nagano	N35-48-34 E138-05-15	875	grassland
38	10/11	CED2001-113	211835	30006064	<i>Vicia nipponica</i> 5420440025	wild	Hiji(非持), Nagano	N35-48-34 E138-05-15	875	grassland
39	10/11	CED2001-114	211836	30006065	<i>Vicia japonica</i> 5420440023	wild	Chino(茅野市), Nagano	N35-39-22 E138-09-01	795	grassland
40	10/12	CED2001-115	211837	30006066	<i>Vicia pseudo</i> <i>oribis</i> 5420440029	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
41	10/12	CED2001-116	211838	30006067	Weedy <i>Vigna</i> 5420610005	weedy	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
42	10/12	CED2001-117	211839	30006068	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	
43	10/12	CED2001-118	211840	30006069	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	
44	10/12	CED2001-119	211841	30006070	<i>Glycine soja</i> 5420170005	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	
45	10/12	CED2001-120	211842	30006071	<i>Vicia pseudo</i> <i>oribis</i> 5420440029	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
46	10/12	CED2001-121	211843	30006072	Weedy <i>Vigna</i> 5420610005	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
47	10/12	CED2001-122	211844	30006073	<i>V.angularis</i> var. <i>nipponensis</i> 5420610025	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland

open	high	25 m ²	mature		yes	no	no	cultivated in front of grave collected because close to 2001-29 and growing in the grounds of grave site.
medium		1 m ²	flowering	loam	yes	yes	yes	land use: beside upland field.
light	medium	2 x 5 m	mature	loam	yes	yes	no	beside road and field. Most of pods damaged by something. Leaf larger than -101
light			mature		yes	yes	no	beside river and road. Small leave.
light		5 x 10 m	mature		yes	yes	no	beside road and river. Leaf: powdery mildew very small leaves
medium	medium	1 m ²	mature	clay	yes	yes	no	road side'
open	low	6 x 20 m	mature	clay	yes	yes	no	in the field, beside the road flower color: light yellow and purple, small leaves
open	low	8 x 25 m	mature	clay	yes	yes	no	small leaves
light		2 m ²	mature	clay	yes	yes	no	beside road
open	low	8 x 15 m	mature	clay	yes	yes	no	
light	medium	2 m ²	mature	clay	yes	yes	no	beside the field
light		3 m ²	mature	clay	yes	yes	no	middle Mt. beside road
light	medium				yes	yes	no	under the mountain and beside the field
light	medium		mature		yes	yes	yes	beside field and road on the mountain.
light	medium	10 x 2		clay	yes	yes	no	flower color: purple
light	medium	0.5 x 0.5		clay	yes	yes	no	beside the field and streed road
open	low			clay	yes	yes	no	beside river on the bank
light	medium		mature	clay	yes	yes	no	6 leaves small leaves
light	medium		mature		yes	yes	yes	yellow & black seeds
open	medium				yes	yes	no	
open	medium				yes	yes	no	
light	medium				yes	yes	no	
light	medium		mature		yes	yes	no	
light	medium				yes	yes	no	
light	medium				yes	yes	no	

48	10/12	CED2001-123	211845	30006074	<i>Glycine soja</i> 5420170005	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
49	10/12	CED2001-124	211846	30006075	<i>Vicia amoena</i> 5420440001	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
50	10/12	CED2001-125	211847	30006076	<i>Glycine soja</i> 5420170005	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
51	10/12	CED2001-126	211848	30006077	<i>Vicia amoena</i> 5420440001	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
52	10/12	CED2001-127	211849	30006078	<i>Vicia pseudo</i> <i>oribis</i> 5420440029	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
53	10/12	CED2001-128	211850	30006079	<i>Vicia amoena</i> 5420440001	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland
54	10/12	CED2001-129	211851	30006080	<i>Vicia pseudo</i> <i>oribis</i> 5420440029	wild	Higashi-Ueda(東部町 東上田), Nagano	N36-22-40 E138-20-23	585	grassland

light	medium		mature		yes	yes	no	
light	medium		mature		yes	yes	no	
light	medium		mature		yes	no	no	big pod
light	medium		mature		yes	yes	no	inmedicinetae leaves
light	medium		mature		yes	yes	no	big leaves
light	medium		mature		yes	yes	no	small leaves
light	medium		mature		yes	yes	no	big leaves

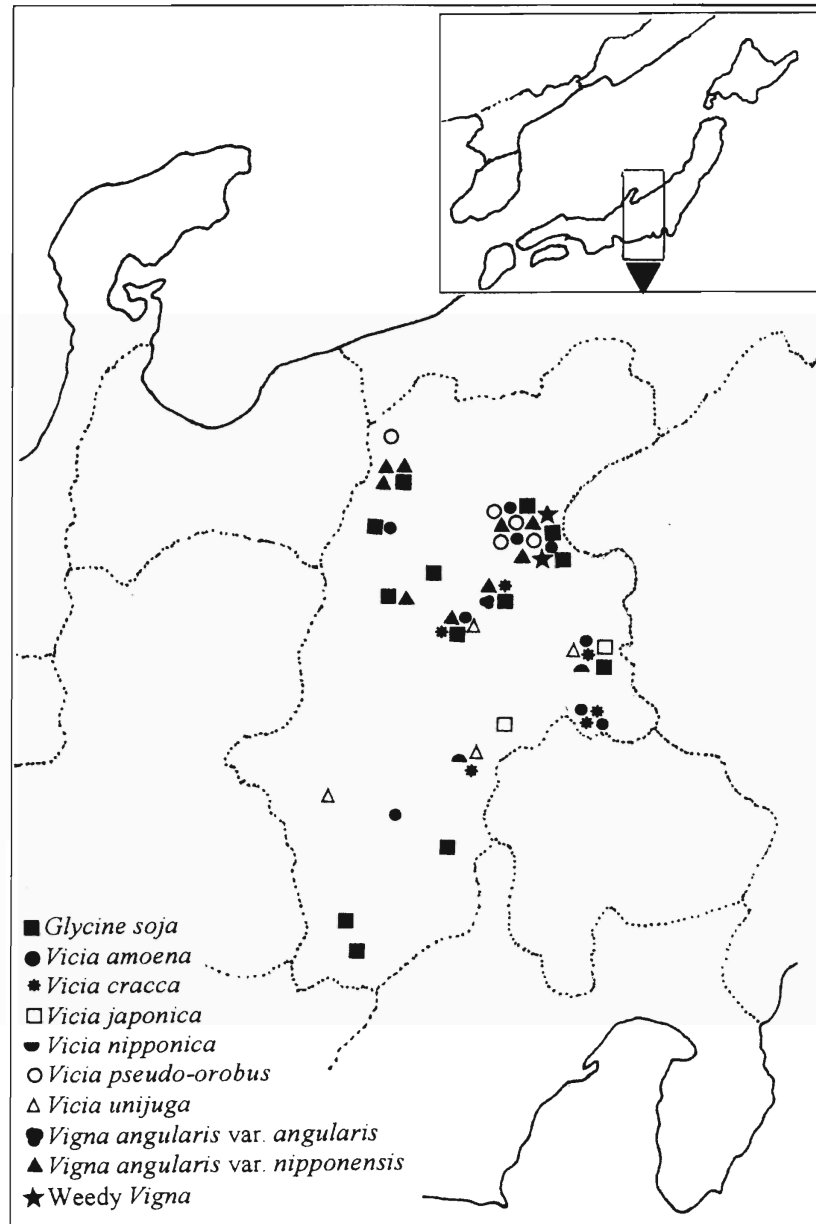


Fig. 2. Distribution of each species collected in Nagano
 長野県における各種の収集地点



Vigna nipponica at site 1 growing beside a forest track in the shade.



Glycine soja, *Vicia cracca* and *Vigna angularis* var. *nipponensis* growing together in an abandoned terrace at site 4.



Vigna angularis var. *nipponensis* growing beside a harvested paddy field at site 12.



Vicia unijuga growing in a field terrace at site 15.



Vicia nipponica growing in a field terrace at site 15.