〔植探報　Vol. 22 : 135 ～ 147，2006〕

東ティモールにおけるマメ類および共生微生物遺伝資源多様性の保全，2005 年

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Conservation of Legume - Symbiotic Rhizobia Genetic Diversity in East Timor, 2005

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Summary

A field survey was conducted in East Timor from May 16 to 24, 2005. As a result, 2 accessions of cultivated mungbean (*Vigna radiata* var. *radiata*), 7 of wild mungbean (*V. radiata* var. *sublobata*), 19 of cultivated rice bean (*V. umbellata*), 6 of wild rice bean (*V. umbellata*), 5 of cowpea (*V. unguiculata*), 3 of *V. trinervia*, 1 of *V. reflexo-pilosa*, 4 of soybean (*Glycine max*), 1 of *Glycine* sp., 1 of hyacinth bean (*Lablab purpureus*) and 3 of common bean (*Phaseolus vulgaris*) were collected and conserved.

Introduction

Timor is located in the eastern end of Lesser Sunda Islands, surrounded by Indonesia, Papua New Guinea and Australia(Fig.1). The island is about 800 km length (East to west) and 100 km width (North to South). It has the highest peak of 2,963 m and has diverse ecological zones. Timor is divided into approximately two equal area West Timor of Indonesia and East Timor.

Biologically it is located in the transitional zone between Southeastern and Australian flora and fauna, so that unique genetic resources are expected. To understand and to conserve legume genetic resources of East Timor, a survey was planned. In this survey, conservation of traditional legume crops, wild relatives and their symbiotic root nodules (rhizobia) are the main

objectives.

Methods

The field survey was conducted in East Timor from May 16 to 24, 2005 (Table 1). The route of the survey is shown in Fig. 2. Seeds, herbarium specimens and if available root nodules were collected. Information on collection sites including village name, altitude, latitude, longitude, habitat and other ecological data together with detailed sketch maps of the collection sites were recorded as passport data.

Results and Discussion

A summary list of collected materials is shown in Table 2 and detailed passport data is presented in Table 3. The map locality of the collection sites of wild *Vigna* spp. is shown in Fig. 3. Identification of *Vigna* spp. was done based on the key prepared by Tomooka *et al.* (2002).

Leguminous crops

Among leguminous crops, rice bean (*Vigna umbellata*) and cowpea (*V. unguiculata*) are the most popular and are cultivated throughout East Timor. Nineteen accessions of rice bean and 5 accessions of cowpea are collected. However in the market of Maubisse, located at the highest altitude of ca. 1,500 m, we could not find cowpea or rice bean and only common bean (*Phaseolus vulgaris*) is sold there. Around Maubisse, we observed several common bean fields on road side slopes together with sweet potato, taro and corn. Three accessions were collected. Mungbean is sold in some markets such as Baucau and Viqueque. Mungbean seems not so popular in East Timor. Soybean (*Glycine max*: three yellow and one black seeded type) is found in markets of higher elevation such as Aileu and Ermera provinces. Soybean seeds are cooked by boiling together with corn. This type of food seems very popular in East Timor and rice bean, cowpea, common bean are used in this way. These legume seeds are sold mixed with corn seeds in many markets. Around Baucau area, we often found velvet bean (*Mucuna pruriens* var. *utilis*) growing in home gardens. In the area around Bobonaro, hyacinth bean (*Lablab purpureus*) fields are frequently seen. However, we could not collect any seed samples for these two species. These leguminous crops seem to have been cultivated in East Timor for long time.

Wild legumes

Eighteen wild legume accessions consist of 4 *Vigna* and 1 *Glycine* species were collected. Among wild legumes, wild mungbean (*V. radiata* var. *sublobata*) and wild rice bean (*V. umbellata*) are the two commonly found species.

Wild mungbean prefers rather dry lowland to mid altitude grassland habitat where eucalypt trees are sporadically growing (Fig. 3). The altitude of collection sites in this type of habitat ranged from 2 m to 712 m. However, in one place near Maubisse, we found a wild mungbean population growing on bare gravel soil at an altitude of 1,298 m (ET21, Table 3). Plants in this population showed unique growth characters which are completely different from the other populations. ET21 plants have spreading long branches crawling on the ground. Leaflets are extremely small. They have shorter pods (3-4 cm) containing fewer seeds (8-9). They have

adapted to the specific habitat which is characterized by very dry, cold and windy environment located near the top of mountain road. A population of wild *Glycine* sp. (ET22) was also found growing in this place. In other typical grassland habitats, wild mungbean showed twining growth habit and pod length and number of seeds per pod ranged from 4.5 to 6 cm and from 12 to 15 seeds, respectively.

Wild rice bean prefers a wetter and cooler habitat compared with wild mungbean. The altitude of collection sites ranged from 550 to 1,645 m with an average of 992 m (Fig. 3). Out of 7 populations of wild rice bean, plants which have atypical seed coat color were found in 5 populations. These plants with atypical seed coat color (black and pale brown) are considered to be derived from natural hybridization between wild and cultivated rice bean. Plants in a population (ET23) showed brighter yellow standard petal color with purple pigment outside. Their leaves are densely hairy. This wild rice bean population was collected in the highest altitude (1,645 m) among those collected in East Timor.

Three accessions of *V. trinervia* were collected from high altitude places (Fig. 3; 1,297 - 1,400 m). They are growing on road side slopes with dry soil conditions. Plants are characterized by their densely hairy stems and leaves. Local people said goats like to eat this plant. An accession of *V. reflexo-pilosa* was collected near Gleno at an altitude of 800 m. The habitat is a wet road side slope.

Acknowledgements

This research is supported by the Grant-in-Aid for Scientific Research No.16310160, Japan Society for the Promotion of Science.

References

Tomooka N., D. A. Vaughan, H. Moss and M. Maxted (2002) The Asian *Vigna* : genus *Vigna* subgenus Ceratotropis genetic resources. Kluwer Academic Publishers. 270 pages.

和文摘要

東ティモールは，インドネシア（東南アジア）とニューギニア，オーストラリア大陸との間に位置する長さ 800km 幅 100km 程度の島である．アジアの生物相からオーストラリアの生物相へと移行するウォーレス線の東に位置し，島ごとに独自の生物相をもつウォーレシアと呼ばれる興味深い地域にあたる．アジア的要素として水田，水牛による蹄耕がみられ，オーストラリア的要素としてはユーカリの林が印象的である．太古から繰り返しアジアからの民族移動の波が押し寄せ，多様な民族が島の各地で多様な文化・言語を維持しつつ生活している．我々はこれまでに東南アジア各地に続いてパプアニューギニアでの調査を行ってきた．本調査では，東ティモールのほぼ全域にわたって，道路沿いに調査を行い，伝統的マメ科作物，その近縁野生種および共生している根粒菌の収集保全を行った．

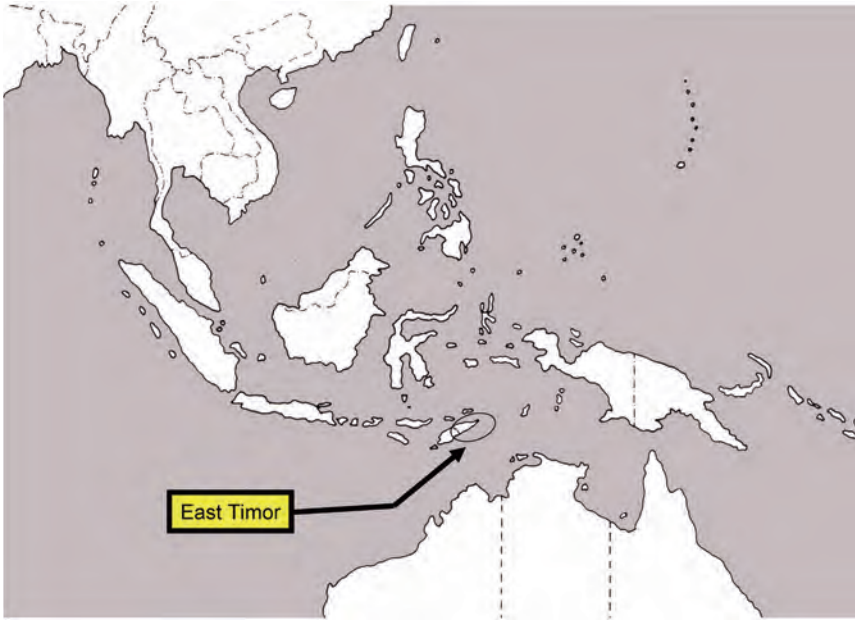


Fig. 1. Locality of East Timor

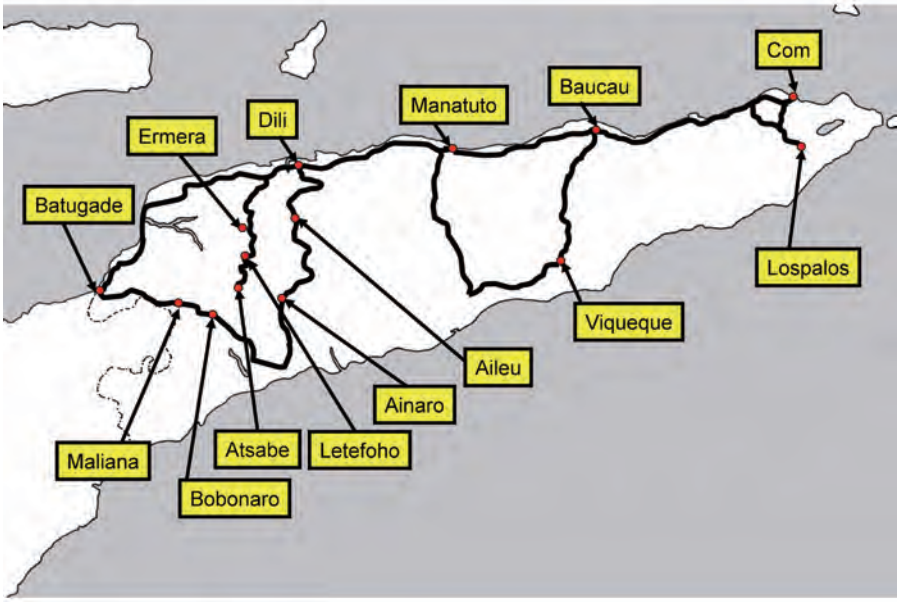


Fig. 2. Exploration routes and main cities in East Timor

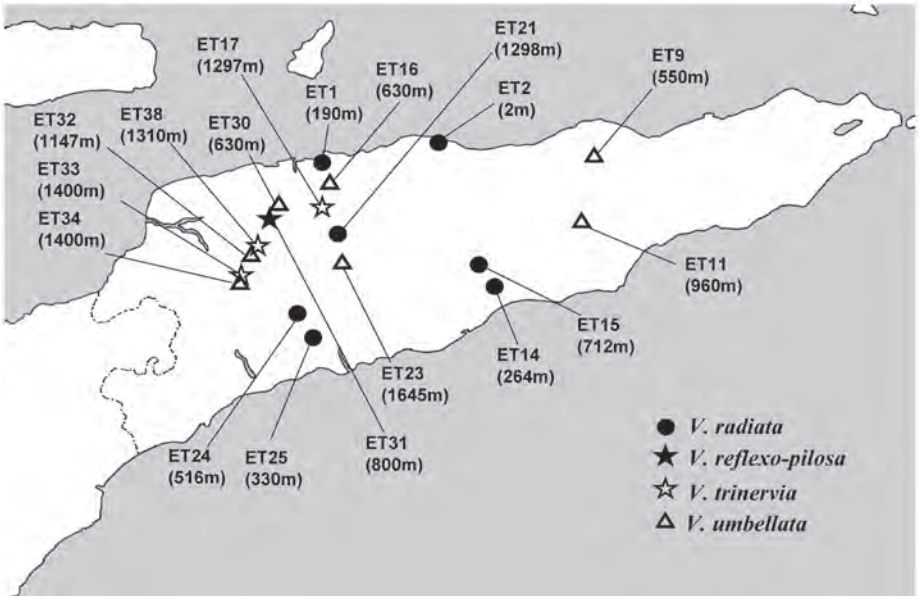


Fig. 3. Collection sites of wild *Vigna* species in East Timor

Table 1. Itinerary of the field survey in East Timor, 2005

Date	Day	Itinerary	Stay
16-May	Mon	Narita 11:00 -- GA881 -- 16:50 Bali, Indonesia	Bali
17-May	Tue	Bali 9:10 -- MZ8480 -- 12:00 Dili, East Timor	Dili
18-May	Wed	Dili -- Manatuto -- Baucau -- Com	Com
19-May	Thu	Com -- Baucau -- Viqueque -- Manatuto -- Dili	Dili
20-May	Fri	Dili -- Aileu -- Ainaro	Ainaro
21-May	Sat	Ainaro -- Bobonaro -- Maliana -- Batugade -- Dili	Dili
22-May	Sun	Dili -- Ermera -- Letefoho -- Atsutabe -- Dili	Dili
23-May	Mon	Dili 12:45 -- MZ8490 -- 13:40 Bali, Indonesia 22:00 -- GA880	Bali
24-May	Tue	-- 8:50 Narita	

Table 2. Summary list of collected accessions in East Timor

Species	Status	No. of accessions	Province	Altitude range
Vigna radiata	cultivated	2	Baucau, Viqueque	300 m
	wild	7	Dili, Manatuto, Ainaro	2 - 1298 m
Vigna reflexo-pilosa	wild	1	Ermera	800 m
Vigna trinervia	wild	3	Aileu, Ermera	1298 - 1400 m
Vigna unguiculata	cultivated	5	Baucau, Lautem, Viqueque, Bobonaro	300 - 755 m
Vigna umbellata	cultivated	19	Baucau, Viqueque, Cova Lima, Bobonaro, Ermera	300 - 1225 m
	wild	8	Baucau, Viqueque, Ainaro, Liquica, Ermera	550 - 1645 m
Glycine max	cultivated	4	Aileu, Ermera	933 - 1225 m
Glycine sp.	wild	1	Ainaro	1298 m
Phaseolus vulgaris	cultivated	3	Baucau, Ermera	350 - 1400 m
Total		53		

Table 3. Passport data of the collected materials in East Timor (2005)

収集品のパスポートデータ

No.	Coll. Date	Coll. No.	Species	Status	Collection Site	Site No.	Latitude/ Longitude	Alti-tude (m)
1	May 18	2005ET-1	*Vigna radiata* var. *sublobata*	wild	5km E of Dili, Dili Province	1	S08-33-40.4 E125-38-11.3	190
2	May 18	2005ET-2	*Vigna radiata* var. *sublobata*	wild	5km W of Manatuto, Manatuto Province	2	S08-28-46.1 E125-55-08.1	2
3	May 18	2005ET-3	*Vigna unguiculata*	cultivated	Baucau new market, Baucau Province	3	S08-27 E126-27	350
4	May 18	2005ET-4	*Phaseolus vulgaris*	cultivated	Baucau new market, Baucau Province	3	S08-27 E126-27	350
5	May 18	2005ET-5	*Vigna radiata*	cultivated	Baucau new market, Baucau Province	3	S08-27 E126-27	350
6	May 18	2005ET-6-1	*Vigna umbellata*	cultivated	Baucau old market, Baucau Province	4	S08-27 E126-27	300
7	May 18	2005ET-6-2	*Vigna umbellata*	cultivated	Baucau old market, Baucau Province	4	S08-27 E126-27	300
8	May 18	2005ET-7	*Vigna umbellata*	cultivated	E of Baucau, Baucau Province	5	S08-28-12.2 E126-29-09.9	311
9	May 18	2005ET-8	*Vigna unguiculata*	cultivated	A little S of Lautem, Lautem Province	6	S08-25-12.5 E126-55-28.1	340
10	May 19	2005ET-9	*Vigna umbellata*	wild	20km SW of Baucau, Baucau Province	7	S08-34-30.0 E126-23-15.9	550
11	May 19	2005ET-10-1	*Vigna umbellata*	cultivated	Kota Berkoli, Baucau Province	8	S08-36-26.2 E126-22-57.5	680
12	May 19	2005ET-10-2	*Vigna umbellata*	cultivated	Kota Berkoli, Baucau Province	8	S08-36-26.2 E126-22-57.5	680
13	May 19	2005ET-10-3	*Vigna umbellata*	cultivated	Kota Berkoli, Baucau Province	8	S08-36-26.2 E126-22-57.5	680
14	May 19	2005ET-11	*Vigna umbellata*	wild	near Ossu, Viqueque Province	9	S08-43-24.9 E126-22-01.3	960
15	May 19	2005ET-12-1	*Vigna unguiculata*	cultivated	Viqueque market, Viqueque Province	10	S08-51 E126-21	300
16	May 19	2005ET-12-2	*Vigna umbellata*	cultivated	Viqueque market, Viqueque Province	10	S08-51 E126-21	300
17	May 19	2005ET-12-3	*Vigna umbellata*	cultivated	Viqueque market, Viqueque Province	10	S08-51 E126-21	300
18	May 19	2005ET-13	*Vigna radiata*	cultivated	Viqueque market, Viqueque Province	10	S08-51 E126-21	300
19	May 19	2005ET-14	*Vigna radiata* var. *sublobata*	wild	50km S of Manatuto, Manatuto Province	11	S08-57-16.9 E125-59-30.7	264
20	May 19	2005ET-15	*Vigna radiata* var. *sublobata*	wild	45km S of Manatuto, Manatuto Province	12	S08-53-06.5 E125-59-12.7	712

Habitat	Shading	Distur-bance	Popula-tion size	Growth stage	Soil	Seed	Sample	Herba-rium	Rhizo-bium	Remarks
road side grassland	light	high	sporadi-cally	flowering → mature	silt	yes	bulk	yes	no	pod length 4.5~5 cm, black pod with short brown hair, 12~13 seeds per pod, seed blackish with reticulation, hilum slightly protruding
near the beach	medium	medium	a few plants	flowering	sandy	yes	indi-vidual	yes	no	pod not fully mature, seed blackish with reticulation, hilum slightly protruding
market				harvested		yes	bulk	no	no	shiny black seed
market				harvested		yes	bulk	no	no	purple with mottled seed
market				harvested		yes	bulk	no	no	dull green seed
market				harvested		yes	bulk	no	no	dark red seed
market				harvested		yes	bulk	no	no	tan seed
farmer's field	medium	low	5 x 5 m	mature	silt	yes	bulk	no	no	pod length 10cm, pod pale brown, 10 seeds per pod, dark red seed
farmer's house				harvested		yes	bulk	no	no	pale brown seed
road side grassland	light	medium	2 x 10 m	flowering → mature	black silt	yes	bulk	yes	yes	pod length 6~7 cm, 10~11 seeds per pod, pale brown with black mottle seed, leaflet shape variable
farmer's field	light	low	10 x 10 m	mature	clay	yes	bulk	no	no	pod length 8~9 cm, 10 seeds per pod, smoky red seed
farmer's field	light	low	10 x 10 m	mature	clay	yes	bulk	no	no	pod length 8~9 cm, 9~10 seeds per pod, dark red seed
farmer's field	light	low	10 x 10 m	mature	clay	yes	bulk	no	no	pale yellowish brown seed
road side grassland	light	medium	a few plants	flowering	silt	yes	bulk	yes	yes	pod length 6~7 cm, 10 seeds per pod, pale brown with black mottle seed
market				harvested		yes	bulk	no	no	shiny black seed
market				harvested		yes	bulk	no	no	pale to dark shiny red seed
market				harvested		yes	bulk	no	no	pale yellowish brown seed
market				harvested		yes	bulk	no	no	dull green seed
grassland with eucaypt	light	medium	sporadi-cally	flowering → mature	silt	yes	bulk	yes	yes	pod length 5~5.5 cm, 12~13 seeds per pod, seed blackish with reticulation, hilum slightly protruding, large leaflet with red vein
grassland with eucalypt	medium	medium	sporadi-cally	flowering → mature	silt	yes	bulk	no	no	pod length 5~5.5 cm, 14~15 seeds per pod, seed blackish with reticulation, hilum slightly protruding

Table 3. (continued).

No.	Coll. Date	Coll. No.	Species	Status	Collection Site	Site No.	Latitude / Longitude	Altitude (m)
21	May 20	2005ET-16	*Vigna umbellata*	wild	10km S of Dili, Dili Province	13	S08-36-12.8 E125-34-56.0	630
22	May 20	2005ET-17	*Vigna trinervia*	wild	20km S of Dili, Aileu Province	14	S08-38-17.9 E125-36-01.5	1297
23	May 20	2005ET-18	*Glycine max*	cultivated	Aileu market, Aileu Province	15	S08-43-44.0 E125-34-00.1	933
24	May 20	2005ET-19	*Glycine max*	cultivated	Aileu market, Aileu Province	15	S08-43-44.0 E125-34-00.1	933
25	May 20	2005ET-20-1	*Vigna umbellata*	cultivated	Aileu market, Aileu Province	15	S08-43-44.0 E125-34-00.1	933
26	May 20	2005ET-20-2	*Vigna umbellata*	cultivated	Aileu market, Aileu Province	15	S08-43-44.0 E125-34-00.1	933
27	May 20	2005ET-21	*Vigna radiata var. sublobata*	wild	10km NW of Maubisse, Ainaro Province	16	S08-48-06.4 E125-34-55.1	1298
28	May 20	2005ET-22	*Glycine* sp.	wild	10km NW of Maubisse, Ainaro Province	16	S08-48-06.4 E125-34-55.1	1298
29	May 20	2005ET-23	*Vigna umbellata*	wild	5km S of Maubisse, Ainaro Province	17	S08-53-31.9 E125-35-33.2	1645
30	May 21	2005ET-24	*Vigna radiata* var. *sublobata*	wild	5km S of Ainaro Province	18	S09-02-14.6 E125-30-31.6	516
31	May 21	2005ET-25	*Vigna radiata* var. *sublobata*	wild	10km S of Ainaro Province	19	S09-03-42.8 E125-31-41.1	330
32	May 21	2005ET-26	*Vigna umbellata*	cultivated	30km SE of Bobonaro, Cova Lima Province	20	S09-07 E125-25	400
33	May 21	2005ET-27-1	*Vigna umbellata*	cultivated	10km SE of Bobonaro, Cova Lima Province	21	S09-04-01.6 E125-22-59.7	600
34	May 21	2005ET-27-2	*Vigna umbellata*	cultivated	10km SE of Bobonaro, Cova Lima Province	21	S09-04-01.6 E125-22-59.7	600
35	May 21	2005ET-28	*Vigna unguiculata*	cultivated	5km E of Bobonaro, Bobonaro Province	22	S09-01-40.5 E125-22-21.4	755
36	May 21	2005ET-29-1	*Vigna unguiculata*	cultivated	5km E of Bobonaro, Bobonaro Province	22	S09-01-40.5 E125-22-21.4	755
37	May 21	2005ET-29-2	*Vigna umbellata*	cultivated	5km E of Bobonaro, Bobonaro Province	22	S09-01-40.5 E125-22-21.4	755
38	May 21	2005ET-29-3	*Vigna umbellata*	cultivated	5km E of Bobonaro, Bobonaro Province	22	S09-01-40.5 E125-22-21.4	755
39	May 22	2005ET-30	*Vigna umbellata*	wild	15km SW of Dili, Dili Province	23	S08-37-41.2 E125-27-53.8	630
40	May 22	2005ET-31	*Vigna reflexo-pilosa*	wild	5km S of Gleno, Ermera Province	24	S08-44-28.2 E125-26-05.1	800

Habitat	Shading	Distur-bance	Popula-tion size	Growth stage	Soil	Seed	Sample	Herba-rium	Rhizo-bium	Remarks
road side grassland	light	medium	sporadi-cally	flowering → mature	silt	yes	bulk	yes	yes	pod length 7 cm (by her-barium), 9 seeds per pod, true black seed, a bit larger than typical wild seed
gully beside mountain road	open	high	sporadi-cally	flowering → mature	gravel	yes	bulk	yes	no	pod length 5.5~6 cm, 14~15 seeds per pod, long brown hairs on mature pod, pods eas-ily dettached from peduncle, flower clean yellow, stem, leaf, pod hairy, goat like to eat
market				harvested		yes	bulk	no	no	yellow with brown hilum seed
market				harvested		yes	bulk	no	no	whitish yellow with pale brown hilum seed
market				harvested		yes	bulk	no	no	dark red seed
market				harvested		yes	bulk	no	no	pale yellowish brown seed
gully near the top of mountain road	open	high	sporadi-cally	flowering → mature	gravel	yes	bulk	yes	yes	pod length 3~4 cm, 8~9 seeds per pod, blackish with reticu-lation seed, very small seed, hilum slightly protruding, spreading growth habit, small leaflet
gully near the top of mountain road	open	high	sporadi-cally	flowering → mature	gravel	yes	bulk	yes	no	pod length 2 cm, 5 seeds per pod, pale brown short hairs on mature pod
road side grassland	light	high	sporadi-cally	flowering → mature	silt	yes	bulk	yes	yes	pod length 7~8 cm, 9~10 seeds per pod, true black seed, flower bright yellow, leaf hairy
road side grassland	medium	medium	several plants	mature	gravel (dry)	yes	bulk	yes	no	pod length 5.5~6 cm, 13~14 seeds per pod, blackish with reticulation seed, hilum slightly protruding
river side	medium	medium	one plant	flowering	gravel	yes	indi-vidual	yes	yes	no seed
from farmer				harvested		yes	bulk	no	no	3 seeds only, red seed, rather round seed shape
from farmer				harvested		yes	bulk	no	no	plant mixed with corn, Nov./ Dec. → May, pale to dark red seed
from farmer				harvested		yes	bulk	no	no	plant mixed with corn, Nov./ Dec. → May, pale yellowish brown seed
from farmer				harvested		yes	bulk	no	no	shiny black seed
from farmer				harvested		yes	bulk	no	no	shiny black seed
from farmer				harvested		yes	bulk	no	no	pale to dark red seed
from farmer				harvested		yes	bulk	no	no	pale yellowish brown seed
road side grassland	medium	medium	several plants	flowering		yes	indi-vidual	yes	yes	pod not yet matured, seeds from herbarium specimen, white mark on leaflet
road side wet slope	medium	medium	several plants	mature	clay (wet)	yes	bulk	yes	no	pod length 7~8 cm, pod black, 11~13 seeds per pod, balck seed, hairless stem

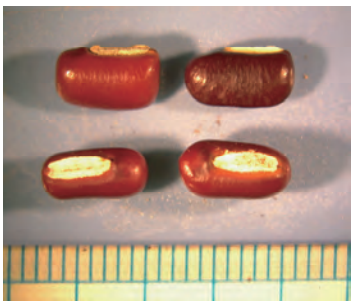
Table 3. (continued).

No.	Coll. Date	Coll. No.	Species	Status	Collection Site	Site No.	Latitude / Longitude	Alti-tude (m)
41	May 22	2005ET-32-1	*Vigna umbellata*	wild	10km S of Letefoho, Ermera Province	25	S08-52-14.8 E125-24-47.2	1147
42	May 22	2005ET-32-2	*Vigna umbellata*	wild	10km S of Letefoho, Ermera Province	25	S08-52-14.8 E125-24-47.2	1147
43	May 22	2005ET-33	*Vigna trinervia*	wild	15km S of Letefoho, Ermera Province	26	S08-53-07.1 E125-25-04.4	1400
44	May 22	2005ET-34	*Vigna umbellata*	wild	15km S of Letefoho, Ermera Province	26	S08-53-07.1 E125-25-04.4	1400
45	May 22	2005ET-35-1	*Phaseolus vulgaris*	cultivated	15km S of Letefoho, Ermera Province	26	S08-53-07.1 E125-25-04.4	1400
46	May 22	2005ET-35-2	*Phaseolus vulgaris*	cultivated	15km S of Letefoho, Ermera Province	26	S08-53-07.1 E125-25-04.4	1400
47	May 22	2005ET-36-1	*Vigna umbellata*	cultivated	Atsabe coffee shop, Ermera Province	27	S08-55-26.3 E125-23-52.3	1225
48	May 22	2005ET-36-2	*Vigna umbellata*	cultivated	Atsabe coffee shop, Ermera Province	27	S08-55-26.3 E125-23-52.3	1225
49	May 22	2005ET-37-1	*Glycine max*	cultivated	Atsabe coffee shop, Ermera Province	27	S08-55-26.3 E125-23-52.3	1225
50	May 22	2005ET-37-2	*Glycine max*	cultivated	Atsabe coffee shop, Ermera Province	27	S08-55-26.3 E125-23-52.3	1225
51	May 22	2005ET-38	*Vigna trinervia*	wild	3km N of Letefoho, Ermera Province	28	S08-49-23.1 E125-26-01.2	1310

Habitat	Shading	Distur-bance	Popula-tion size	Growth stage	Soil	Seed	Sample	Herba-rium	Rhizo-bium	Remarks
road side grassland	light	medium	several plants	mature	gravel	yes	bulk	yes	no	pod length 7~7.5cm, pod brown, 9~11 seeds per pod, pale brown with slightly black mottled seed
road side grassland	light	medium	several plants	mature	gravel	yes	bulk	yes	no	pod length 7~7.5cm, pod brown, 9~11 seeds per pod, pale brown seed
road side grassland	light	medium	several plants	mature	dry	yes	bulk	yes	no	pod length 5.5~6 cm, pod brown with long hair, 12~13seeds per pod, blackish with reticulation seed
road side grassland	light	medium	several plants	mature	gravel	yes	bulk	no	no	pod length 7~7.5 cm, 9~10 seeds per pod, true black seed
road side slope field	light	none	5 x 10 m	mature	gravel	yes	bulk	no	no	purple seed
road side slope field	light	none	5 x 10 m	mature	gravel	yes	bulk	no	no	white seed
from farmer				harvested		yes	bulk	no	no	red seed
from farmer				harvested		yes	bulk	no	no	pale yellowish brown seed
from farmer				harvested		yes	bulk	no	no	whitish yellow with brown hilum seed
from farmer				harvested		yes	bulk	no	no	black with black hilum seed
road side slope field	light	medium	several plants	mature	gravel	yes	bulk	no	no	pod length 5.5~6 cm, pod brown with long hair, 11~12 seeds per pod

2005ET-3
Vigna unguiculata

2005ET-8
Vigna unguiculata



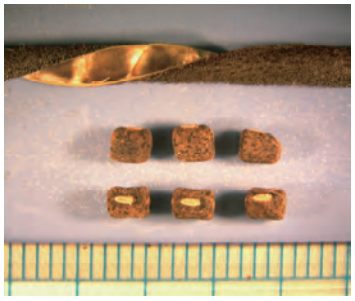
2005ET-6-1
Vigna umbellata

2005ET-6-2
Vigna umbellata

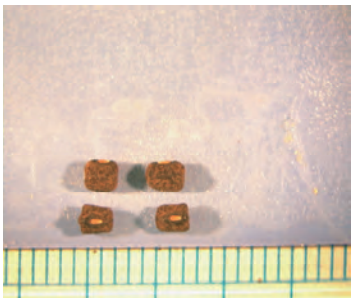
2005ET-10-3
Vigna umbellata

2005ET-9
Vigna umbellata

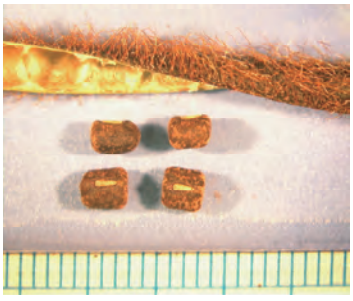
2005ET-5
Vigna radiata



2005ET-1
Vigna radiata

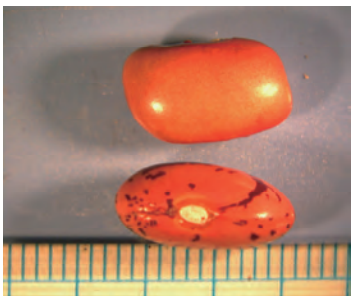


2005ET-21
Vigna radiata



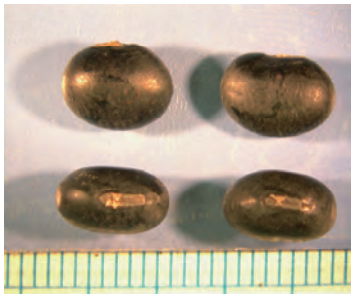
2005ET-33
Vigna trinervia

2005ET-31
Vigna reflexo-pilosa



2005ET-4
Phaseolus vulgaris

2005ET-18
Glycine max



2005ET-37
Glycine max

2005ET-22
Glycine sp.