

原著論文

インド・タミルナドゥ州におけるマメ科植物遺伝資源 多様性の保全, 2011年

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Conservation of leguminous crops and their wild relatives in Tamil Nadu, India, 2011

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Summary

Based on the Memorandum of Understanding between the National Institute of Agrobiological Sciences, Japan and the Tamil Nadu Agricultural University, India, a field survey was conducted in Tamil Nadu State, India from 2nd to 6th February, 2011. As a result, 39 accessions of leguminous plants consist of the genus *Vigna*, were recorded and seed samples consisting of 29 cultivated and 10 wild accessions were collected. All the seed materials collected were deposited at Tamil Nadu Agricultural University, India. Cultivation of *Vigna stipulacea* by local farmers and selling their seeds by local seed dealer were confirmed. Genetic erosion of traditional pulse landraces is rapidly proceeding in Tamil Nadu mainly due to an increase in the area of cash crops.

Key Words: India, Tamil Nadu, Wild relatives, Legumes, *Vigna*

Introduction

In order to facilitate the collaborative research activities on plant genetic resources, the National Institute of Agrobiological Sciences, Japan and the Tamil Nadu Agricultural University, India agreed to establish the Memorandum of Understanding (MOU) on Joint Research of Genetic Resources in April, 2007. This is a report of the third collaborative field survey on leguminous plants in Tamil Nadu, India under this MOU. A report of the first trip and the second trip was published and available from NIAS genebank web site (Tomooka et al., 2008; <http://>

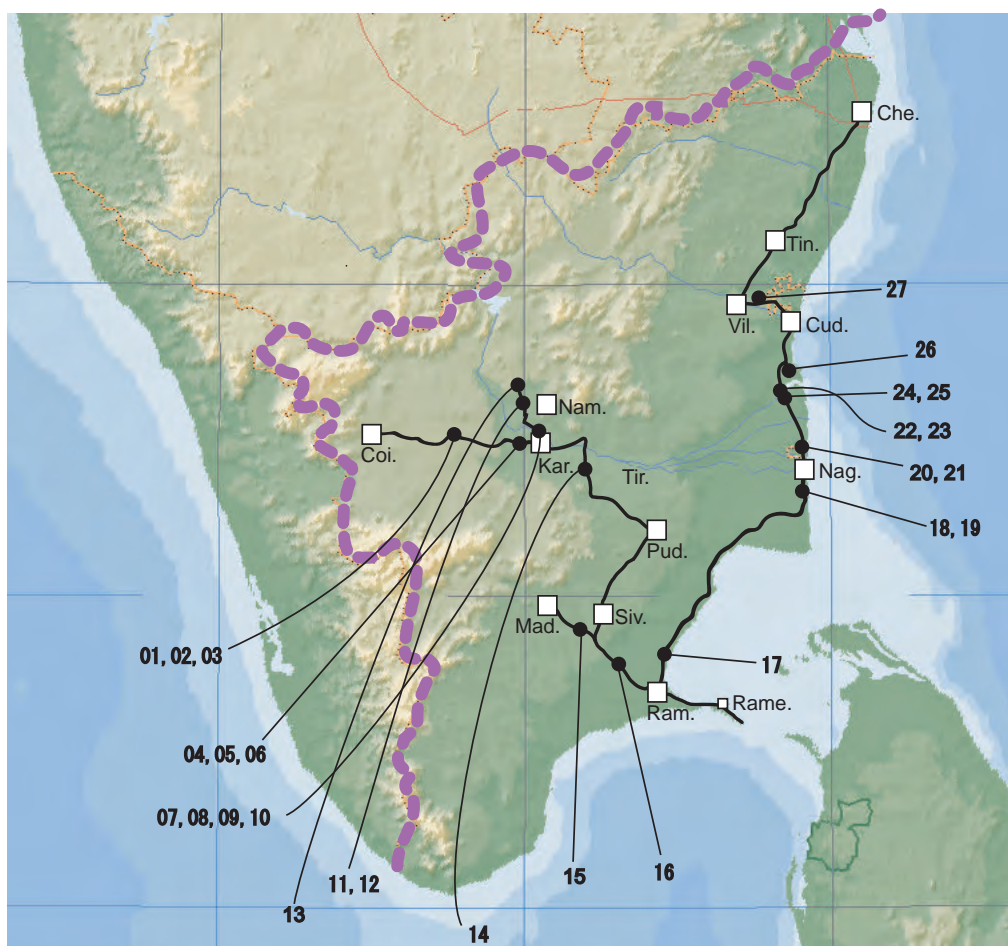


Fig. 1. Exploration route (—), collection sites (●), collection numbers (Figures) and major towns (□) in Tamil Nadu, India.

Town name abbreviations:

Che (Chennai), Coi (Coimbatore), Cud (Cuddalore), Kar (Karur), Mad (Madurai), Nag (Nagappattinam), Nam (Namakkal), Pud (Pudukkottai), Ram (Ramanathapuram), Rame (Rameswaram), Siv (Sivaganga), Tin (Tindivanam), Tir (Tiruchirappalli), Vil (Viluppuram)

Table 1. Itinerary

Date	Day	Itinerary	Activities	Stay
2011/1/30	Sun	Narita 11:30 -- (SQ637) -- 18:00 Singapore 21:30 -- (SQ5358) -- 23:25 Coimbatore	Transportation	Coimbatore
2011/1/31	Mon	AgBio' 2011 Global Summit on AgBio Innovations	International Symposium	Coimbatore
2011/2/1	Tue	AgBio' 2012 Global Summit on AgBio Innovations	International Symposium	Coimbatore
2011/2/2	Wed	Coimbatore -- Kangayam -- Karur	Field survey	Karur
2011/2/3	Thu	Karur -- Namakkal -- Manapparai -- Madurai	Field survey	Madurai
2011/2/4	Fri	Madurai -- Manamadurai -- Ramanathapuram -- Dhanushkodi -- Ramanathapuram -- Nagappattinam	Field survey	Nagappattinam
2011/2/5	Sat	Nagappattinam -- Pondicherry -- Sirkazhi -- Chidambaram -- Cuddalore -- Tindivanam	Field survey	Tindivanam
2011/2/6	Sun	Tindivanam -- Valavanur -- Tindivanam -- Chennai 16:15 -- (SQ5335) -- 22:45 Singapore 23:55 -- (SQ638) --	Transportation	on flight
2011/2/7	Mon	-- 07:30 Narita		

Table 2. A summary of the collected samples

収集品の内訳			
Species	Cultivated	Wild	Total
<i>V. aconitifolia</i>	5	0	5
<i>V. mungo</i>	2	0	2
<i>V. radiata</i>	5	0	5
<i>V. stipulacea</i>	14	2	16
<i>V. trilobata</i>	0	8	8
<i>V. unguiculata</i>	3	0	3
Total	29	10	39

www.gene.affrc.go.jp/pdf/report/parts/2007_2-2.pdf, Tomooka et al., 2009; http://www.gene.affrc.go.jp/pdf/report/parts/2008_2-1.pdf).

Methods

We surveyed mainly in the central part of Tamil Nadu State by car from 2nd to 6th February, 2011 as shown in Table 1 and Fig. 1. Seeds, herbarium specimens and root nodules (if available) were collected. Information on collection sites including village name, altitude, latitude, longitude, habitat, cultural practices and other ecological data of the collection sites were recorded as passport data (Tables 2 & 3). Identification of wild *Vigna* plants was done based on a key prepared by Tomooka et al. (2002, p.26-28).

Results and Discussion

A total of 39 legume accessions of the genus *Vigna* consist of 6 species were recorded and seed samples were collected (Tables 2 & 3). Collected seed samples are conserved at Tamil Nadu Agricultural University. They consist of 29 cultivated and 10 wild accessions.

Collected cultivated and wild legumes

Five cultivated *Vigna* species were collected (Table 2). They are *Vigna aconitifolia* (moth bean, 5 accessions), *Vigna mungo* (black gram, 2 accessions), *Vigna stipulacea* (14 accessions), *Vigna radiata* (mungbean, 5 accessions) and *Vigna unguiculata* (cowpea, 3 accessions).

For wild legumes, *Vigna stipulacea* (2 accessions) and *V. trilobata* (8 accessions) were collected.

Vigna aconitifolia (Moth bean)

Local name of moth bean is “Nari Payaru” (fox bean, TN12) or “Kottu Karamani” (TN27, Photo16). As was noted in the previous year’s report (Tomooka et al., 2008 and 2009), farmers recognized two types of moth bean cultivar called “Wild Type” and “Cultivated Type”. However, both are apparently domesticated plants. “Wild Type” is characterized by deeply lobed leaflets and by prostrating long crawling stems. On the other hand, “Cultivated Type” is characterized by shallowly lobed leaflets and by nearly-erect short stems. While “Wild Type” is generally cultivated under a mixed cropping system with sorghum, “Cultivated Type” is cultivated as a

mono crop.

According to a farmer (Mrs. Adilakshmi, TN27, Photo 8), she cultivates mainly “Cultivated Type” of moth bean at a scale of 2 acres. She said that the market price of moth bean seeds (80 Rp/kg) is better than that of black gram (50 Rp/kg). The price of these beans increased rapidly. The price of moth bean was 40 Rp/kg, and that of black gram was 30 Rp/kg in 2009 survey.

Vigna mungo (Black gram)

Black gram is especially important in Tamil Nadu State and is cooked into various dishes. Two accessions (TN21 and TN23) were collected (separated) from farmer’s seed stock of *Vigna stipulacea*.

Vigna radiata (Mungbean)

Five accessions were collected. Two accessions (TN 04 and TN09) were still growing in the field. They were sown on July and harvesting is on February. An accession (TN04, Photo 10) was grown mixed with sorghum. Local name was “Passi Payaru” (Green legume) or “Tatta Payaru”. A farmer at this site said she did not apply any insecticide. A farmer cultivating mungbean (TN09) told us that the market price of mungbean seed is about 100 Rp/kg. Other three accessions were collected (separated) from farmer’s seed stock of *Vigna stipulacea*.

Vigna stipulacea (semi-domesticated form and wild form)

The name *V. stipulacea* has not been used in the Indian literatures and this species seems to have been included in the description of *V. trilobata* (Tomooka et al., 2006). As was mentioned in the previous trip report (Tomooka et al., 2008, 2009), farmers told that there was a semi-domesticated form of *V. Stipulacea* (Photo 5) in Tamil Nadu. However, we could not meet farmer who cultivated *V. stipulacea* in the previous two field surveys. In the present field survey, we could meet farmers who are cultivating *V. stipulacea* (TN14 Photos 2 & 3, TN15 Photo 4, TN 20, TN21 Photo 6, 13 & 14, TN22, TN23, TN24, TN25, Photo 15). Based on the map of collection site (Fig. 1), it is clarified that the cultivation of *V. stipulacea* is still widely conducted in lowland paddy field area of Tamil Nadu. In addition, we could find seed dealer who are selling the seeds of *V. stipulacea* (TN25) in his shop (Photo 7).

Mr. Kunnahoundar, a farmer who cultivated *V. stipulacea* (TN14) in Karur province told us that he cultivated this legume mainly for producing fodder for milk animal and also as manure production. He said it was a good fodder and cow produces 1 -1.5 liter extra milk per day when he gave *V. stipulacea* as a fodder. Market price of *V. stipulacea* seeds is 65-75 Rp/kg and sometimes reaches up to 100Rp/kg. When he collects seeds, he harvests pods by hand picking. The harvested pods are sun dried, threshed and kept in a storage room. He said the seed dormancy was not a problem after 30 days of storage period, hence seeds could be broadcasted without germination problem. He prepared a small piece of land for the seed increase (Photo 3). He also said that seeds of *V. stipulacea* were always available in a market.

Mr. Pandi in Sivaganga province showed us the seeds of *V. stipulacea* (TN15) stored in his house (Photo 4). He said that the local name was “Siru Payaru” (small legume) or “Minni Payaru”. He grows this crop before paddy rice cultivation. He broadcasts seeds of *V. stipulacea* (5kg/acre) at the end of March. After the plants grow, he cuts and harvests the upper plant parts twice at 2 months intervals (end of May and end of July). In September, he ploughs the plants

into soil as a green manure before paddy rice planting. Some plants of *V. stipulacea* are grown separately for seed production for next year's growing. Extra seeds are consumed as "Sambal" (vegetable stew) or "Thuvayal (Chatney)" (condiment prepared with spice and vegetable). He said those products prepared from seeds of *V. stipulacea* were very tasty.

Mr. Chandra and Mr. Panneer in Tiruvarur province said 4 persons in the village cultivated *V. stipulacea* (TN20, TN21) this year. Average area of cultivation of *V. stipulacea* is 30-40 acres per person. The plants are used as a fodder and as a green manure. The seeds are cooked and eaten by human. They said almost all farmers in their village cultivated *V. stipulacea* in the former time. The decrease of *V. stipulacea* cultivation is mainly due to high labor required for harvesting pods. The quality of *V. stipulacea* as a fodder is high and cow prefer to eat it. Selling price by farmer is about 50 Rp/kg.

Mrs. Jayalashni grows *V. stipulacea* (TN24, called "Nari Payaru") for the preparation of "Dosai". "Dosai" is usually prepared by black gram (*V. mungo*) seed flour. The black gram seed flour is fermented before baking. In contrast, when she use *V. stipulacea* seed flour, she said it is not necessary to ferment before baking because it is so soft. When she adds water to the *V. stipulacea* seed flour, color changes from white to yellow. She believes that this yellow color gives good taste and good flavor. She also use *V. stipulacea* flour for bread baking. When she grows *V. stipulacea*, she does not need to use any pesticide. She said that the pod of *V. stipulacea* is harder than those of mungbean and black gram, it is more resistant to the attack by stink bug. Growth speed of *V. stipulacea* at its early stage is faster than mungbean or black gram, it is more competitive to weed. She said that "Sambal" made from *V. stipulacea* seeds was used for wedding ceremony until about 20 years ago.

Mr. Kotteswaran sells seeds of *V. stipulacea* in his seed shop (K.T. Rajan and Sons) at a price of 60 Rp/kg. He sold 1500kg of *V. stipulacea* seeds last year. He said that almost all farmers in this area grew *V. stipulacea* until 20 years ago. The price of mungbean, black gram and *V. stipulacea* seeds in his shop is 60, 65 and 60 Rp/kg, respectively. In May, he went to buy the seeds of *V. stipulacea* in Tiruchchirappalli area. When we were interviewing to Mr. Kotteswaran, a farmer came and bought seeds of *V. stipulacea* and sesbania. He said he will grow these 2 legumes as mixed cropping.

Two accessions of wild form were collected this year (TN17, TN26). They were found growing in a wet clay soil habitat in and around paddy field.

Vigna trilobata

In the present survey, 7 populations of *V. trilobata* (TN02, TN06, TN07, TN11, TN16, TN18, TN19) were found (Photos 9 and 12). Mrs. Nallammal who was harvesting mungbean pods said that *V. trilobata* grows naturally in her sorghum field (Photo 1). She said that if climate condition is favorable to the growth of *V. trilobata*, she harvests the plants by sickle, dries them and collects seeds. Seeds are used for the preparation of "Chatney" (condiment prepared with spice and vegetable) or "Sambal" (vegetable stew). Mr. Muthusamy in Namakkal province also said that if the growth of naturally growing *V. trilobata* is good, he collects and eats young pod of *V. trilobata*. He also uses dry seeds for eating.

Vigna unguiculata (cowpea)

Cultivation of cowpea is common in dry upland fields. Cowpea landraces seems to be

highly tolerant to drought. Three accessions were collected in this survey (TN03, TN05, TN10, Photo 11).

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和文摘要

本報告は、独立行政法人農業生物資源研究所ジーンバンクとインド、タミルナドゥ農業大学の間で2007年4月に締結した協同研究協定(MOU)に基づいて行ったインド、タミルナドゥ州における第三回目のマメ科植物遺伝資源の調査報告である。調査は、2011年2月2日～2月6日にかけて行った。調査の結果、ササゲ(*Vigna*)属栽培種5種29系統、ササゲ属野生種2種10系統を収集し、タミルナドゥ農業大学に保存した。タミルナドゥ州における豆類の価格は上がっており、儲かる作物になってきた。しかし、収穫作業に必要な労働者を雇用することが困難になってきているため、栽培をあきらめざるを得ない地主が多かった。今回の調査で、少々栽培化が進んで大型化したと考えられるマメ科植物 *Vigna stipulacea* の農家による栽培が確認できた。*V. stipulacea* を栽培している農民は、1月から2月に水田にこの種の種子を散播し、緑肥、飼料、食料として利用している。種子は農民が自家採種し次年度に使うほか、町の種子屋でも販売していることを確認した。種子屋での聞き取りによれば、昨年は1500kgの種子を販売し、販売価格はリョクトウ種子と同じで、1kgあたり60ルピー(120円)であった。聞き取りを行ったすべての農民が、Sambal, Chatney, Dosai, Idli等の伝統食品を作る場合、リョクトウやケツルアズキより *V. stipulacea* の種子で作る方が風味があり、美味であるという感想を持っていた。また、栽培に関しても、リョクトウやケツルアズキに比べて病害虫に強く、*V. stipulacea* を栽培する際には一切農薬を散布する必要がないとのことであった。

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

JP No./Coll. No.	Coll. Date	Species name	Status	Local Name	Farmer's name / Collection Site	Province
JP243643/ 2011TN01	2-Feb-11	<i>Vigna aconitifolia</i>	cultivated		Avanashipalayam, east of Coimbatore	Coimbatore
JP243644/ 2011TN02	2-Feb-11	<i>Vigna trilobata</i>	wild		Avanashipalayam, east of Coimbatore	Coimbatore
JP243645/ 2011TN03	2-Feb-11	<i>Vigna unguiculata</i>	cultivated		Avanashipalayam, east of Coimbatore	Coimbatore
JP243646/ 2011TN04	2-Feb-11	<i>Vigna radiata</i>	cultivated	Passi (green) Payaru, Tatta Payaru	Pavithvang, Kolathupalayam, ca. 10km W of Karur	Karur
JP243647/ 2011TN05	2-Feb-11	<i>Vigna unguiculata</i>	cultivated	Tatta Payaru	Pavithvang, Kolathupalayam, ca. 10km W of Karur	Karur
JP243648/ 2011TN06	2-Feb-11	<i>Vigna trilobata</i>	wild		Pavithvang, Kolathupalayam, ca. 10km W of Karur	Karur
JP243649/ 2011TN07 (BROWN SEEDS)	3-Feb-11	<i>Vigna trilobata</i>	wild		Mrs. Nallammal / Mammangalam	Karur
JP243650/ 2011TN07 (MOTTLED SEEDS)	3-Feb-11	<i>Vigna trilobata</i>	wild		Mrs. Nallammal / Mammangalam	Karur
JP243651/ 2011TN08	3-Feb-11	<i>Vigna aconitifolia</i>	cultivated		Mrs. Nallammal / Mammangalam	Karur
JP243652/ 2011TN09	3-Feb-11	<i>Vigna radiata</i>	cultivated		Mrs. Nallammal / Mammangalam	Karur
JP243653/ 2011TN10	3-Feb-11	<i>Vigna unguiculata</i>	cultivated		Mrs. Nallammal / Mammangalam	Karur
JP243654/ 2011TN11	3-Feb-11	<i>Vigna trilobata</i>	wild	Kotto (forest) Nari Payaru (=moth bean)	Mr. Muthusamy / Marureddi, Paramathi	Namakkal
JP243655/ 2011TN12	3-Feb-11	<i>Vigna aconitifolia</i>	cultivated	nari payaru (= fox bean)	Mr. Muthusamy / Marureddi, Paramathi	Namakkal
JP243656/ 2011TN13	3-Feb-11	<i>Vigna aconitifolia</i>	cultivated		Thalakarai Kollaram village, ca. 10km SE of Tiruchengodu	Namakkal
JP243657/ 2011TN14	3-Feb-11	<i>Vigna stipulacea</i>	cultivated		Mr. Kunnahoundar / Perur, Thogamalai	Karur

Latitude	Longitude	Altitude (m)	Soil	Seed	Herbarium	Nodule	Remarks
N10-58-42.0	E77-27-27.1	336m	red sandy gravel	bulk	no	no	slope 0, grown mixed with horse gram (main crop).
N10-58-42.0	E77-27-27.1	336m	red sandy gravel	bulk	no	no	slope 0, growing naturally and abundantly in and around a horse gram field, large leaflet, hairy stem.
N10-58-42.0	E77-27-27.1	336m	red sandy gravel	bulk	no	no	grown next to a horse gram field, slope 0.
N10-57-26.0	E77-59-25.9	145m	red sandy	bulk	no	no	local name: Passi (=green) Payaru (=legume), Tatta Payaru. usage: prepare "Sambal" (a kind of curry soup), mixed cropping with sorghum. twining on sorghum stalk. Cercospora leaf spot (a little), no insecticide applied. After pick the pod, allow grazing. July sowing - Feb. near harvest. No need to rotate the field.
N10-57-26.0	E77-59-25.9	145m	red sandy	bulk	no	no	no disease, no insect attack (stick bug), grown as a mono crop, crawling on a ground, white pod.
N10-57-26.0	E77-59-25.9	145m	red sandy	bulk	no	no	growing naturally, no mature pod collected.
N11-02-08.2	E78-03-43.2	143m	red sandy	bulk	no	no	growing in a sorghum field naturally. If <i>V. trilobata</i> growth is vigorous, harvest by sickle, dry, collect seeds and cook as "Chatney (a kind of curry)", "Sambal (dry with fire, boil with salt and spice)".
N11-02-08.2	E78-03-43.2	143m	red sandy	bulk	no	no	growing in a sorghum field naturally. If <i>V. trilobata</i> growth is vigorous, harvest by sickle, dry, collect seeds and cook as "Chatney (a kind of curry)", "Sambal (dry with fire, boil with salt and spice)".
N11-02-08.2	E78-03-43.2	143m	red sandy	bulk	no	no	growing in a sorghum field naturally. She said she did not sow the seeds.
N11-02-08.2	E78-03-43.2	143m	red sandy	bulk	no	no	small seeds, somewhat twining, July sowing, Feb. harvesting. market price 100Rp/kg.
N11-02-08.2	E78-03-43.2	143m	red sandy	bulk	no	no	growing in a sorghum field naturally. She said she did not sow the seeds.
N11-10-32.6	E78-00-43.6	152m	red sandy	bulk	yes	no	growing naturally, eat young pod, if growth is good (heavy rain continuously), harvest, collect grain, and keep them for human consumption, taste is better than <i>V. aconitifolia</i> .
N11-10-32.6	E78-00-43.6	152m	red sandy	bulk	no	no	sickle and collect for animal.
N11-17-22.2	E77-58-57.9	176m	-	bulk	no	no	In this place, abundant <i>V. trilobata</i> plants also growing naturally. They collect plants of <i>V. trilobata</i> to make hay (3000Rp/hay). If <i>V. trilobata</i> growth is good, seeds soaked and grinded and given to animals. When 5 liter/day given, cow produce 1 ~ 2 liter/day more milk. market price 110Rp/kg.
N10-48-03.7	E98-25-39.5	116m	sandy clay	bulk	yes	no	manure, fodder for milk animal, give 5l/day of <i>V. stipulacea</i> , cow produce 1 ~ 1.5 liter extra milk per day, market price: 65 ~ 75Rp/kg up to 100Rp/kg. for seed collection, they pick the pods by hand, sun dry, thresh and keep. After 30 days of storage, dormancy is lost. broadcast the seeds and mixed into soil as green manure 30 days later. Seeds of <i>V. stipulacea</i> always available in a market.

Table 3 (Continued).

JP No./Coll. No.	Coll. Date	Species name	Status	Local Name	Farmer's name / Collection Site	Province
JP243658/ 2011TN15 (BLACK SEEDS)	4-Feb-11	<i>Vigna stipulacea</i>	cultivated	minni payaru, siru (=small) payaru	Mr. Pandi / Kalpirivu, Manamadurai, Sivaganga	Sivaganga
JP243659/ 2011TN15 (BROWN SEEDS)	4-Feb-11	<i>Vigna stipulacea</i>	cultivated	minni payaru, siru (=small) payaru	Mr. Pandi / Kalpirivu, Manamadurai, Sivaganga	Sivaganga
JP243660/ 2011TN16	4-Feb-11	<i>Vigna trilobata</i>	wild		Meenakshibhavah Hotel, ca. 10km W of Paramakkudi	Ramanathapuram
JP243661/ 2011TN17	4-Feb-11	<i>Vigna stipulacea</i>	wild	minni payaru	Mr. Ramu Achari / Kudallur, 10km N of Devipatam	Ramanathapuram
JP243662/ 2011TN18	5-Feb-11	<i>Vigna trilobata</i>	wild	Naripayaru sedi	Mrs. Prabhakaran / Prathaparamapuvam, ca. 12km S of Nagappattinam	Nagappattinam
JP243663/ 2011TN19	5-Feb-11	<i>Vigna trilobata</i>	wild		Mrs. Prabhakaran / Prathaparamapuvam, ca. 12km S of Nagappattinam	Nagappattinam
JP243664/ 2011TN20	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		Mr. Chandra Sekaran / Mr. S. Panneer Seruam / Panarcudi Andipanthal	Thiruvarur
JP243665/ 2011TN21 (BLACK SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		Mr. Chandra Sekaran / Mr. S. Panneer Seruam / Panarcudi Andipanthal	Thiruvarur
JP243666/ 2011TN21 (BROWN SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		Mr. Chandra Sekaran / Mr. S. Panneer Seruam / Panarcudi Andipanthal	Thiruvarur

Latitude	Longitude	Altitude (m)	Soil	Seed	Herbarium	Nodule	Remarks
N09-42-30.4	E78-25-21.4	79m	clay	bulk	no	no	local name: Siru (=small) payaru (=legume), minni payaru. black seeds separated from mixed seed color sample (2011TN15). This farmer cultivates <i>V. stipulacea</i> before paddy preparation, broadcast seeds (5kg/1 acre) at the end of March, cut and harvest upper plant parts twice at 2 months interval (end of May & end of July), plough as a green manure before paddy preparation (Sept.), collect seeds for next year, eat extra seeds as "sambal" or "thuvayal (chatni)", good taste. He kept his own seeds in his house.
N09-42-30.4	E78-25-21.4	79m	clay	bulk	no	no	local name: Siru (=small) payaru (=legume), minni payaru. brown seeds separated from mixed seed color sample (2011TN15). This farmer cultivates <i>V. stipulacea</i> before paddy preparation, broadcast seeds (5kg/1 acre) at the end of March, cut and harvest upper plant parts twice at 2 months interval (end of May & end of July), plough as a green manure before paddy preparation (Sept.), collect seeds for next year, eat extra seeds as "sambal" or "thuvayal (chatni)", good taste.
N09-34-13.0	E78-32-16.1	55m	sand	bulk	no	no	back yard garden of a restaurant, flower color: bright yellow, many butterfly visited flowers.
N09-37-13.5	E78-55-45.3	4m	clay	bulk	yes	no	beside paddy (salt affected area by tsunami 2004, near the sea)
N10-39-32.1	E79-50-04.1	16m	sand	no	no	yes	growing under mango trees, crawling on the ground, very slender stem (hairy), very fine sandy soil (white), good nodules formed near the soil surface, small leaflets with white mark, roots appeared from stem and nodulated, stems do not go upwards. Before 12 ~ 20 years, cultivation of this wild plants (maybe <i>V. stipulacea</i>) were common. Sowing end of January, harvestig after 3 months by hand picking. no insect no disease problem. eat seeds as "chatni" better taste.
N10-39-21.8	E79-51-04.5	9m	sand	bulk	no	no	growing around harvested paddy near the sea shore, tsunami affected place.
N10-51-33.4	E79-38-38.9	17m	clay	bulk	no	no	seeds purchased from Tiruthurai Poondi Deepa Traders, sowing on early February, harvesting on April/May, four person in the village cultivate <i>V. stipulacea</i> this year, 30 ~ 40 acres per person, triple purpose (green manure, fodder, seeds for human food), in grandfather's time, almost all farmers in the village cultivated <i>V. stipulacea</i> .
N10-51-33.4	E79-38-38.9	17m	clay	bulk	no	no	seeds purchased from Tiruthurai Poondi Deepa Traders, sowing on early February, harvesting on April/May, four person in the village cultivate <i>V. stipulacea</i> this year, 30 ~ 40 acres per person, triple purpose (green manure, fodder, seeds for human food), in grandfather's time, almost all farmers in the village cultivated <i>V. stipulacea</i> .
N10-51-33.4	E79-38-38.9	17m	clay	bulk	no	no	seeds purchased from Tiruthurai Poondi Deepa Traders, sowing on early February, harvesting on April/May, four person in the village cultivate <i>V. stipulacea</i> this year, 30 ~ 40 acres per person, triple purpose (green manure, fodder, seeds for human food), in grandfather's time, almost all farmers in the village cultivated <i>V. stipulacea</i> . Good fodder, cattle became bulky, labor problem for harvesting, no disease and pests for <i>V. stipulacea</i> , seed price 50 Rp/kg (farmer's price).

Table 3 (Continued).

JP No./Coll. No.	Coll. Date	Species name	Status	Local Name	Farmer's name / Collection Site	Province
JP243667/ 2011TN21 (<i>V. radiata</i>)	5-Feb-11	<i>Vigna radiata</i>	cultivated		Mr. Chandra Sekaran / Mr. S. Panneer Seruam / Panarcudi Andipanthal	Thiruvarur
JP243668/ 2011TN21 (<i>V. mungo</i>)	5-Feb-11	<i>Vigna mungo</i>	cultivated		Mr. Chandra Sekaran / Mr. S. Panneer Seruam / Panarcudi Andipanthal	Thiruvarur
JP243669/ 2011TN22 (<i>V. stipulacea</i> - BLACK SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		near Sirkazhi	Nagappattinam
JP243670/ 2011TN22 (<i>V. stipulacea</i> - BROWN SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		near Sirkazhi	Nagappattinam
JP243671/ 2011TN22 (<i>V. radiata</i>)	5-Feb-11	<i>Vigna radiata</i>	cultivated		near Sirkazhi	Nagappattinam
JP243672/ 2011TN23 (<i>V. stipulacea</i> - BLACK SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		near Sirkazhi	Nagappattinam
JP243673/ 2011TN23 (<i>V. stipulacea</i> - BROWN SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		near Sirkazhi	Nagappattinam
JP243674 2011TN23 (<i>V. mungo</i>)	5-Feb-11	<i>Vigna mungo</i>	cultivated		near Sirkazhi	Nagappattinam
JP243675/ 2011TN24 (<i>V. stipulacea</i> - BLACK SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated	nari payaru (= fox bean)	Mr. Rajangani and Mrs. Jayalakshni / Sirkazhi	Nagappattinam
JP243676/ 2011TN24 (<i>V. stipulacea</i> - BROWN SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated	nari payaru (= fox bean)	Mr. Rajangani and Mrs. Jayalakshni / Sirkazhi	Nagappattinam
JP243677/ 2011TN24 (<i>V. radiata</i>)	5-Feb-11	<i>Vigna radiata</i>	cultivated		Mr. Rajangani and Mrs. Jayalakshni / Sirkazhi	Nagappattinam
JP243678/ 2011TN25 (BLACK SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		Mr. K.T. Kotteeswaran / seed shop (K.T. Rajan Sons), Sirkazhi town	Nagappattinam
JP243679/ 2011TN25 (BROWN SEEDS)	5-Feb-11	<i>Vigna stipulacea</i>	cultivated		Mr. K.T. Kotteeswaran / seed shop (K.T. Rajan Sons), Sirkazhi town	Nagappattinam
JP243680/ 2011TN26	5-Feb-11	<i>Vigna stipulacea</i>	wild		Mr. Sabeer Arandaraj / Kandamangalam, Chidambaram	Cuddalore
JP243681/ 2011TN27	5-Feb-11	<i>Vigna aconitifolia</i>	cultivated	kottu karamani	Mrs. Adilakshmi / near Valavanur, Tindivanam	Viluppuram

Latitude	Longitude	Altitude (m)	Soil	Seed	Herbarium	Nodule	Remarks
N10-51-33.4	E79-38-38.9	17m	clay	bulk	no	no	Seeds of <i>V. radiata</i> separated from <i>V. stipulacea</i> farmer's seed stock (2011TN21).
N10-51-33.4	E79-38-38.9	17m	clay	bulk	no	no	Seeds of <i>V. mungo</i> separated from <i>V. stipulacea</i> farmer's seed stock (2011TN21).
				bulk	no	no	seeds from a farmer's stock.
				bulk	no	no	seeds from a farmer's stock.
				bulk	no	no	seeds from a farmer's stock, seeds of <i>V. radiata</i> separated from <i>V. stipulacea</i> seed stock (2011TN22).
				bulk	no	no	seeds from a farmer's stock.
				bulk	no	no	seeds from a farmer's stock.
				bulk	no	no	seeds from a farmer's stock, seeds of <i>V. mungo</i> separated from <i>V. stipulacea</i> seed stock (2011TN23).
N11-13-55.1	E79-43-57.3			bulk	no	no	seeds from a farmer's stock, they are cultivating <i>V. stipulacea</i> , for food (dosai), better taste and flavour compared with dosai prepared with <i>V. mungo</i> , competitive to weeds because of its quick growth in early stage, more resistant to insect pests and diseases, bought seeds by 60Rp/kg.
N11-13-55.1	E79-43-57.3			bulk	no	no	seeds from a farmer's stock, they are cultivating <i>V. stipulacea</i> , for food (dosai), better taste and flavour compared with dosai prepared with <i>V. mungo</i> , competitive to weeds because of its quick growth in early stage, more resistant to insect pests and diseases, bought seeds by 60Rp/kg.
N11-13-55.1	E79-43-57.3			bulk	no	no	seeds from a farmer's stock, seeds of <i>V. radiata</i> separated from <i>V. stipulacea</i> seed stock (2011TN24).
N11-14-26.3	E79-44-6.5			bulk	no	no	seeds from seed shop (K.T. Rajan Sons), price 60Rp/Kg, shop keeper said he sold 1500Kg of <i>V. stipulacea</i> seeds last year, every farmer grew <i>V. stipulacea</i> until 20 years ago, shop keeper bought <i>V. stipulacea</i> seeds from farmers around Tiruchchirappalli area.
N11-14-26.3	E79-44-6.5			bulk	no	no	seeds from seed shop (K.T. Rajan Sons), price 60Rp/Kg, shop keeper said he sold 1500Kg of <i>V. stipulacea</i> seeds last year, every farmer grew <i>V. stipulacea</i> until 20 years ago, shop keeper bought <i>V. stipulacea</i> seeds from farmers around Tiruchchirappalli area.
N11-24-57.8	E79-42-22.2	10m	clay	bulk	no	no	naturally growing beside an irrigation stream in paddy field area.
N12-00-26.9	E79-32-23.1	37m	clay	bulk	no	no	local name: kottu karamani, she cultivated 2 acres of <i>V. aconitifolia</i> mainly consist of erect type, use car to shatter the pod, use for child nutritious food, higher price than mungbean, black gram, <i>V. aconitifolia</i> 80Rp/kg, <i>V. mungo</i> 50Rp/kg.



Photo 1. Mrs. Naltammal said she used to harvest naturally growing *V. trilobata* (TN07, 08) plants by sickle and prepare "Chatney" or "Sambal".



Photo 2. Hay with *V. stipulacea* (TN14) compiled near farmer's house. Perur village, near Thogamalai, Karur province.



Photo 3. A field for *V. stipulacea* seed increase near farmer's house (TN14). This farmer bought *V. stipulacea* seed in a local market 3 years ago.



Photo 4. A farmer (Mr. Pandi) showing seed stock of *V. stipulacea* (TN15). Grow mainly for fodder and manure before rice. Sivaganga province.



Photo 5. Plant of cultivated *V. stipulacea*. Plant size is much larger than that of naturally growing wild *V. stipulacea*.



Photo 6. Farmers showing seed stock of *V. stipulacea* (TN20, 21). All farmers in this village used to grow this crop until 20 years ago. Thiruvavur province.



Photo 7. Mr. Kotteeswaran (right) who is selling *V. stipulacea* seeds (TN25) in his shop (60Rp/kg: same price as mungbean). He sold 1500kg seeds last year. Sirkazhi town, Nagappattinam province.



Photo 8. Erect type moth bean (TN27) field near Valavanur, Tindivanam province. Mrs. Adilakshmi grows 2 acres of moth bean. Price (80Rp/kg) is higher than mungbean and black gram (50Rp/kg).

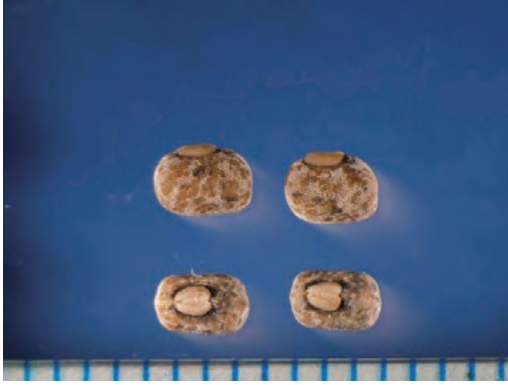


Photo 9. Seeds of *Vigna trilobata* (2011TN02), Avanashipalayam, east of Coimbatore. Growing naturally in and around horse gram field.

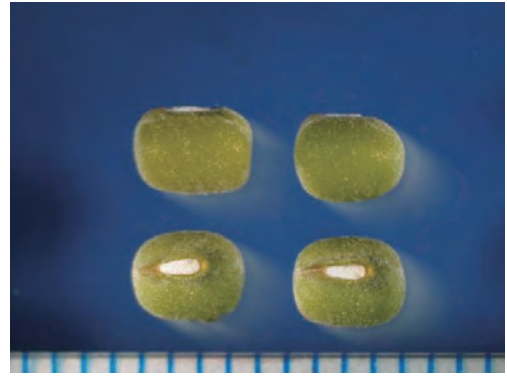


Photo 10. Seeds of *Vigna radiata* (2011TN04) grown mixed with sorghum. Climbing on sorghum stalk. Pavithvang, 10km W of Karur.

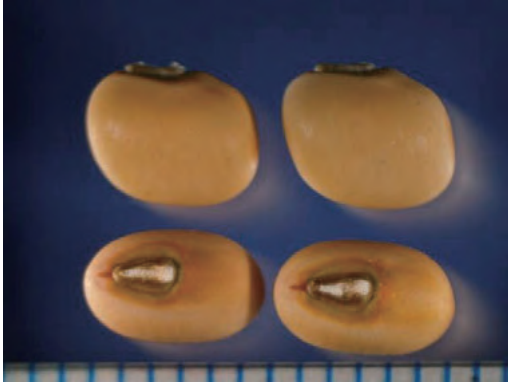


Photo 11. Seeds of *Vigna unguiculata* (2011TN10) growing in a sorghum field. Mammangalam, Karur.



Photo 12. Seeds of *Vigna trilobata* (2011TN11) growing naturally in a sorghum field. Young pod and seeds for human food. Namakkal.

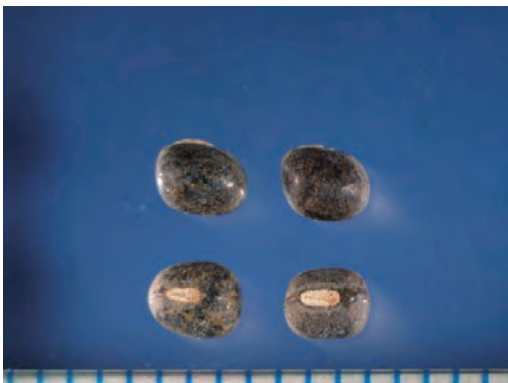


Photo 13. Seeds of cultivated *Vigna stipulacea* (2011TN21). Black seeds separated from farmer's stock. Tiruvarur province.



Photo 14. Seeds of cultivated *Vigna stipulacea* (2011TN21). Tan seeds separated from farmer's stock. Tiruvarur province.

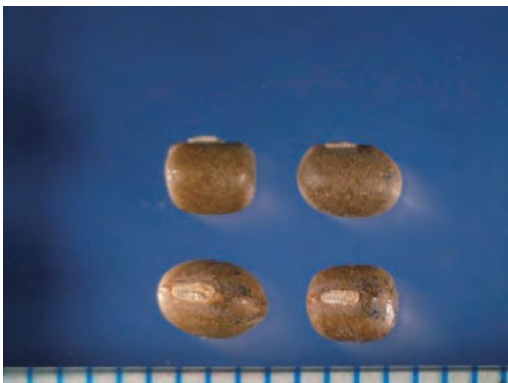


Photo 15. Seeds of cultivated *Vigna stipulacea* (2011TN25). Sirkhazi town, Nagappattinam province.



Photo 16. Seeds of *Vigna aconitifolia* (2011TN27) grown in a farmer's field, near Valavanur, Viluppuram province.