

Report of a Collaborative Multi-crop and Crop Wild Relatives Collection Mission in Papua New Guinea: Focus Genera *Manihot*, *Metroxylon*, *Oryza* and *Vigna*. 12th -28th June 2005

Duncan A. VAUGHAN¹⁾, Akito KAGA¹⁾, Rosa KAMBUOU²⁾,
Janet PAOFA²⁾ and Norihiko TOMOOKA¹⁾

- 1) *Crop Evolutionary Dynamics Team, National Institute of Agrobiological Sciences, Kannondai 2-1-2, Tsukuba, Ibaraki 305-8602, Japan*
- 2) *Dry Lowlands Programme, Laloki, National Agricultural Research Institute, P.O. Box 1828, Port Moresby, Papua New Guinea*

Summary

This second year of collaboration between the National Agricultural Research Institute, Papua New Guinea and National Institute of Agrobiological Sciences, Japan focussed on the northern provinces of East Sepik and Madang. In accordance with the workplan wild *Oryza*, legumes (*Vigna*) and sago (*Metroxylon* spp.) were the main focus of the collecting. In the East Sepik *Oryza ridleyi* was found and collected at 4 locations. This is the first report of this species from East Sepik. It appears to be common along the banks of the Sepik River and tributaries. *O. rufipogon* was also collected in the Blackwater area along a tributary of the Sepik. Surprisingly it was not found in the Chambri Lakes. In Madang Province *O. ridleyi* was collected in the lower Ramu and *O. schlechteri* in two locations along the Jamu River a tributary of the Minjeng River.

There have been no previous reports of *Vigna* from East Sepik Province hence all the collections from there are new records. *V. reflexo-pilosa* was found along the road side in the forested hills between Wewak and Maprik. On the native grass Sepik plains between Maprik and Pagwi an unidentified *Vigna* species, of the *Vigna minima* complex, was found in two locations. Along the Sepik River and abundantly in the Chambri Lakes *V. radiata* var. *sublobata* was found. The taxonomic status of these *Vigna* species will be clarified based on observations of growing them with closely related germplasm. In Madang Province *V. reflexo-pilosa* and *V. radiata* var. *sublobata* were collected in several locations.

In several villages in East Sepik and Madang provinces local residents supplied suckers of Sago and these materials will form the basis of the NARI Sago collection. A few samples of cassava were also collected for the cassava collection maintained by NARI at Laloki.

Introduction

Based on a Memorandum of Understanding between the National Agricultural Research Institute (NARI), Papua New Guinea and National Institute for Agrobiological Sciences (NIAS), Japan, signed in 2003 a three-year workplan was prepared and this report represents the activities of the second year of the workplan in Papua New Guinea. The report of the first year of the workplan in Papua New Guinea has been published (Tomooka *et al.*, 2005). The focus area of collecting this year was the northern provinces of East Sepik and Madang (Fig.1). Prior to the visit permission for the mission was obtained from the Papua New Guinea Office of the Secretary Conservation Division.

The collecting trip in this year had a multi-crop/wild relatives focus because the target area was quite difficult to get to and in the locations visited there were genetic resources of interest to the various members of the team and included in the workplan. Hence collections of cassava, sago (*Metroxylon* spp.), *Oryza* and *Vigna* were made. The trip experiences gave insights into future approaches to collecting in Papua New Guinea and to *in situ* conservation.

Methods

Where available seeds were collected otherwise plant samples were collected. Herbarium specimens were collected for most *Vigna* and *Oryza* populations. For *Oryza* species single plant DNA samples were taken by crushing leaves onto FTA Classic Card (Whatman) for selected populations. For wild *Oryza* samples it was not known in advance if seeds would be available therefore prior permission was sought from the Japanese quarantine service to import vegetative samples.

Full passport data was recorded for each sample collected and this is summarized in Table 3a and b.

The itinerary of the trip is given below.

Table 1. Itinerary

Day	mm/dd/yy	Places visited	Overnight
1	6/12/2005	Tsukuba-Narita-Cairns (QF168)	Plane
2	6/13/2005	Cairns-Port Moresby (PX091)	Port Moresby
3	6/14/2005	Port Moresby-Lae (visit NARI headquarters and Forestry Institute Herbarium)-Madang (PX100, PX309)	Madang
4	6/15/2005	Madang - Wewak (PX126)	Wewak
5	6/16/2005	Wewak-Maprik-Pagwi	Pagwi
6	6/17/2005	Pagwi-Chambri Lakes-Pagwi	Pagwi
7	6/18/2005	Pagwi-Blackwater-Pagwi	Pagwi
8	6/19/2005	Pagwi-Wewak	Wewak
9	6/20/2005	Wewak-Madang-Brahmin valley-Madang (PX125)	Madang
10	6/21/2005	Madang-Bogia-Namnam (lower Ramu)	Namnam
11	6/22/2005	Namnam-Madang	Madang
12	6/23/2005	Madang-Asui	Forest
13	6/24/2005	Asui-Jamu River-Asui	Asui
14	6/25/2005	Asui-Minjeng River- Madang	Madang
15	6/26/2005	Madang-Port Moresby (PX111)	Port Moresby
16	6/27/2005	Port Moresby	Port Moresby
17	6/28/2005	Port Moresby-Cairns-Narita-Tsukuba (PX090, QF167)	Tsukuba

Results

a. *Oryza* (Fig. 2)

This is the second visit to northern Papua New Guinea to collect wild *Oryza*. The first visit occurred in 1990 (Vaughan, 1990). The objective this time was to explore different parts of the Sepik River for wild *Oryza*. In addition, one objective was to recollect from previously visited areas but for which germplasm is not available in Japan, particularly samples of *Oryza schlechteri* a little known *Oryza* species.

The area of the Sepik River explored was from Pagwi to Blackwater and the Chambri Lakes. The visit to the Chambri Lakes revealed that *O. rufipogon* does not grow there although local people recognise two wild rices one in the forest (*Oryza ridleyi*) and one at the lake side (*O. rufipogon*). However, *O. rufipogon* seems not to be in this lake now. This may be due to invasive plant and fish species. Recently exotic fish have been introduced into the Sepik river system and this has disturbed the ecological balance. Annual burning that is done when the lake recedes in the dry season may also explain the absence of *O. rufipogon*. Another factor maybe water quality. *O. rufipogon* grows in the Blackwater Lake area and was collected by the team (Photo 1). Blackwater Lake has water colour that suggests that it is peaty/organic water compared to the Chambri Lakes and also the vegetation in the two lakes is different. Tall grasses such as wild sugarcane are abundant in the Chambri Lakes while smaller floating millets are common in Blackwater. The team were not able to find flowering or seeding material of *O. rufipogon* but DNA and vegetative samples were taken. On a subsequent trip the lower Sepik should be targeted for *O. rufipogon*.

In the area visited *O. ridleyi* was commonly found in primary forests close to the river or lake edge. This species has not previously been reported from East Sepik Province but it seems to be common. At each population fertile seeds were difficult to find but usually one or two panicles did have several fertile seeds. Sterility seems to be high in this species. This species can grow up trees if there are supporting branches. It also seems to find decaying wood a suitable habitat to grow (Photo 2).

In Madang Province *O. ridleyi* was also found in the village of Namnam. This village had been visited before in 1990. At that time seeds were very difficult to obtain and this was the case this time. On this trip it was learned that the entire village (and *O. ridleyi* population) was flooded in March to about 0.5-1m. Thus most of the population was at a young vegetative stage when we visited and only 2 seeds were found in the large population covering about 1ha.

A major objective of this trip was to recollect *O. schlechteri* from the type locality. On the previous visit the village leader in Asui told that there was a second population of this species further into the mountains but it was too far to visit at that time (Vaughan 1991). On this occasion the son of that village leader met with us and agreed to take us to the second population that is larger than the presumed type locality. In order to achieve this it was necessary to camp beside the river in the forest. The two localities of *O. schlechteri* are both on the river Jamu. The first is small and below the Jamu Gorge (Photo 3) the second is larger and above the Jamu Gorge (Photo 4). Both sites are characterised by the landslip gravelly soil on which they grow. The dry season along the Jamu and Minjeng rivers only lasts for 2 months between May-July. This appears to be the main flowering time as abundant flowers and seeds

were found on this trip. The sites are partially shaded and the habitat very humid being right on the riverbank. The sites are very vulnerable to landslides and we were told that part of the larger, upper population had been buried under a landslide.

b. *Vigna* (Fig. 3)

There are relatively few reports of *Vigna* in northern Papua New Guinea compared to the south. It was therefore surprising that *Vigna* spp. were found in most places visited. In East Sepik *V. radiata* var. *sublobata* is very common along the Sepik River bank and in the Chambri Lakes. At the village of Savanaut a small population was growing at the boat jetty in silt from the Sepik River that is flowing past the site (Photo 5). In the Chambri Lakes as well as finding this species in each village visited we also found it growing on a small (100 m across) island right in the middle of the lake. Presumably birds or possibly water flow has been responsible for its dispersal in the area.

V. radiata var. *sublobata* was found growing abundantly in more typical habitats for this wild species along the Madang-Lae Road and in the Brahmin Valley, Madang Province. The habitat was quite different from the populations found in the East Sepik. Along the Madang-Lae Road the roadside habitat was highly disturbed and dryer than the Sepik and soils are not silt. The plants had different characteristics from the Sepik populations more robust leaves and fewer seeds per pod. Based on our field observations the East Sepik and Madang Province accessions may represent distinct ecological types.

V. reflexo-pilosa was found in a variety of habitats in both hilly locations and at sea level. In East Sepik *V. reflexo-pilosa* was found growing in a disturbed roadside habitat in an area of wet tropical primary forest. Along the Madang-Lae Road we crossed a mountain range from Madang into the Brahmin Valley. *V. reflexo-pilosa* was only found in the hills on the wetter Brahmin Valley side of the road but not on the Madang side. On the road to Bogia and beyond Bogia *V. reflexo-pilosa* was growing at sea level and at one wet site (PNG22) within sight of the sea. *V. reflexo-pilosa* at this site (PNG22) was in a very wet ditch beside the road and was climbing to several meters height in a shrub (Photo 6).

The third *Vigna* species collected was found on the native grass plains north of the Sepik River. Ecologically this is considered a part of the dry zones of Papua New Guinea. The species was found growing up grasses along a drainage ditch (Photo 7) and close to a Sago Swamp (Photo 8). Based on seed morphology this species appears to represent a member of the *Vigna minima* complex. Extremely slender leaves are a characteristic of this species (Photo 7). A full assessment of this taxonomic status of this germplasm will be necessary since it appears to have characteristics new to species in section *Angularis* of the Asian *Vigna*.

c. *Metroxylon* spp. (Sago)

Collecting Sago has a different approach to that of collecting wild relatives because Sago trees are owned and therefore the owner must be approached to obtain permission to take suckers. Discussion with villagers is essential to learn the various agronomic characteristics of the Sago. In total 16 Sago samples were collected were 12 cultivated and 4 wild. Among the characteristics of the sagos were dwarf types and types with no thorns.

d. *Manihot esculenta* (Cassava)

Papua New Guinea is a secondary centre of diversity for many crops. Among them is cassava that originally came from South America. During the collecting mission 3 samples of traditional cassava and 4 weedy samples were collected as vegetative specimens.

e. Collecting plant genetic resources in Papua New Guinea.

This trip gave the team insights into how to better prepare for collecting trips in PNG.

1. Equipment. Mosquito nets are essential and in some places bee net protectors would be helpful in particularly mosquito-infested areas. We did not find Japanese bought mosquito repellent sprays particularly effective. Locally bought repellents are recommended. Binoculars could help identify germplasm from boats.

2. In remote areas it is better to over estimate the need for food. However, usually if water is insufficient coconuts can be bought from local villagers.

Table 2. Summary of samples collected

Species	Number of samples
<i>Oryza rufipogon</i>	2
<i>O. ridleyi</i>	5
<i>O. schlechteri</i>	2
<i>Vigna radiata</i> var. <i>sublobata</i>	10
cf. <i>Vigna minima</i>	2
<i>V. reflexo-pilosa</i>	7
<i>V. marina</i>	1
<i>V. luteola</i>	1
Legume species	1
Cassava (<i>Manihot esculenta</i>)	7 (3 cultivated, 4 weedy)
Sago (<i>Metroxylon</i> sp.)	16 (12 cultivated, 4 wild)

Acknowledgements

The team thanks the Papua New Guinea Department of the Environment and Conservation for permission to undertake the trip. The hospitality and help from various people during the trip is gratefully acknowledged, particularly Mr. Fred Hombuangje (Madang), Mr. Robin Dee (Minjeng), Mr. Ismael Singut (Wewak) and Mr. Aro (Minjeng). We appreciate receiving permission from Mr. Robert Kapranis to consult the herbarium at Lae. The help and support of Dr. Raghunath Ghodake, Director General, and Dr. Sergie Bang, Director of Research, at NARI Headquarters in Lae is much appreciated.

References

- 1) Tomooka, N., N. Kobayashi, R.N. Kambuou, J. Risimeri, J. Poafa, A. Apa, A. Kaga, T. Isemura, Y. Kuroda, D.A. Vaughan. 2005. Ecological survey and conservation of legume - symbiotic Rhizobia genetic diversity in Papua New Guinea. Annual report on exploration and introduction of plant genetic resources, NIAS, Tsukuba. 21:135-143
- 2) D. A. Vaughan, 1990. The relatives of rice in Papua New Guinea. Report of collaborative germplasm collecting in Papua New Guinea between the Department of Primary Industry and

IRRI. Mimeographed. IRRI library. 51 pages

- 3) Vaughan, D.A. 1991. Wild rices of Papua New Guinea. Collaborative Department of Primary Industry and IRRI collecting of *Oryza* species from 11th -29th July 1991. Mimeographed IRRI library. 29 pages
- 4) Hovius, N., C.P. Stark, M.A. Tutton and L.D. Abbott.1998. Landslide-driven drainage network evolution in a pre-steady-state mountain belt; Finisterre Mountains, Papua New Guinea. *Geology* 26: 1071-1074

和文摘要

生物研と NARI (パプアニューギニア) は植物遺伝資源共同探索調査の MOU を 2003 年に取り交わし、今回の探索はその 3 年計画の 2 年目にあたる。1 年目のパプアニューギニア中山間部や東部の探索 (Fig. 1) については友岡ら (2005) が報告している。今回はパプアニューギニアのなかでもアクセスが極めて困難で、ほぼ手付かずの高温多湿の熱帯雨林が広がるパプアニューギニア北部 (Fig. 1) においてイネ (*Oryza*), マメ (*Vigna*), サゴヤシ (*Metroxylon*) およびキャッサバ (*Manihot*) の探索を行った。調査期間は平成 17 年 6 月 12 日～6 月 28 日である。調査地域は Fig. 1 に示した East Sepik 州と Madang 州の 2 地域である。East Sepik 州では Wewak ～ Pagwi を車で、広大な Sepik 川の氾濫原はボートで探索した。Madang 州では Usino ～ Madang ～ Namnam を車で、Ramu 川の氾濫原をボートで、Minjeng 川渓谷 Asui 村は徒歩で探索した (Table 1)。

その結果、イネ属野生種 3 種 9 系統、アズキ亜属野生種 3 種 20 系統およびササゲ亜属野生種 2 種を収集することができた (Table 2)。昨年度の探索で見つかっているダイズ属野生種やライマメ、ササゲ、シカクマメなどのマメ科作物は確認できなかった。今回訪問した East Sepik 州の低湿地林帯の住民はサゴデンプンを主食としており、各村が独自のサゴヤシを維持していた。アクセスが困難なためこの地域のサゴヤシはこれまで収集されていなかったが、サゴヤシ栽培型 12 系統および野生型 4 系統の吸枝を収集することができた。また、Madang 州ではキャッサバ在来種 3 系統および雑草型 4 系統を収集した。

イネ属野生種 (Fig. 2): *O. rufipogon* については Blackwater 湖で収集できたが (Photo 1)、広大な分布が期待された Chambri 湖では全く見つからなかった。

East Sepik 州 Sepik 川とその支流、Chambri 湖周辺の低湿地林合計 4 ケ所で *Oryza ridleyi* を発見した (Photo 2)。East Sepik 州での記録は今回がはじめてである。Madang 州では、Ramu 川の低湿地林で *O. ridleyi* を、Minajim 川上流の支流 Jamu 川の 2 ケ所において、これまで国内で入手不可能であった *O. schlechteri* を発見した (Photo 3 および 4)。これらからは種子および集団構造分析用のサンプルを収集し、*O. rufipogon* と *O. schlechteri* については生茎葉も持ち帰った。

アズキ亜属野生種 (Fig. 3): East Sepik 州でのアズキ亜属野生種に関する記録は今回がはじめてである。Sepik 川と Chambri 湖の湿地帯 5 ケ所においてリョクトウ野生種 (*V. radiata* var. *sublobata*) と考えられる植物を見出した (Photo 5)。これらは乾燥したサバンナ植生で見つかったリョクトウ野生種とは明らかに異なる生育地に広く分布し、形態的にもやや異なる特徴を持っていた。East Sepik 州 Maprik から Pagwi の草原帯のなかの道路沿いの比較的湿った場所で、イネ科植物に巻き付いた *V. minima* に近縁と考えられる植物を発見した (Photo 7 および 8)。この植物の花は小さく、葉は植物全体にわたり極めて細長く、種子の臍があまり突出していないなど、典型的な *V. minima* とは異なる複数の特徴を持っていた。また、これら 2 種については分類学上の位置づけが明らかでないので、今後持ち帰った収集品を調査する予定である。

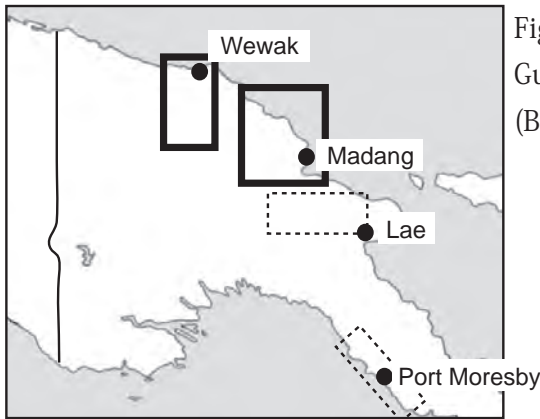
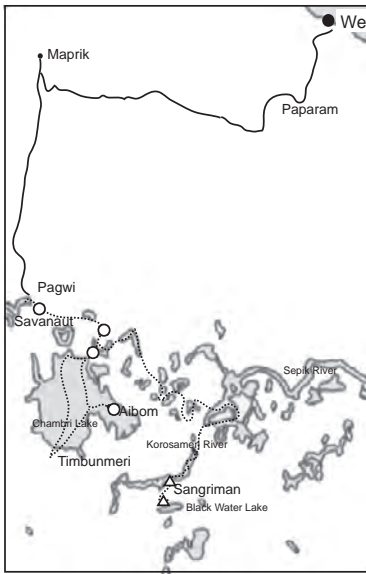
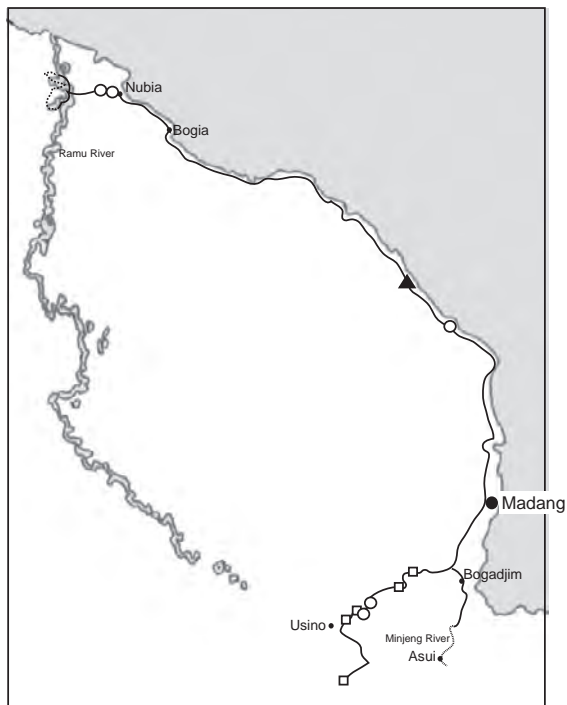
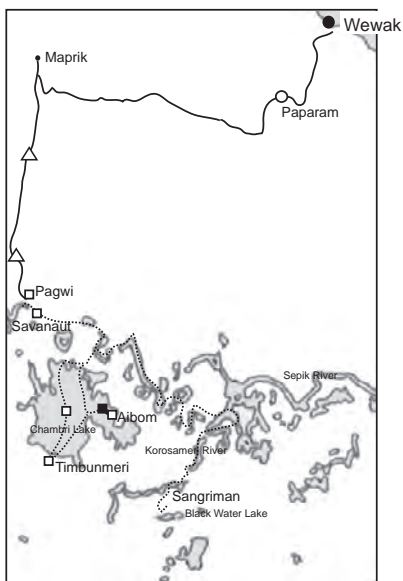


Fig. 1. Locations visited in Papua New Guinea.
(Bold frame: 2005, dotted: 2004).



- *O. ridleyi*
- △ *O. rufipogon*
- *O. schlechteri*

Fig. 2. Collecting sites of *Oryza* species.



- *V. radiata* var. *sublobata*
- △ cf. *V. minima*
- *V. reflexo-pilosa*
- *V. luteola*
- ▲ *V. marina*

Fig. 3. Collecting sites of *Vigna* species.

Table 3a. Passport data of the collected materials in Papua New Guinea

収集品のパスポートデータ

No.	Coll. Date	Coll. No.	Species	Status	Collection Site	Latitude/ Longitude	Altitude (m)	Habitat	Shading	Disturbance	Population size	Growth stage	Soil	Seed	Herbarium	Rhizobium	Remarks
1	6/16	05PNG01	<i>V.reflexo-pilosa</i>	wild	Paparom, Kubalia, 25km from Wewak	S03-41-43.7 E143-32-05.7	200	roadside in forest area	open	med-high	100x100m	flowering-maturity		bulk	yes	yes	Twining up elephant grass associated with Pueraria
1a	6/16	05PNG01a	<i>V.reflexo-pilosa</i>	wild	Paparom, Kubalia, 25km from Wewak	S03-41-43.7 E143-32-05.7	200	roadside in forest area	open	med-high	1x1m	flowering-maturity		one individual			This one individual was somewhat erect
2	6/16	05PNG02	cf. <i>V. minima</i>	wild	Patugo, Wasara, Afeel, between Maprik and Pagwi	S03-48-02.4 E143-02-01.2	35	roadside in grassland area	open	high	50x1m	flowering-maturity		few plants	yes	yes	Growing close to Sago on raised area, twining up grasses. This species most likely belongs to the <i>V. minima</i> complex.
3	6/17	05PNG03	<i>O. ridleyi</i>	wild	Short Mary Baret (waterway) Suapmeri, Maprik, East Sepik	S04-10-16.5 E143-09-38.6	10	Forest	shaded	low	20x20m	flowering-maturity	silt	bulk	yes	no	Scattered over wide area along this channel to the Chambri Lakes
4	6/17	05PNG04	<i>V. luteola</i>	wild	Aibom, Chambri Lakes, Pagwi, East Sepik	S04-15-35.1 E143-1059.2	15	Growing in the lake	open	low	3x3m	flowering-maturity	mud	bulk	yes	no	Growing up grass in standing water. Collected by boat.
5	6/17	05PNG05	<i>O. ridleyi</i>	wild	Aibom, Chambri Lakes, Pagwi, East Sepik	S04-16-07.04 E143-11-36.6	22	Village forest	shaded	medium	20x20m	flowering-maturity	forest litter	bulk	yes	no	Growing close to the boat jetty in forest shade
6	6/17	05PNG06	cf. <i>V. radiata</i> var. <i>sublobata</i>	wild	Aibom, Chambri Lakes, Pagwi, East Sepik	S04-16-07.04 E143-11-36.6	22	Lakeside grasses	open	med-high	Scattered over large area	flowering-maturity	lake side silts	bulk	yes	yes	Climbing up grasses on the lakeside
7	6/17	05PNG07	cf. <i>V. radiata</i> var. <i>sublobata</i>	wild	Timbun, Chambri Lakes, Pagwi, East Sepik	S04-20-07.5 E143-05-05.6	20	Lakeside grasses	open	high	10x10m	flowering-maturity	lake side silts	bulk	yes	yes	Climbing up grasses on the lakeside
8	6/17	05PNG08	cf. <i>V. radiata</i> var. <i>sublobata</i>	wild	Ari John, middle of Chambri Lakes, Pagwi, East Sepik	S04-16-17.9 E143-06-40.6	15	Lakeside grasses	open	low	5x5m	flowering-maturity	lake side silts	bulk	no	yes	Climbing up grasses on the lakeside
9	6/18	05PNG09	<i>O. ridleyi</i>	wild	Korogu, 15km S Pagwi, Pawi, East Sepik	S04-07-09.1 E143-11-14.4	15	Primary forest	shaded	med	100x100m	flowering-maturity	silt	bulk	yes	no	Disturbance from wild pigs, high sterility
10	6/18	05PNG10	<i>O.rufipogon</i>	wild	Sangriman, entrance to the Blackwater lakes, East Sepik	S04-23-14.7 E143-19-09.3	10	Primary forest	semi shade	med	10x10m	vegetative	silt	vegetative samples	yes	no	Disturbance due to water fluctuation, very tall plants
11	6/18	05PNG11	<i>O.rufipogon</i>	wild	Sangriman, entrance to the Blackwater lakes, East Sepik	S04-23-14.7 E143-19-09.3	10	Primary forest	semi shade	med	20x10m	vegetative	silt	dna samples only	yes	no	Disturbance due to water fluctuation, very tall plants
12	6/19	05PNG12	cf. <i>V. radiata</i> var. <i>sublobata</i>	wild	Savanaut, Pagwi, East Sepik	S04-05-06.3 E143-03-13.7	6	River bank	open	high	5x5m	flowering-maturity	silt	bulk	yes	yes	Growing alone in the muddy bank of the Sepik River
13	6/19	05PNG13	<i>O. ridleyi</i>	wild	Savanaut, Pagwi, East Sepik	S04-05-06.3 E143-03-13.7	6	Sago forest	shaded	med	Scattered over large area	flowering-maturity	forest litter	bulk	yes	no	Mainly sterile just 2 panicles with fertile seeds
14	6/19	05PNG14	cf. <i>V. radiata</i> var. <i>sublobata</i>	wild	Pagwi, East Sepik	S04-03-19.3 E143-01-48.7	5	Pasture and waste land in the village	open	high	10x10m	flowering-maturity	pasture	bulk	yes	yes	

Table 3a (continued).

15	6/19	05PNG15	cf. <i>V. minima</i>	wild	Saingo, Pagwi, East Sepik	S03-58-53.6 E143-00-32.9	34	Grassland of the Sepik Plains	open	high	150x3m	flowering-maturity	grassland	bulk	yes	yes	Growing along a drainage ditch. Probably belongs with the <i>V. minima</i> complex.
16	6/20	05PNG16	<i>V. radiata</i> var. <i>sublobata</i>	wild	15-20km W of Madang on Lae road, Madang	S05-24-10.5 E145-35-29.1	193	Roadside	open	high	50x50m	flowering-maturity	herbs-grasses	bulk	yes	yes	
17	6/20	05PNG17	<i>V. radiata</i> var. <i>sublobata</i>	wild	about 30km from Madang, Naru, Madang	S05-26-04.9 E145-32-58.4	202	Roadside	open	high	50x50m	flowering-maturity	herbs-grasses	bulk	yes	?	Many kamemushi on these plants
18	6/20	05PNG18	<i>V. radiata</i> var. <i>sublobata</i>	wild	Yagumbu, road to Brahmin, Ramu valley, Madang	S05-40-05.4 E145-25-36.9		Roadside	open	high	50x50m	flowering-maturity	grass	bulk	yes	yes	Grasses at the edge of road but forest beyond.
19	6/20	05PNG19	<i>V. radiata</i> var. <i>sublobata</i>	wild	Madang, Madang	S05-31-04.5 E145-25-29.2	274	Roadside	open	high	100x100m	flowering-maturity	herbs-grasses	bulk	yes	yes	
20	6/20	05PNG20	<i>V. radiata</i> var. <i>sublobata</i>	wild	33 km east of PNG18, Madang	S05-29-50.9 E145-27-45.0	287	Roadside	open	high	50x50m	flowering	herbs-grasses	no seeds found	no	no	
21	6/20	05PNG21	<i>V.reflexo-pilosa</i>	wild	Tapopo, Madang, Madang	S05-29-38.4 E145-28-42.2	320	Roadside verge	open	high	50x50m	flowering	herbs-grasses	few seeds	yes	yes	This species matures later than <i>V. radiata</i> var. <i>sublobata</i> in this area.
22	6/20	05PNG22	<i>V. radiata</i> var. <i>sublobata</i>	wild	Tapopo, Madang, Madang	S05-29-38.4 E145-28-42.2	320	Roadside verge	open	high	30x30m	flowering-maturity	herbs-grasses	bulk	no	yes	Sympatric with <i>V. reflexo-pilosa</i>
23	6/20	05PNG23	<i>V.reflexo-pilosa</i>	wild	Tapopo, Madang, Madang	S05-29-07 E145-29-02.7	362	Roadside verge	open	high	100x100m	flowering-maturity	herbs-grasses	bulk	yes	no	On the one side of the road the flower was much bigger than the other side.
24	6/21	05PNG24	<i>V.reflexo-pilosa</i>	wild	Between Sarang 1 and 2, Karim, Madang, Madang	S04-46-24.3 E145-41-29.8	5	Roadside ditch	open	high	20x50m	flowering-maturity	herbs-grasses-shrubs	bulk	yes	yes	Wet ditch with standing water. Plants of this population were climbing over large shrubs to 3-4m
25	6/21	05PNG25	<i>V. marina</i>	wild	Between Sarang 1 and 2, Karim, Madang, Madang	S04-46-24.3 E145-41-29.8	sea level	beach	open	high	very large all along the beach	flowering-maturity	not growing with other species	bulk	no	yes	
26	6/21	05PNG26	<i>V.reflexo-pilosa</i>	wild	Nubia coconut plantation, Bogia, Madang	S04-10-31.6 E144-50-35	9	coconut plantation	open	high	20x20m	flowering-maturity	herbs-grasses	bulk	yes	yes	Brown seeds
26a	6/21	05PNG26a	<i>V.reflexo-pilosa</i>	wild	About 500m from PNG 26	S04-11-02.2 E144-49-54.5	1	coconut plantation	open	high	20x20m	flowering-maturity	herbs-grasses	bulk	no	no	
27	6/22	05PNG27	<i>O. ridleyi</i>	wild	Namnam, Bogia, Madang	S04-09-33.2 E144-40-16.7	sea level	forest	shaded	medium	150x100m	vegetative	trees	only 2 seeds	yes	no	
28	6/24	05PNG28	<i>O. schlechteri</i>	wild	Anuta Warumu's land, Wanis above Jamu gorge, Asui, Madang	S05-39-07.5 E145-41-14.1	361	river side, above which is primary forest	semi shade	medium	60x10m	flowering-maturity	other herbs, shrubs	bulk	yes	no	Close to this population there was a large landslide. The population is vulnerable to flooding and landslides. 20 DNA samples taken
29	6/24	05PNG29	<i>O. schlechteri</i>	wild	Melon Tulo's land, Gulubu, Asui, Madang	S05-38-00.3 E145-40-49.2	301	steep river side	semi shade	medium	20x20m	flowering-maturity	other herbs, shrubs	bulk	yes	no	The original population collected in 1990. Presumed type population.

Table 3b. Passport data of the collected materials in Papua New Guinea

収集品のパスポートデータ

Sago

Donor name	Donor no.	Local name	Meaning of local name	Donor ethnic group	Coll. No	Coll. Date	Province	District	Village
Jerry Kapa	JK01	Dabum Warawat	Short var. no thorns	Yatwal	JPRK01	17June05	East Sepik Prov.	Wosera-Gawi	Aibon
Petrus Managa	PM01	Lamenau Waruwat	Dwarf medium	Yatwal	JPRK02	17June05	East Sepik Prov.	Wosera-Gawi	Aibon
Aivo Audambia	AA01	Lamenau Waruwat	Dwarf	Yatwal	JPRK03	17June05	East Sepik Prov.	Wosera-Gawi	Aibon
Bernard Upan	BU01	Dabun Upan		Yatwal	JPRK04	17June05	East Sepik Prov.	Wosera-Gawi	Aibon
Cherobim Wombue	CW01	Laminau (Walingavi)	Very tall	Yatwal	JPRK05	17June05	East Sepik Prov.	Wosera-Gawi	Aibon
Cherobim Wombue	CW02	Walingavi Varuat	Medium tall	Yatwal	JPRK06	17June05	East Sepik Prov.	Wosera-Gawi	Aibon
Ismael Singut	IS01	Nau	Sago	Gebmakundi	JPRK07	18June05	East Sepik Prov.	Wosera-Gawi	Yamanumbu
Sebby Janguan	SJ01	Wowiak nau	Wild sago	Gebmakundi	JPRK08	19June05	East Sepik Prov.	Wosera-Gawi	Pagwi
Sebby Janguan	SJ02	Nau		Gebmakundi	JPRK09	19June05	East Sepik Prov.	Wosera-Gawi	Pagwi
William Bar	WB01	Tam ves	Sago	Bosman	JPRK10	22June05	Madang	Bogia	Nemnem
William Bar	WB02	Pom		Bosman	JPRK11	22June05	Madang	Bogia	Nemnem
William Bar	WB03	Dung		Bosman	JPRK12	22June05	Madang	Bogia	Nemnem
William Bar	WB04	Zimar		Bosman	JPRK13	22June05	Madang	Bogia	Nemnem
William Bar	WB05			Bosman	JPRK14	22June05	Madang	Bogia	Nemnem
Joseph Teehan	JT01			Ogea	JPRK15	23June06	Madang	Madang	Erima
Joseph Teehan	JT02			Ogea	JPRK16	23June06	Madang	Madang	Erima

Cassava(*Manihot esculenta*)

Donor name	Donor no.	Local name	Meaning of local name	Donor ethnic group	Coll. No	Coll. Date	Province	District	Village
Marksy Mareg.K	MMK01			Bel	JPRK01	23June05	Madang	Madang	Jimjam
					JPRK01	20June05	Madang		Igriwe
					JPRK02	20June05	Madang		Igriwe
					JPRK03	20June05	Madang		Tapopo
Ronny Yebu	RY01			Waupe	JPRK04	23June05	Madang	Madang	Kulel
Ronny Yebu	RY02			Waupe	JPRK05	24June05	Madang	Madang	Kulel
Ronny Yebu	RY03			Waupe	JPRK06	24June05	Madang	Madang	Yawar



Photo 1. Habit of Sepik *O. rufipogon* at the rivers edge, Blackwater, Sepik.



Photo 2. Young plants of *O. ridleyi* growing on the forest floor and decaying tree stump.



Photo 3. *O. schlechteri* growing on loose soils at rivers edge.



Photo 4. A large population of *O. schlechteri* at rivers edge to the right of picture. The muddy riverbed is the consequence of a recent landslide adjacent to the site.



Photo 5. cf. *V. radiata* var. *sublobata* growing in silt at edge of the Sepik River.



Photo 6. *V. refexo-pilosa* growing 2-3m high in roadside bushes.



Photo 7. cf. *V. minima* showing flower and slender leaflets, growing in grasses on the Sepik Plain.



Photo 8. cf. *V. minima* habitat on the natural grasslands of the Sepik River plains, Sago trees in the background.