

4.3.5 Summary of Rice Farm Survey Results in Selected Districts

4.3.5.1 Rice Eco-system and Cropping Patterns

Rice is grown as an upland mono-crop in the two surveyed districts. According to the PDAL rice project staff the same practice is also done in other districts in the province. Upland rice growing and the subsistence food gardens in Lagaha village are however different from the rest of the rice gardens studied in the survey. The upland rice and subsistence food gardens in Lagaha are located on steep shoulders or natural terraces of mountains in the Adelbert Range of the North Coast. Even the main village and hamlets are located in razorback ridges which serve as paths for walking between hamlets and food gardens. The dirt road in the last five kilometers to Lagaha village is on razorback ridges. Suitable areas for food gardens are difficult to select, access, clear and plant especially for older members of farm households. Details on road conditions and constraints on arable land and soil are available in Chapters 8 and 9 respectively.

Table 4.29. Rice Eco-systems and Cropping Patterns in surveyed villages

District	Villages	Eco-system	Next & final crops	Soil rejuvenation
1. Madang, LLG	Lagaha Umun	Upland monocrop Upland monocrop	Sweet potato & yam Yam, taro, & sweet potato	Bush fallow Bush fallow
2. Usino-Bundi, LLG	3. Danaro 4. Yakumbo	Upland monocrop Upland monocrop	Sweet potato & yam Sweet potato & yam	Kunai fallow Kunai/bushfallow

Source: JICA Rice Farm Survey May 2002

4.3.5.2 Production Technology of Rice

All rice cultivation practices in the two surveyed districts are typical of upland rice in PNG as shown in the Table 4.30 below.

A local variety from Finschafen District called Finsch White is grown widely in the two surveyed districts. It is a tall variety with medium grain that is suitable for upland conditions in mountainous or hilly locations where plant exposure to sunlight is limited at most times throughout the day. It matures after five months from seeding. In Lagaha village of Madang District, the rugged terrain and the location of rice gardens in mountain shoulders and terraces make this tall erect medium-maturing variety suitable for existing local conditions. In Umun village, farmers plant Finsch White in bush fallow clearings on both banks of Gogol river. This variety is doing well there. Likewise in Usino-Bundi District, Finsch White is also planted widely and its yields are good in Danaro and Yakumbu villages. TCS-10 is planted in some gardens in Yakumbu village.

New varieties apart from TCS-10 were introduced lately in both districts. IR10 was seen in Lagaha and Umun villages. TCS-10 did not perform as well as Finsch White possibly because of the cloud cover and shorter sunlight exposure. The IR10 plants in Lagaha had few tillers in each hill and panicles were short. IR-10 seeds were brought home to these two villages by farmer leaders who attended the rice course in OISCA Training Center in Warongoi, ENB last year. These two farmers said that they wanted to try this variety in their gardens because they like the aroma and taste of the cooked IR 10 rice. Two other farmers had planted and harvested a new variety called PSB-RC1 supplied by PDAL from

Erap NDAL Station in Morobe Province, which is two-hours drive away on the Markham Highway.

It was noted that the TCS-10 rice plants in the Usino-Bundi show uneven vegetative growth with many off-types and uneven maturity. Like in other Provinces, they need to be replaced with new foundation, registered or certified seeds. Seeds are planted by dibbling method in Madang District and drilling method in Usino-Bundi.

A new Kubota power tiller was recently received by Madang PDAL from JICA in connection with the JICA-NDAL Smallholder Rice Training & Visit Project together with an Iseki rice mill. A decision on where to locate these two items in the province will be made by PDAL in consultation with the JICA Smallholder Agriculture Advisor who is with NDAL.

Table 4.30. Methods of Land Preparation, Planting, Weeding; and Type of Seeds, Fertilizers and Insecticides Used

Villages	Method of Land Preparation	Method of Planting	Method of Weeding	Type of Seeds Used	Insecticide Spraying	Use of Fertilizers
1. Lagaha	Slash & burn	Dibbling	Hand	Uncertified	Nil	Nil
2. Umun	Slash & burn	Dibbling	Hand	Uncertified	Nil	Nil
1. Danaru	Hired tractor or youth group with hand tools	Drilling	Hand	Uncertified	Nil	Nil
2. Yakumbu	Slash & burn	Drilling	Hand	Uncertified	Nil	Nil

Source: JICA Rice Farm Survey - May, 2002

4.3.5.3 Cultivated Area and Yields of Farm Households in Surveyed Villages

Clearing of rice gardens in Lagaha, Umun and Danaru is done by slash and burn method. In these three surveyed villages, no soil cultivation is required as the soil is loose, soft and ready to plant after clearing the forest re-growth. As a result of long fallow periods ranging from seven years in Lagaha to three years in Danaro, all soils are considerably fertile and could take up to two to three consecutive crops including rice. Subsistence food growers in Danaro have plenty of arable areas of customary land in the Ramu valley.

*Usino Bundi District, Madang
Danaru village
Pipeline running through the
peanut garden to supply water
to fishpond beside houses in
the background*



But in Yakumbu in Usino-Bundi District where access to arable land is limited for permitted settlers, intensive cultivation is practised in the family gardens in small size blocks of 0.25 ha/settler household. Each block has the farm household house, their food gardens, pigs and poultry activities. At present, there are 300 settler families in Sausi village in the Yakumbu area with this size of farmholding per family. Their parents who came from inland Kesa in the east had purchased and settled down in customary land that is one kilometer x 0.50 kilometers. This parcel was sold to them by the local landowners in 1975 for K5,000. Only 11 settlers in Yakumbu planted rice in early 2002. Rice was introduced in late 2001. Land clearing and preparation in Yakumbu settlement area is done by a hired tractor and in some cases by local youths who use hand tools for clearing and soil cultivation. For a family rice plot of 34 meters by 43 meters, K50 would normally be the service fee charged.

Opportunity exists for getting local rice farmers to consider rainfed lowland rice cultivation in Umun and Danaro. The low areas near the current upland rice gardens are under water for most part of the year. According to the farmers interviewed, water from creeks flowing to the Gogol river in Umum and run-off water from the mountains above Danaro keep the low areas wet almost all year round. The rice growers here are not aware that rice can be grown and made to produce higher yield in wet soil.

Table 4.31. Average Cultivated Area and Yield and Number of Rice Growers

Villages	Ave. Area Planted (Ha)	Ave. Yield/ Ha (Tonne)	No. of Rice Growers
1. Lagaha	0.06	3.00	15
2. Umun	0.08	3.25	24
3. Danaro	0.08	3.50	16
4. Yakumbu	0.05	2.00	11

Source: Rice Farm Survey-May, 2002

4.3.5.4 Agronomic Problems Observed in Farm Survey

Leaffolders (*Cnaphalocrocis medinalis*) and rice bugs (*Leptocorisa oratorius*) are the only insects attacking maturing rice plants in all the surveyed villages. Damage is insignificant. Except for Yakumbu where arable land for settlers is out of the question, shifting cultivation in the other three surveyed villages has further kept the amount of insect types to a minimum level. In Yakumbu, crop rotation in small crop-intensive plots seems to keep insect numbers down.

No symptoms of rice disease were observed in the four surveyed villages. Given the very low number and types of insects and the absence of diseases and relatively fertile soil conditions, the yields are relatively high for upland rice in all surveyed villages except for Yakumbu. In Yakumbu, average rice yield/ha is lower due to intensive use and short grass fallow period.

Table 4.32. Rice Pests, Diseases and Problems of Plant Nutrition, Soil & Water Management

Villages	Insect Pests	Diseases	Plant Nutrition	Soil Conditions	Water Management
1. Lagaha 2. Umun	- Leaffolder & Ricebugs - do	-Nil -Nil	Nil Nil	Soil erosion Nil	Nil Nil
3. Danaro 4. Yakumbu	- Leaffolder & Ricebugs - do-	-Nil -Nil	Nil Nil	Nil Nil	Nil Nil

Source: JICA Farm Survey-May, 2002

4.3.5.5 Current Support System for Rice Promotion in Surveyed Villages

Table 4.33 Current Types and Sources of Support at National, Provincial and Districts Levels.

Villages Surveyed	Areas of Rice Promotion	National Govt agencies/donors/etc	Provincial Govt agencies/etc	District/LLG Govt agencies, etc
1. Lagaha, Madang District	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harv. tools/machinery	1 rice mill ex JICA in DDAL shed in town.		
	3. Farmer Advisory Visits	Nil	Seldom-road closed	Seldom-road is closed
	4. Staff/Farmer Leader Training	OISCA Rice Course	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	Nil
	8. Ext. Staff Vehicle/Funds	Nil	Yes	Yes
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc/Cooperative	Nil	Nil	Nil
2. Umun, Madang District	1. Prod. tools/materials/machinery	(1 power tiller ex JICA in DDAL shed in town)		
	2. Post Harv. tools/machinery	1 rice mill ex JICA in DDAL shed in town.		
	3. Farmer Advisory Visits	Nil	Ext. officer in PDAL	Ext. officer in DDAL
	4. Staff/Farmer Leader Training	OISCA Rice Course	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	Served from District Office in town.	
	8. Ext. Staff Vehicle/Funds	Nil	Yes	Yes
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc/Cooperative	Nil	Nil	Nil
3. Danaro, Usino-Bundi District	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harvest tools/machinery	JICA rice mill in Dumpu	Nil	Nil
	3. Farmer Advisory Visits	Nil	PDAL ext. officer	DDAL ext. officer
	4. Staff/Farmer Leader Training	OISCA Rice Course	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	1 house in Walium for DDAL ext.officer.	
	8. Ext. Staff Vehicle/Funds	Nil	1 vehicle ex LLG for DDAL staff.	
	9. Applied Research	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc/Cooperative	Nil	Nil	Nil
4. Yakumbu, Usino-Bundi District	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harvest Technology	JICA rice mill in Dumpu	Nil	Nil
	3. Farmer Advisory Visits	Nil	PDAL ext. officer	DDAL ext. officers
	4. Staff/Farmer Leader Training	OISCA Rice Course	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	1 house in Walium for DDAL ext.officer.	
	8. Ext. Staff Vehicle/Funds	Nil	1 vehicle ex LLG for DDAL staff.	
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc/Cooperative	Nil	Nil	Nil

Source: JICA Rice Farm Survey- May, 2002

4.3.5.6 Certified Seed Multiplication and Distribution

After almost ten years, it is expected that certified seeds of TCS-10 will be available to replace the old TCS-10 throughout PNG. The old seeds are now showing signs of possible genetic degeneration and mechanical mixing with other varieties. Foundation seeds of the variety TCS-10 were imported from Taiwan by JICA PNG and are now being multiplied in the irrigated rice paddy fields in OISCA Training Centre in Warongoi, ENB. These seeds will be available sometime in the 3rd quarter of 2002 to PDAL for distribution to rice-producing districts in PNG.

Importation of foundation seed and multiplying them in Warongoi, ENB are ad hoc measures taken by JICA. Details on which government agencies or institutions in PNG in the long term should import and multiply certified seeds of suitable varieties in PNG are discussed in Part II – Master Plan, Priority Projects. The current situation on certified seed importation, multiplication and distribution of TCS-10 is shown in Table 4.34 below.

Table 4.34. Importation, Multiplication and Distribution of Certified Seeds, TCS-10

Tasks Involved	Current Situation		
	National	Provincial	District/LLG
1. Importation of Foundation Seed	JICA	Nil	Nil
2. Multiplication of Foundation Seed	OISCA, ENB	Nil	Nil
3. Storage Facilities for Certified Seed	Nil	Nil	Nil
4. Distribution of C/S to Rice Farmers	FSB-DAL	PDAL	DDAL

Source: JICA Rice Farm Survey-May, 2002

4.3.5.7 Post-Harvest Technology

All harvesting and practices in post-harvest are manually done except in areas where rice mills are available. Rice is harvested by cutting the mature panicles or stalks with a small knife or with the forefinger and thumb. The cut panicles or stalks are dried on small tarpaulins or bracts of black palm. Then, the grains are stripped by hand or separated by beating on a threshing wooden or wire screen. The team observed that there are only two factory-made sickles that are shared among rice growers in each of the surveyed villages.

The survey team saw a foot-pedal thresher from Japan that is used by a progressive village farmer who also has a meat bird project and a rice garden. His farm is located two kilometers off the main highway from Usino-Bundi in a dirt road that veers off on the right side at approximately 25 kilometers outside of Madang town. Winnowing is done during windy days by dropping or throwing the dry grain slowly in the air so that the wind can blow the rubbish away. There are no motor-driven or hand-operated winnowers in Madang Province.

There are no middlemen in the villages or districts who deal in paddy purchasing, drying, milling, storage, packaging and marketing in Madang Province.

In both districts, transport is provided by DDAL for large quantities of rice from the villages to the rice mills in Madang town or in Dumpu. But farm households continue to use mortar and pestle or the jean method for dehulling small amounts of rice. Dry paddy or milled rice is stored inside the house of rice growers in old flour bags or imported rice

bags. Table 4.35 below shows the practices in post-harvest technology of rice in the two surveyed districts.

Table 4.35. Current Practices in Post-Harvest Technology

Villages	Harvesting	Threshing/ Winnowing	Paddy Drying	Common Farm Household Practice	Rice mill Location	Grain Storage
1. Lagaha	Knife	Manual	Sun	Mortar & pestle/Jean	Madang	House
2. Umun	Knife	Manual	Sun	Mortar & pestle/Jean	Madang	House
3. Danaro	Knife	Manual	Sun	Mortar & pestle	Dumpu	House
4. Yakumbu	Knife	Manual	Sun	Mortar & pestle	Dumpu	House

Source: JICA Rice Farm Survey-May, 2002

4.3.5.8 Farm Machinery & Facilities for Post Harvest Technology in Surveyed and Un-surveyed Locations in Madang Province

Since the launching of the smallholder Rice Program for the province in 1999, the farm machinery available in Madang are only five rice mills; four rice mills from JICA and one from NDAL. Except for these rice mills and a foot-pedal rice thresher outside Madang town, there are no other farm machinery for post-harvest tasks in Madang Province.

Locations of these rice mills are shown in Table 4.36 below.

Table 4.36 Current Number, Locations and Sources of Machinery and Facilities for Post Harvest Technology

Types	No.	Location	Agency	Rice Sites Served
Rice mills -200+ kg/hr capacity	1	- DDAL Shed in Madang town	JICA	Lagaha, Umun
	1	- Dumpu	-do-	Danaro, Yakumbu
	1	- Brahman High School	-do-	Brahman High School
	1	-	-do-	Yet to be determined
	1	- W/ PDAL awaiting decision.	-do-	Yet to be determined.

Source: JICA Rice Farm Survey-May, 2002 & Food Security Branch, NDAL

4.3.6 Direction of Progress in Rice Cultivation for Self-Sufficiency

Rice growing is being supported throughout PNG under the National Food Security Policy Program as a food crop for peri-urban and rural farm households. At the end of the harvest of each rice crop, it is hoped that the farm household will be able to put aside enough milled rice for itself and sell surplus to the immediate community. Results of the JICA farm survey in Madang Province show that some amount of rice after each milling trip were sold to neighbouring households in most of the interviewed villages. Selling prices were well below those of the imported rice from supermarkets or village trade stores. Selling of some milled rice indicated that the farm household needed cash more than the rice at that period.

In Madang Province and particularly so in the two surveyed districts, production of rice in small manageable family-sized gardens both as a food crop and as a saleable food item within the immediate community, is steadily increasing since the year 2000. At present, all of the farm households that were interviewed had responded that they still continue to purchase imported rice from town or village trade stores at least once a week if not once a

fortnight. It is an indication that all the interviewed farm households are still unable to attain full self-sufficiency in rice for themselves due to reasons that the Rice Study aims to address in the Master Plan.

There are enough good land and willing growers in the two surveyed districts in Madang Province for individual farm households in the surveyed villages to become self-sufficient in rice. The current yields of rice can be increased if farm households can use certified seeds, fertilizers, farm chemicals, basic hand tools for land preparation, harvesting and post-harvest work and are taught basic skills in upland or lowland rice. Furthermore, rice production will increase if small rice mills were appropriately located in proximity to rice farming villages. In summary, table 4.37 below is a list of conditions with regard to progress of rice cultivation in the surveyed villages.

Table 4.37. Comparison of current rice households with potential rice households, area planted and potential rice area, and average yield against potential yield

Surveyed Villages	No. of Rice Household	Non-rice Farm H/holds	Total Area Planted (ha)	Potential rice area (ha)	Average Yield/ha (tonne)	Potential Yield/ha (tonne)
1. Lagaha	15	29	0.90	20	3.00	3.50
2. Umun	24	50	1.92	100	3.25	3.75
3. Danaro	16	75	1.28	200	3.50	4.00
4. Yakumbu	11	300*	0.55*	15*	2.00	2.50

Source: Rice Farm Survey- May, 2002

* These figures are for permitted settlers of Sausi village in Yakumbu area. They do not reflect the indigenous or local food gardeners and landowners who are not interested to grow rice.

It should be noted that data on the size of arable land from the PNGRIS database are limited only to districts and not specific to villages within each district. It was therefore necessary to estimate the potential arable land for rice on visual inspection of the surveyed villages. The number of available farm households in the surveyed villages, not yet engaged in rice production is based on the 2000 National Census. The current yield/hectare for rice was calculated on samples of rice weighed and rice gardens measured with a chain and discussed in the preceding section 4.3.5.3, *Cultivated Area and Yields of Farm Households in Surveyed Villages*.

Table 4.37 below shows that potentials exist to increase rice production in Madang Province. They are:

- i. Increase the yield of each rice garden currently under rice cultivation.
- ii. Increase the area of each household currently cultivating rice.
- iii. Increase the number of rice farm households.

Table 4.37. Analysis of the proposed means to increase rice production

Surveyed Villages	Three Directions for Rice Promotion		
	1. Can current rice yields be increased?	2. Is there more arable land to increase farm size/household?	3. Are there more farm households who can grow rice?
5. Wareo	- Yes	- Yes & accessible	- Yes -
6. Salodi	-do-	-do-	-do-
7. Danaro	- Yes	- Yes & accessible	- Yes -
8. Yakumbu	-do-	- No for settler households	-do-

Source: JICA Rice Farm Survey-May, 2002

4.3.7 Problems and Constraints in Rice Promotion in Madang Province

Table 4.38. Brief Analysis of Problems and Constraints

Areas	Problems and Constraints	Consequences	Causes
1. Production Technology	1. No farm capital 2. No certified seeds 3. Shortage of hand tools 4. Insect pests & diseases 5. Unutilized rainfed lowland area	- Low production - - Low yield - Small area cultivated - Nil or low yield - Lost opportunity	- No credit facility for rice crop - No foundation seed - No credit facilities - No sprayers & chemicals - No knowledge of lowland rice
2. Post Harvest Technology	1. No sickles, tarpaulins 2. No threshers & winnowers 3. Shortage of rice mills 4. No grain storage facilities	- Low production - -do- - -do- - -do-	- No credit facilities - -do- - -do- - -do-
3. Support Activities	1. No Nat'l Rice Resource Centre 2. No Prov. Rice Resource Centre 3. No full-time project vehicle 4. PIP NFSP is for five years only.	- Low production -do- - Slow rice promotion - Rice Project uncertainty	- No government funding -do- -do- -Low priority for rice promotion

Source: Based on JICA Rice Farm Survey- May, 2002

4.3.8 Recommendations

Details of recommendations for problems and constraints are covered in Part II – Master Plan, Priority Projects of this report. Summary of recommendations is shown in Table 4.39 below.

Table 4.39. Summary of Recommendations for Problems and Constraints in Rice Promotion in Madang Province

				PROPOSED FUNDING SOURCES & ROLES		
Areas	Problems and Constraints	Suggested Solutions	Implementing Agencies	National & Donor Agencies	Provincial / Government & Administration	LLG & District Administration
1. Production Technology	1. No farm capital 2. No certified seeds 3. No manures & fertilizers 4. Shortage of hand tools 5. Insect pests & diseases 6. Poor irrig./drainage system	<ul style="list-style-type: none"> Capital injection through credit & incentive facilities Encourage efficient distribution of Certified seeds multiplications & Hand tools Training on pest control / good drainage / soil improvement & rice growing Improve farmer networking through formation of Farmer Assoc & cooperatives. Irrigation Engineerer 	NDAL PDAL DDAL NDP	RDB of PNG NARI 2KR 2KR 2KR NDAL & JICA	Prov. Admin. Budget Prov. Resource Centre Remit payments to 2KR -do- -do- Oversee activity	Support Grant Distribution Collect payment Implement -do- -do-
2. Post Harvest	1. No sickles, tarpaulins 2. No threshers & winnowers 3. Shortage of rice mills 4. No grain storage facilities	<ul style="list-style-type: none"> Provide necessary implements as part of incentive package. Provide additional rice mills & train farmers on use of mills Assist farmers set up storage facilities with appropriate technology for purposes of sustainability 		2KR tools 2KR machinery 2KR/donors Aid donors	Remit payments to 2KR -do- -do- Supervise construction	Distribute/collect Distribute/collect Implement/collect Supervise use
3. Support Activities	1. No Nat'l Resource Centre 2. No Prov. Resource Centre 3. No full-time project vehicle 4. PIP NFSP is for five years.	<ul style="list-style-type: none"> Develop Res. Centers Increase institutional support Review NFSP with a view to extend. Create Rice and Grain Authority as approved by NEC in 1992 		Aid donors Aid donors NDAL or donors Create Authority	Security of resources. O & M costs Prov. Admin. Budget Collaborate	Collaborate Collaborate O & M Costs Collaborate

Source: Based on JICA Rice Farm Survey- May 2002

4.4 Rice Production in East Sepik Province

4.4.1 History of Rice Growing in East Sepik Province

The colonial Australian Administration introduced Rice into East Sepik Province in the 1950s. The extensive Sepik floodplains from Angoram to Wosera prompted the introduction of rice as a commercial food crop to local subsistence households in East Sepik. A huge mechanized rice mill was set up in Bainyik in the Maprik District with facilities to dry and store paddy rice that was brought in from Angoram, Ambunti and Wosera. Although labour intensive in nature, local subsistence food growers were encouraged to plant rice in food gardens.

The harvested paddy was purchased by government agencies, transported to the rice mill in Bainyik, milled, packed and sold through rural cooperative societies within the province. Annual production of paddy rice in East Sepik was boosted with the implementation of the East Sepik Integrated Rural Development Project in the 1970s. During that decade, annual paddy production in the province or in PNG for that matter had peaked to more than 800 tonnes. In the 1980s, paddy production in the province began to experience some irregularity in performance due to management and technical problems.

4.4.2 Maprik Rice Project by NDAL & PDAL

In 1989, the NDAL Grain and Rice Project received funding from the Government of PNG through the Public Investment Programme (PIP). The project was intended to help revitalise rice production and to establish a viable rice industry in East Sepik as well as in Central Province. With PIP funding, NDAL and the PDAL were able to launch the Maprik Rice Project. This enabled the NDAL to purchase, transport, milled and marketed paddy rice that were brought in from ESP and WSP. A local company called Korambu Rice Pty Ltd was formed with the aim to encourage local growers participation in the management of the local rice industry. Using the facilities and resources of NDAL & PDAL, milled rice was marketed as Korambu Rice.

By this time, the rice mill and storage building in Bainyik had deteriorated; the mill in particular beyond repair due to lack of spare parts. Under the PIP funding, milling was done using a smaller rice mill in one of the two rice sheds in Hayfield that were built earlier to supplement the old shed rice shed in Bainyik. The small rice mill could not keep up with the paddy that was coming in. At one point, the accumulated paddy waiting to be milled had reached up to 300 tonnes. Some bags of paddy rice were kept in storage for two years before they got milled. Dry paddy came in from as far as Wewak and Lumi in West Sepik.

In 1994, the PNG government began to experience some cash flow difficulties that inevitably impacted on the Maprik Rice Project. There was insufficient fund to pay for dry paddy that was brought in to Hayfield by rice growers throughout the East Sepik Province. By 1995, further delays in payment of paddy delivered to Hayfield had caused a huge setback. Most local rice growers stopped growing and supplying paddy rice to Maprik District. Some subsistence farmers continued to grow rice in small quantities for household consumption. Small quantities of rice harvests were de-husked with the aid of mortar and pestle.

NEC approved a 10-year Rice Self-Sufficiency Program for PNG in 1999. And of the K4 million approved annual budget, K2.8 million was allocated. This enabled paddy buying, transporting, milling and packaging to take place in Bainyik. It was a one-off allocation as in

the following year, this program was shelved when all NDAL PIPs for food production were abolished or handed over to government corporations or statutory bodies. The rice research program was handed over to NARI together with the rice research facilities in Bubia and its annual allocation of K0.8 million.

The PNG NFSP was established as the only PIP remaining with NDAL for food production or national food security. This was given a limited life span of only five years from 2000. In that particular year, PNGNFSP received an annual appropriation of K2.8 million to fund 14 sub-programmes. Rice promotion became a sub-programme of this new PIP. PNGFSP PIP has also contributed toward supporting the current smallholder rice program that is being implemented in East Sepik by PDAL and various DDALs. In 2001, NDAL gave a 4wd utility vehicle to Maprik Rice Project. In early 2002, two rice mills were provided to PDAL by NDAL and JICA.

4.4.2.1 Participation of the Korean International Cooperation Agency (KOICA)

KOICA participated in the rice program in East Sepik from 1990 to 1993. A rice technologist was posted to Maprik District station to provide rice extension support services to the Maprik Rice Project. Like in Bereina and in Cape Rodney of Central Province this support was terminated when the South Korean government recalled the KOICA contingent from PNG as a result of economic crisis in 1994 which affected all economies in Southeast Asia and Pacific Region.

4.4.2.2 National Agricultural Research Institute (NARI)

NARI's participation in the rice project in East Sepik is very recent. NARI carried out a rice variety trial this year in the Maprik District. The survey team inspected the same in May 2002 at Bainyik. It was a standard replicated trial on upland conditions using local and introduced varieties. On closer examination, the survey team observed that all the trial plots had produced empty panicles as a result of heavy infestation of stemborers. Photograph of the rice trial plots is shown below.

4.4.2.2 Japan International Cooperation Agency (JICA)

JICA selected the East Sepik Province as one of the five Provinces for the joint JICA –NDAL rice training and extension visit program. Under this program, rice extension officers and rice farmer leaders from East Sepik were sent to OISCA Training Centre for a month training course on rice. Two short-term JICA experts in farm machinery and rice culture visited East Sepik Province early this year. JICA donated a rice mill to PDAL. This also culminated in the sponsorship of this Rice survey.



Maprik District- ESP. Banyak- NARI variety trials attacked by stem borers resulting in empty panicles for all varieties

4.4.3 Location of JICA Rice Farm Survey

Table 4.40 below shows the two districts and surveyed villages selected by the Provincial DAL Advisor for East Sepik Province.

Table 4.40. Selected Districts and villages surveyed.

Districts	Villages
1. Wewak	1. Nienguanje 2. Warak
2. Maprik	1. Aupik 2. Waikakum

Source: JICA Rice Survey, May 2002

4.4.4 Criteria for Selecting the Two Districts for the Rice Farm Survey

4.4.4.1 Wewak

Wewak and Maprik Districts and the respective two villages were selected by the PDAL. Nienguanje is in the mainland ten kilometers north of Wewak town while Warak is in Musu (Muschu) Island 25 kilometers off the coast of Wewak. Both villages are consistently producing rice as a food crop for local farm households and cash. In the past, milling of paddy from these two villages was done in Hayfield. This year, paddy from both villages can be milled in Wewak after JICA donated a rice mill to PDAL. These villages were selected in line with the PDALs plan to concentrate paddy production within Wewak District. In early 2002, the local Member of Parliament donated another rice mill a neighboring village beside Nienguanje.

4.4.4.2 Maprik

The Maprik Rice Project Manager selected the two villages in Maprik District for the survey. The villages of Aupik and Waikakum have been consistent in producing paddy rice for household consumption and cash generation.

These two villages are considered well organized. Their respective village councilors and committees are actively involved with rice extension officers in promoting rice as a food crop and cash crop for subsistence farm households.

4.4.5 Summary - Results of Rice Farm Survey in Selected Districts

4.4.5.1 Rice Eco-system and Cropping Patterns

Rice is grown as an upland crop in newly cleared gardens from secondary forest regrowth. In most cases, rice is planted as the initial crop immediately after bush clearing. Clearing of the food garden is done by slash and burn method using farm household labour or hired community labor. Rice is normally flanked in a mixed garden of vegetables such as yam, chinese taro, sweet potato, bananas, aibika, sugarcane and beans. When rice is harvested, a crop of yam, sweet potato or chinese taro is planted in its place depending on the availability of planting materials. Yam is the predominant staple food crop planted in all food gardens in the surveyed villages.

Depending on the nutrient content of the soil, the garden is left during the following year or so to fallow when yields of common staple crops planted have declined. Table 4.41 below shows the eco-systems and cropping patterns surrounding rice cultivation in the four surveyed villages.

Table 4.41. Rice Eco-systems and Cropping Patterns in surveyed villages

District	Villages	Eco-system	Food crops after rice	Soil rejuvenation
1. Wewak	1. Nienguanje (Mainland)	Upland monocrop	-Yam/Chinese taro/ sweet potato	- Forest re-growth fallow for 7-10 years
	2. Warak (Muschu Island)	Upland monocrop	-Chinese taro/yam/ sweet potato	- Forest re-growth fallow for 6-8 years
2. Maprik	1. Aupik	Upland monocrop	- Sweet potato/banana taro/yam	- Forest re-growth fallow for 7-10 years
	2. Waikakum	Upland monocrop	-do-	-do-

Source: JICA Rice Farm Survey May 2002

4.4.5.2 Production Technology of Rice

Like all upland rice gardens in the region, the surveyed farm households lack farm machinery such as tractors or power tiller for clearing and cultivation. After several years of bush fallow, the soil in most garden sites is ready for planting. Fertilizers are not in use as the soil is fairly fertile. Due to unavailability of knapsack sprayers, insecticides are not used. As part of the bush clearing process, it is also presumed that insects are destroyed when the debris are burnt. Rice sowing and weeding are done manually by members of the farm household or by community helpers. Small amount of cash is paid if any, but mainly a meal is shared with groups or individuals assisting in land clearing and weeding.

Table 4.42. Methods of Land Preparation, Planting, Weeding and Type of Seeds, Fertilizers and Insecticides Used

Villages	Method of Land Preparation	Method of Planting	Method of Weeding	Type of Seeds Used	Insecticide Spraying	Use of Fertilizers
1. Nienguanje	Slash & burn	Drilling	Hand	Uncertified	Nil	Nil
2. Warak	Slash & burn	Drilling	Hand	Uncertified	Nil	Nil
3. Aupik	Slash & burn	Drilling	Hand	Uncertified	Nil	Nil
4. Waikakum	Slash & burn	Drilling	Hand	Uncertified	Nil	Nil

Source: JICA Rice Farm Survey-May, 2002

4.4.5.3 Cultivated Area and Yields of Farm Households in Surveyed Villages

The smallest average size family rice garden is from 0.03 ha in Warak village in Muschu Island of Wewak District. The Largest average size family rice garden is 0.20 ha in Waikakum village in Maprik District. The lowest average yield is 1 tonne/ha in Waikakum village while the highest average yield is 2.20 tonnes/ha in Aupik village in Maprik District. The average area planted/rice garden and the average yield/ ha in the four surveyed villages are shown in the table 4.43 below.

Table 4.43. Average Cultivated Area and Yield and Number of Rice Growers

Villages	Average Area/garden Planted (Ha)	Average Yield/Ha (Tonne)	No. of Rice Growers
1. Nienguanje	0.15	2.00	25
2. Warak	0.03	1.20	12
3. Aupik	0.18	2.20	40
4. Waikakum	0.20	1.00	37
Average	0.14	1.60	114

Source: Rice Farm Survey-May, 2002

4.4.5.4 Agronomic Problems Observed in Farm Survey

The biggest problem observed is probably rice stem borers [*Scirpophaga incertulas* (yellow)? or *S. innotata* (white)?], evident in Bainyik and Waikakum villages in Maprik District. In Bainyik, the NARI rice trials were wiped out by stem borers. In Waikakum, all ten respondents said that 2002 showed the lowest yield reported in the village. Ricebug (*Leptocoriza oratorius*) is another insect that is posing some level of concern as it sucks the rice grains during milking and early dough stage. It accounts for large amounts of empty and damaged grains. Another problem which compounded the stemborer problem in Waikakum village, is the lack of perimeter drains around rice gardens or plots which could have controlled water see page and thus increase the nutrient intake by rice plants.

Table 4.44. Rice Pests, Diseases and Problems of Plant Nutrition, Soil & Water Management

Villages	Insect Pests	Diseases	Plant Nutrition	Soil Conditions	Water Management
1. Nienguanje	Rice bugs & Leafhoppers	Nil	Nil	Sandy soils underneath	Nil
2. Warak	Rice bugs & Leafhoppers	Nil	Low NPK intake	Heavy clay underneath	Nil
3. Aupik	Stem-borers & Ricebugs	Nil	Nil	Gravelly Clay Heavy Clay & water seepage in some gardens	Nil
4. Waikakum	Stem-borers & Ricebugs	Nil	Low NPK uptake		Perimeter drain needed

Source: JICA Farm Survey-May 2002

4.4.5.5 Current Support System for Rice Promotion in Surveyed Villages

Table 4.45

Villages Surveyed	Areas of Rice Promotion	National	Provincial	District/LLG
1. Nienguanje	1. Prod. tools/materials/machinery	Power tiller ex JICA	Nil	Nil
	2. Post Harv. tools/machinery	Rice mill ex JICA	Nil	Nil
	3. Farmer Advisory Visits	Nil	Nil	Nil
	4. Staff/Farmer Leader Training	Nil	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	Nil
	8. Ext. Staff Vehicle/Funds	Nil	Nil	Nil
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc./Cooperative	Nil	Nil	Nil
2. Warak	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harv. tools/machinery	Rice mill ex NDAL	Nil	Nil
	3. Farmer Advisory Visits	Nil	Nil	Nil
	4. Staff/Farmer Leader Training	Nil	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	On site w/ own house
	8. Ext. Staff Vehicle/Funds	Nil	Nil	Nil
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc./Cooperative	Nil	Nil	Nil
2. Aupik	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harvest tools/machinery	Rice mill in Hayfield	Nil	Nil
	3. Farmer Advisory Visits	Nil	Nil	DDAL ext. officers
	4. Staff/Farmer Leader Training	Nil	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	1 house in Maprik station ex Prov/Dist. Admin.	
	8. Ext. Staff Vehicle/Funds	1 Hilux ex NDAL	Nil	Nil
	9. Applied Research	NARI variety trials in Bainyik		Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc./Cooperative	Nil	Nil	Nil
3. Waikakum	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harvest Technology	Rice mill in Hayfield	Nil	Nil
	3. Farmer Advisory Visits	Nil	Nil	DDAL ext. officers
	4. Staff/Farmer Leader Training	OISCA Rice Course	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	(Refer to next topic)	Nil	Nil
	7. Ext. Staff House on Site	Nil	1 house in Maprik station ex Prov/Dist. Admin.	
	8. Ext. Staff Vehicle/Funds	Same Hilux ex NDAL	Nil	Nil
	9. Applied Research on Site	NARI variety trials in Bainyik		Nil
	11. Agricultural Credit Facility	Nil	Nil	Nil
	10. Farmers Assoc./Cooperative	Nil	Nil	Nil

Source: JICA Rice Farm Survey- May 2002

4.4.5.6 Certified Seed Multiplication and Distribution

Farmers and Extension officers mentioned that since 1989, the current and previous rice projects did not utilize certified seeds. Table 4.46 below is the current interim arrangements for multiplication and distribution of certified seeds which are being multiplied at present at OISCA Training School in Warongoi, ENB.

Table 4.46. Importation, Multiplication and Distribution of Certified Seeds, TCS-10

Tasks Involved	Current Situation		
	National	Provincial	District/LLG
1. Importation of Foundation Seed	JICA	Nil	Nil
2. Multiplication of Foundation Seed	OISCA, ENB	Nil	Nil
3. Storage Facilities for Certified Seed	Nil	Nil	Nil
4. Distribution of C/S to Rice Farmers	FSB-DAL	PDAL	DDAL

Source: JICA Rice Farm Survey-May, 2002

4.4.5.7 Post-Harvest Technology

With the exception of milling, all methods and practices in harvest and post-harvest technology are done manually. There are no sickles for harvesting and no grain storage facilities at the farm household level.

Table 4.47. Current Practices in Post-Harvest Technology

Villages	Harvest	Threshing/ Winnowing	Paddy Dry/g	Common Farm House - hold Practice	Rice mill Location	Grain Storage
1. Nienguanje	Knife	Manual	Sun	Mortar & pestle	Wewak	House
2. Warak	Knife	Manual	Sun	Mortar & pestle	Wewak	House
3. Aupik	Knife	Manual	Sun	Mortar & pestle	Hayfield	House
4. Waikakum	Knife	Manual	Sun	Mortar & pestle	Hayfield	House

Source: JICA Rice Farm Survey-May, 2002

4.4.5.8 Farm Machinery & Facilities for Post Harvest Technology.

A total of four rice mills constitute the only farm machinery for post harvest technology available in the two surveyed districts. Two originated from NDAL, one from JICA and one from a local M.P. All are medium-size mills with a milling capacity of around 250-300 kg/hr milled rice. There are no grain storage or packaging facilities, no threshers, winnowers, or grain dryers in the district stations or villages surveyed except for storage sheds in Hayfield.

Table 4.47. Current Number, Locations and Sources of Machinery and Facilities for Post Harvest Technology

Types	No.	Location	Agency	Rice Sites Served
1. Rice mills, 300 kg/hr capacity	2 1 1	Wewak PDAL shed Beside Nienguanje, Wewak District Hayfield, Maprik Dist. Station	NDAL & JICA Local M.P. NDAL	Wewak District Wewak District Maprik District
2. Storage Sheds	2	Hayfield, Maprik Dist. Station	NDAL	Maprik District

Source: JICA Rice Farm Survey-May, 2002 & Food Security Branch, NDAL

4.4.6 Direction of Progress in Rice Promotion

Table 4.48 below is a comparison of the existing number of rice households, the actual rice area cultivated, the current average yield on one hand and the potentials for each case on the other. The potential rice area in each of the four surveyed villages was based on visual estimates made during the survey because the available PNGRIS data for arable land is limited only up to the district level. The cultivated area/household could be increased easily by providing hand tools such as axes, bushknives, spades, and hoes. The yield can be increased by 0.50 tonne/hectare if certified seeds, resistant varieties, perimeter drains (if required), small amounts of fertilizers and prudent use of organic or inorganic insecticides were used exclusively in upland conditions.

Table 4.48. Comparison of current rice households with potential rice households, area planted and potential rice area, and average yield against potential yield

Surveyed Villages	Non-rice Farm H/holds	No. of Rice Households	Average farm area/household (ha)	Total Area Planted (ha)	Potential rice area (ha)	Average Yield/ha (tonne)	Potential Yield/ha (tonne)
1. Nienguanje	48	25	0.15	3.75	200	2.00	2.50
2. Warak	23	12	0.13	0.36	15	1.20	1.50
3. Aupik	36	40	0.18	7.20	170	2.20	2.70
4. Waikakum	45	37	0.20	7.40	150	1.00	1.50

Source: Rice Farm Survey- May 2002

Based on the information in the preceding table, there is evidence for the existing farm households to adopt three practical directions to increase paddy production listed below. Table 4.49 below shows that potentials exist to increase rice production through promoting rice cultivation in ESP. They are:

- i. Increase the yield of each rice garden currently under cultivation.
- ii. Increase the area of each household currently cultivating rice.
- iii. Increase the number of rice farm households.

Table 4.49. Analysis of the proposed means to increase rice production.

Surveyed Villages	Three fundamental bases for Rice Promotion		
	1. Can current rice Yields be increased?	2. Is there more arable Land to increase farm Size/household?	3. Are there more households who can grow rice?
1. Nienguanje	Yes	Yes	Yes
2. Warak	Yes	Yes	Yes
1. Aupik	Yes	Yes	Yes
2. Waikakum	Yes	Yes	Yes

Source: JICA Rice Farm Survey- May, 2002

4.4.7 Problems & Constraints facing Rice Promotion in ESP.

The problems and constraints obtained in the farm survey are grouped in three major categories and briefly analysed according to causes and consequences in Table 4.50 below.

This format or matrix is followed by a discussion of appropriate recommendations in the final topic (4.2.8), which uses the same format for coherence.

Table 4.50. Brief Analysis of Problems and Constraints

Areas	Problems and Constraints	Consequences	Causes
1. Production Technology	1. No farm capital 2. No certified seeds 3. Shortage of tools 4. Insect pests & diseases Poor drainage system 6. Low soil fertility 7. Insufficient rice know-how No formal farmers Assoc.	- Low production - Low yield - Small area cultivated - Nil or low yield - Low yield - Low production - Low production - Unorganized production	- No credit facility for rice crop - No foundation seed - No credit facilities - No sprayers & chemicals - Lack of spades & TA. - Poor Soil Aeration - Lack of rice training - Lack of TA.
2. Post Harvest Technology	1. No sickles, tarpaulins 2. No threshers & winnowers 3. Shortage of rice mills 4. No grain storage facilities	- Low production - -do- - -do- - -do-	- No credit facilities - -do- - -do- - -do-
3. Support Activities	1. No Nat'l Rice RC 2. No Provincial Rice RC 3. No full-time project vehicle 4. Five years PIP NFSP	- Low production -do- - Slow rice promotion - Project uncertainty	- No government funding -do- -Low priority for rice promotion

Source: Based on JICA Rice Farm Survey- May 2002

4.4.8 Recommendations

Details of specific projects to address the problems and constraints are discussed Part II – Master Plan, Priority Projects of this report. Summary of recommendations is shown in Table 4.51 below.

Table 4.51. Summary of Recommendations for Problems and Constraints in Rice Promotion in ESP

Areas	Problems and Constraints	Suggested Solutions	Implementing Agencies	PROPOSED FUNDING SOURCES & ROLES		
				National & Donor Agencies	Provincial / Government & Administration	LLG & District Administration
1. Production Technology	1. No farm capital 2. No certified seeds 3. No manures & fertilizers 4. Shortage of hand tools 5. Insect pests & diseases 6. Poor drainage system 7. Insufficient rice know-how 8. No registered farmer assoc.	<ul style="list-style-type: none"> Capital injection through credit & incentive facilities Encourage efficient distribution of Certified seeds & Hand tools Training on pest control / good drainage / soil improvement & rice growing Improve farmer networking through formation of Farmer Assoc & cooperatives. Perimeter Drainage 	NDAL PDAL DDAL NDP	RDB of PNG NARI 2KR dolomitic lime Nat'l Resource Centre -do-	Prov. Admin. Budget Prov. Resource Centre Remit payments to 2KR -do- -do- Oversee activity -do- Provl Resource Centre -do-	LLG Support Grant Distribution Collect payment Implement -do- -do- -do- -do-
2. Post Harvest	1. No sickles, tarpaulins 2. No threshers & winnowers 3. Shortage of rice mills 4. No grain storage facilities	<ul style="list-style-type: none"> Provide necessary implements as part of incentive package. Provide additional rice mills & train farmers on use of mills Assist farmers set up storage facilities with appropriate technology for purposes of sustainability. 	-do-	2KR 2KR 2KR/donors Aid donors	Remit payments to 2KR -do- -do- Supervise construction	Distribute/collect Distribute/collect Implement/collect Supervise use
3. Support Activities	1. No Resource Centre 2. No Prov. RC 3. No project. Veh. 4. PIP NFSP is for five years only.	<ul style="list-style-type: none"> Develop Res. Centers Increase institutional support Review NFSP with a view to extend. 	-do-	Aid donors Aid donors NDAL or donors NDAL / National Planning Dept.	Security of resources. O & M costs Pro. Admin. Budget Pro. Gov't Budget Collaborate	Collaborate Collaborate O & M Costs Collaborate

Source: Based on JICA Rice Farm Survey- May 2002

4.5 Rice Production in East New Britain Province (ENBP)

4.5.1 History of Rice Growing in ENBP

Although rice was first grown in ENBP by the colonial German Administration before the last war, it was never promoted as a cash or food crop in the past. Rice growing was promoted in the East New Britain Province in the 1980s, through the school farm of the Organization for Spiritual, Industrial and Cultural Advancement (OISCA) Training Centre in Warongoi of Kokopo District. Engineers and a bulldozer from Japan leveled and banded six hectares and built an irrigation canal in the middle of the rice paddy fields in the school. Irrigation water is pumped at a very low head from a perennial creek above the ricefield and distributed to the rice bays or paddy blocks by a concrete irrigation canal built with water gates for all rice paddy blocks.

Trainees at the centre are taught rice farming under upland and irrigated lowland conditions as part of a two-year course in agriculture, mechanics and carpentry. They are encouraged to grow rice as a food crop for their own farm households when they return to their respective villages. Some trainees come from the neighbouring island Provinces. Majority students are from the main island of ENB and WNB. The interest to grow rice for food and source of small cash for farm households in ENBP and neighbouring island Provinces is encouraged by the OISCA Training Centre in Warongoi through its graduates.

The use of rice as a handy relief food item during a state of emergency or calamity has never been more apparent and decisive elsewhere in PNG as in ENBP after the Rabaul volcanic eruptions in 1994. The eruption of the two volcanoes and the displacement of surrounding semi-subsistence communities had made Rabaul District a highly vulnerable area in terms of food insecurity. After the eruptions, several villages around Mt. Tavuvur and Mt. Vulcan were evacuated and resettled in Kokopo District and the commercial centre of Rabaul was shifted to Kokopo. Imported rice provided the immediate relief to the resulting food insecurity experienced by the displaced farm households.

The role of rice in food security whether imported or home-grown, has emerged with no greater clarity than in ENBP. The rising prices of imported food items particularly rice has made it a special food for most farm households in the rural areas since the depreciation of the kina in 1994. Since then, affected local communities have not forgotten the role of rice in a state of emergency in ENB.

Since 1999, most of the displaced and the unaffected farm households in the districts of Rabaul, Kokopo and Pomio have planted, eaten, and sold some of their rice as a practical way to combat price hikes in imported rice. Rice production, decentralized milling and informal marketing in ENBP by farm households are now advancing in these three districts. In these three districts, the volcanic eruptions and the rising cost of imported rice are the two factors that have triggered the mobilization of rural masses in rice production.

4.5.2 PDAL's & DDALs Role in Rice Growing in ENBP

The PDAL took interest in the rice growing activity initiated by OISCA school leavers in several districts of the province and in the milling services provided by OISCA in Warongoi. PDAL then incorporated rice production and milling activities into the provincial program for agricultural development for ENB. DDALs likewise did the same for rice growing in their respective district development programs.

Growing of rice as a food crop picked up in the Rabaul, Kokopo and Pomio Districts from year 2000 onwards. Recently, several rice mills were purchased by donors, the Kokopo District JPBPC and the Kokopo M.P and distributed to rice-producing districts as a means to decentralize milling services down to the LLG or village level. *Refer to Table 4.60 for details of distribution of rice mills in ENB.*

PDAL is now involved in the coordination and monitoring of smallholder rice growing activities in the province. DDALs carry out advisory visits to rice-growing villages within their respective districts. There is a well-established road network system in the mainland which links the three districts of Rabaul, Kokopo, and Gazelle. Pomio District is the fourth district which is accessible only by sea or air from the Provincial Administration in Rabaul District. This road system in the mainland has made extension visits to rice sites in the three districts easier and more regular for PDAL and DDAL extension officers.

PDAL has its own distinct Provincial Food Security Program that was put in place well before the establishment of PNG NFSP program in 1999. It originated in the 1994 volcanic eruptions that dislodged several villages from Rabaul District and relocated them to Kokopo District. The ENBP Food Security Program was initially based on the strengthening of district agricultural programmes that aimed at developing growers' capacity to produce more cocoa, copra and alternative crops such as coffee and vanilla so that farm households would have financial means to access nutritious and sufficient food every day.

Most farm households in the four surveyed villages apart from being engaged in the above cash crops, are growing rice as a handy source of food and cash income. Milled rice is sold to neighbours at a price that is much lower than the imported rice. The province views rice production in subsistence food gardens as a good support for provincial policy on food security. This approach is found to be practical and has gained the support of the provincial, district, and LLG authorities.

4.5.2.1 Community Empowerment Program (CEP) by JICA & OISCA

In 2001, the JICA Agriculture Smallholder Advisor commenced CEP in the five selected Provinces. ENBP is one of these five Provinces. The OISCA Training Centre in Warongoi, ENBP was chosen to carry out farmer and extension officer training and visit program. This T & V program is part of the joint JICA-NDAL Rice Training and Extension Program initiated by the JICA Advisor. Under this program, rice extension officers and rice farmer leaders from the five selected Provinces were sent to OISCA Training Centre for a one-month training course. After returning to their districts, OISCA staff did follow up visits to inspect their rice gardens. The first round was successful. CEP was extended for another year in 2002. Technical advice to CEP rice growers was given by two short-term JICA experts in farm machinery and in rice culture who had visited ENBP and other Provinces early this year.

4.5.2.2 Contribution by COSMO Oil Ltd

To date, COSMO has donated 4 rice mills to ENBP, one in 2001 and three in 2002 respectively. COSMO Oil Ltd is an international oil company that is based in Japan. It is supporting sustainable development projects in Asia-Pacific region. ENBP is a pilot province selected by COSMO. The rice mill now operating in Clampan in East Pomio came from COSMO.

4.5.2.3 NDAL's Role in the Rice Project in ENBP

Food Security Branch of NDAL is coordinating and monitoring rice promotion and production activities in ENBP as well as facilitating training programs for extension officers and farmer leaders in ENB. OISCA and the Islands Regional Office of the Provincial and Industrial Support Services (PISS) of NDAL provide technical advice and support to the PDAL and DDALs of ENBP on rice and other food production programs for the region.

4.5.2.4 NARI's Participation

NARI is responsible for all research activities on rice in ENBP. During the farm survey, no research activity was seen by the survey team in the two selected districts.

4.5.3 Location of JICA Rice Farm Survey

Table 4.52 below shows the two districts and villages that were selected for the survey by the Provincial DAL Advisor for East New Britain Province.

Districts	Villages
1. Kokopo	1. Raputput 2. Ngunguna
2. Rabaul	3. Gelagela 4. Talvat-Sikut

Source: JICA Rice Survey, June 2002

4.5.4 Criteria for Selecting the Two Districts for the Rice Farm Survey

4.5.4.1 Kokopo District

Kokopo District is a vulnerable district in ENBP in terms of food insecurity. A short period of food insecurity existed in this district in 1994 when two volcanic eruptions wiped out the subsistence gardening system in the local communities around Tavuvur & Vulcan and pushed them out of Rabaul District to relocation centres in Kokopo District. Further away from the two volcanoes, cultivated areas in Kokopo district continue to produce cash and food crops. In gardens reserved for traditional staple crops and in old abandoned cocoa and coconut gardens in this district, many farm households have decided to grow rice as a source of food and small cash over the last two years.

In the mainland of ENBP, Ngunguna is one of several rice-growing villages in Kokopo District. In the Duke of York islands, Raputput village in the island of Makada, is one of several rice growing villages, 30 kilometers off the coast of Rabaul that are accessible only by motorized banana boat or dinghy. Raputput has a rice micro-mill donated by a local community based organisation called Community Development Services. In 2001, it milled 3 tonnes from 100 rice growers in four villages in Makada Island. Ngunguna and Raputput are villages not affected by the eruptions and are the leading rice growing villages in the Kokopo District, being the reason for their selection.

4.5.4.2 Rabaul District

At present, the former arable areas in the foothills of Tavuvur and Vulcan remain abandoned and uncultivated because they are covered with thick layers of volcanic ash. Their owners have now resettled into Kokopo District. Other settlements have sprung up in Gelagela and in Talvat-Sikut when the entire village populations from the foothills of Tavuvur and Vulcan were relocated. Since 1999 in Gelagela, the displaced households had to grow rice under intensive soil cultivation in small crowded plots inside small resettlement blocks.

Further inland past Warongoi, relocated families have bigger blocks of land in Talvat-Sikut which is some distance from Kokopo township. Settlers in Talvat-Sikut are able to grow rice as a food crop in bigger and better food gardens. To this date, all settlements that were set up in Kokopo District after the volcanic eruptions in 1994 are still looked after by the Rabaul District Administration although they fall within the boundaries of Kokopo District. This administrative arrangement is another reason for the selection of Gelagela and Talvat-Sikut villages.

4.5.5 Summary of Results of Rice Farm Survey in Two Selected Districts

4.5.5.1 Rice Eco-system and Cropping Patterns

In ENBP, there are two types of eco-systems and cropping patterns for rice. Its similarity is in the system of cultivation. It is planted as an upland monocrop. In the mainland, rice is planted as the initial food crop after clearing old food gardens. In Raputput village in the island of Makada and in Ngunguna village, rice is planted in food gardens located beside coconut or cocoa plantations that have gone to fallow with *Puereria* cover crop. After the rice harvest, traditional staple crops like chinese taro, sweet potato, yam and local leafy vegetables such as aibika and amaranthus are planted. After the harvests in the second year, the food garden is abandoned and allowed to fallow with this leguminous cover crop.

In Gelagela village towards Vunamami, rice is planted twice a year in the same plot inside small family resettlement blocks consisting of 0.10 to 0.15 hectare each. Each farm household has to fit in the farm house and the food garden inside one block. Crop rotation with beans and peanuts is practiced intensively in the same plot for food crops. Further inland in Talvat-Sikut, the settler households were given bigger resettlement blocks because of the availability of land. Rice is also the initial food crop that is planted after clearing secondary forest re-growth.

Clearing of the food garden is done by slash and burn method using farm household labour or hired community labor. When rice is harvested, small plots of sweet potato, chinese taro and yam and leafy vegetables including pumpkin are planted. Sweet potato is the predominant staple food crop planted in all food gardens in the surveyed villages.

Depending on the nutrient composition of the soil, the garden is left during the following year or so in order to revert back to bush fallow when yields of common staple crops have declined. Table 4.53 below shows the eco-systems and cropping patterns surrounding rice cultivation in the four surveyed villages.

Table 4.53. Rice Eco-systems and Cropping Patterns in surveyed villages

District	Villages	Eco-system	Food crops after rice	Soil rejuvenation
1. Kokopo	1. Raputput (Duke of York)	Upland monocrop	-Chinese taro/sweet potato/yam	- Leguminous cover crop for 3-5 years
	2. Ngunguna (Mainland)	Upland monocrop	-Chinese taro/yam/sweet potato	- -do-
2. Rabaul	3. Gelagela	Upland monocrop	-Peanuts/sweet potato/chinese taro/yam	- Peanuts, beans & grass fallow.
	4. Talvat-Sikut	Upland monocrop	-Sweet potato, chinese taro/yam	- Forest re-growth for 4-6 years

Source: JICA Rice Farm Survey, May 2002

4.5.5.2 Production Technology of Rice

Like all upland rice gardens in the region, the farm households in the two surveyed villages do not use or have access to tractors or any form of mechanical clearing or cultivation of garden soil. No soil tillage is necessary after manual slashing and burning of the rice garden except in Gelagela where cultivation with hand tools is necessary because of the permanent cultivation of the same food gardening area. The soil in most garden sites is ready for planting after clearing as a result of several years of leguminous ground cover or bush re-growth fallow.

Fertilizers are not used as the soil has built up enough nutrients. However, in Gelagela, soil is overused because the resettled farm household has no access to customary land. Insecticides are not used in all the surveyed food gardens because of lack of knapsack sprayers in all farm households. Debris in the food gardens is normally burnt as part of the clearing process and this is one way of keeping weeds and insect pests under control. In Gelagela, old grass and weeds are used as mulch and source of organic matter. Planting of rice seeds and weeding are done manually by members of farm household or by hired community labour. Small cash is paid if available or a meal is shared.

Table 4.54. Methods of Land Preparation, Planting, Weeding, and Type of Seeds, Fertilizers and Insecticides Used

Villages	Method of Land Preparation	Method of Planting	Method of Weeding	Type of Seeds Used	Insecticide Spraying	Use of Fertilizers
1 Raputput	Slash & burn	Drilling	Hand	Uncertified	Nil	Nil
2 Ngunguna		Drilling	Hand	Uncertified	Nil	Nil
3. Gelagela	Dig & mulch	Drilling	Hand	Uncertified	Nil	Nil
4 Talvat-Sikut	Slash & burn					

Source: JICA Rice Farm Survey-May, 2002

4.5.5.3 Cultivated Area and Yields of Farm Households in Surveyed Villages

The rice gardens ranges from the smallest average family size of 0.01 ha in Gelagela resettlement village to the largest average size of .09 ha in Ngunguna village. The lowest average yield is 1 tonne/ha in Gelagela village while the highest average yield is 2.00 tonnes/ha in Raputput and in Talvat-Sikut village respectively.

The average area planted/garden and the average yield/ ha and the number of rice growers in the four surveyed villages are shown below.

Table 4.55. Average Cultivated Area and Yield and Number of Rice Growers

Villages	Average area / garden Planted (Ha)	Average yield /ha (Tonne)	No. of rice growers
1. Raputput	0.04	2.00	15
2. Ngunguna	0.09	1.20	13
3. Gelagela	0.01	1.00	21
4. Talvat-Sikut	0.06	2.00	16
Average	0.05	1.55	16

Source: Rice Farm Survey-May, 2002

4.5.5.4 Agronomic Problems Observed in Farm Survey

In the four surveyed villages, there are no agronomic problems that are of major concern except in Gelagela resettlement village. The garden soil is over-cropped. This is inevitable because each settler household is given only a small resettlement block where every square meter must be fully utilized. Rotation with peanuts or beans and incorporating organic matter into the soil are practiced to increase soil fertility. Manual weeding has kept grass and broad-leaf weeds under control.

TCS-10 seeds shatter when matured and if kept long in the field before harvesting. But all respondents in the farm survey do not see shattering as a major problem. It is included in the report because this variety can be replaced with other varieties with good eating qualities but are not prone to shatter the panicles during harvesting.

No major insect pests are visible in the upland crops in all four surveyed villages. *Leptocoriza oratorius* bugs and leafhoppers (*Cnaphalocrosis medinalis*) are present but in small numbers. There are no adverse soil conditions like water seepage or pH problems affecting rice crop in the four villages. The only disease observed is Brown spot (*Helminthosporium oryzae*) at moderate level in Gelagela village. Table 4.56 below shows the minor field problems and one major concern of upland rice in the two surveyed districts in ENBP.

Table 4.56. Rice Pests, Diseases and Problems of Plant Nutrition, Soil & Water Management

Villages	1. Insect Pests	2. Diseases	3. Plant Nutrition	4. Soil Conditions	5. Water Management
1. Raputput	Rice bugs & Leafhoppers	- Nil	- Nil	- Nil	- Nil
2. Ngunguna	-do-	- Nil	- Nil	- Nil	- Nil
3. Gelagela	Rice bugs & Leafhoppers	-Brown Spot	Low nutrient intake	Over - cropping	- Nil
4. Talwat-Sikut	-do-	- Nil	- Nil	- Nil	- Nil

Source: JICA Farm Survey-May, 2002

4.5.5.5 Current Support System for Rice Promotion in Surveyed Villages

Table 4.57. Current Types and Sources of Support at National, Provincial and District Levels.

Villages Surveyed	Areas of Rice Promotion	National	Provincial	District/LLG
1. Raputput	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harv. tools/machinery	Nil	Nil	Rice ext. CBO
	3. Farmer Advisory Visits	Nil	Nil	DDAL Ext. officer
	4. Staff/Farmer Leader Training	Nil	OISCA	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	Nil	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	Nil
	8. Ext. Staff Vehicle/Funds	Nil	Nil	Nil
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc./Cooperative	Nil	Nil	Nil
2. Ngunguna	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harv. tools/machinery	Nil	OISCA rice mill	Nil
	3. Farmer Advisory Visits	Nil	Nil	DDAL ext. officers
	4. Staff/Farmer Leader Training	Nil	OISCA	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	Nil	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	Nil
	8. Ext. Staff Vehicle/Funds	Nil	Nil	Nil
	9. Applied Research on Site	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc./Cooperative	Nil	Nil	Nil
2. Gelagela	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harvest tools/machinery	Nil	Nil	Nil
	3. Farmer Advisory Visits	Nil	Nil	DDAL ext. officers
	4. Staff/Farmer Leader Training	Nil	OISCA rice mill	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	Nil	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	Nil
	8. Ext. Staff Vehicle/Funds	Nil	Nil	Nil
	9. Applied Research	Nil	Nil	Nil
	10. Agricultural Credit Facility	Nil	Nil	Nil
	11. Farmers Assoc./Cooperative	Nil	Nil	Nil
3. Talwat-Sikut	1. Prod. tools/materials/machinery	Nil	Nil	Nil
	2. Post Harvest Technology	Nil	OISCA rice mill	Nil
	3. Farmer Advisory Visits	Nil	Nil	DDAL ext. officers
	4. Staff/Farmer Leader Training	Nil	Nil	Nil
	5. Rice Resource Centre	Nil	Nil	Nil
	6. Supply of Certified Seeds	Nil	Nil	Nil
	7. Ext. Staff House on Site	Nil	Nil	Nil
	8. Ext. Staff Vehicle/Funds	Nil	Nil	Nil
	9. Applied Research on Site	Nil	Nil	DDAL
	10. Agricultural Credit Facility	Nil	Nil	Nil
	10. Farmers Assoc./Cooperative	Nil	Nil	Nil

Source: JICA Rice Farm Survey- May 2002

4.5.5.6 Certified Seed Multiplication and Distribution

Discussions with farmers and extension officers indicated that since 1989, certified seeds have not been used during the entire rice project. Table 4.58 below are the current interim arrangements for multiplication and distribution of certified seeds being multiplied at present in OISCA Training School in Warongoi, ENB.

Table 4.58. Importation, Multiplication and Distribution of Certified Seeds, TCS-10

Tasks Involved	Current Situation		
	National	Provincial	District/LLG
1. Importation of Foundation Seed	JICA	Nil	Nil
2. Multiplication of Foundation Seed	OISCA, ENB	Nil	Nil
3. Storage Facilities for Certified Seed	Nil	Nil	Nil
4. Distribution of C/S to Rice Farmers	FSB-DAL	PDAL	DDAL

Source: JICA Rice Farm Survey-May, 2002

4.5.5.7 Post-Harvest Technology

With the exception of milling, all methods and practices in harvest and post-harvest technology are done manually. There are no sickles for harvesting and no grain storage facilities at the farm household level. Table below 4.59 shows the different practices in post-harvest technology of rice in the two surveyed districts.

Table 4.59. Current Practices in Post-Harvest Technology

Villages	Harvesting	Threshing/ Winnowing	Paddy Drying	Common Farm House - hold Practice	Rice mill Location	Grain Storage
1 Raputput	Knife	Manual	Sun	Mortar & pestle	Raputput	House
2. Ngunguna	Knife	Manual	Sun	Mortar & pestle	OISCA	House
3. Gelagela	Knife	Manual	Sun	Mortar & pestle	OISCA	House
4. Talvat-Sikut	Knife	Manual	Sun	Mortar & pestle	OISCA	House

Source: JICA Rice Farm Survey-May, 2002

4.5.5.8 Farm Machinery & Facilities for Post Harvest Technology.

A total of seven (7) rice mills are available in ENBP for post harvest technology. The following is the break-up of the number of sponsors and the respective number of mills supplied to the ENBP; COSMO (4) OISCA (1), Local M.P (1) and CBO (1). Six are medium-size mills with a milling capacity of around 250-300 kg/hr of milled rice and one is a micro-mill with a capacity of 150 kg/hr of milled rice. There are no grain storage or packaging facilities in the two surveyed districts. There are no threshers, winnowers, or grain dryers in the district stations or villages surveyed. Details on the available post-harvest machinery in the two surveyed and un-surveyed districts are shown in Table 4.60 below.

Table 4.60. Current Number, Locations and Sources of Machinery and Facilities for Post Harvest Technology

Types	No	Location	Agency	Rice Sites Served
1. Rice mills, - 300 kg/hr capacity	- 1 - 1 - 3	- OISCA, Warongoi - Pomio District - Not fielded yet	- OISCA - COSMO Oil Ltd (Japan) - COSMO Oil Ltd (Japan)	- Kokopo District - Pomio District - Not fielded yet
- Micro-mill 150 kg/hr capacity	- 1 - 1	- Not fielded yet - Raputput, Makada Island, Duke of	- Kokopo Open M.P. - Community Dev. Services	- Not fielded yet - Makada Island
2. Storage Shed	Nil	- Nil	-Nil	Nil

Source: JICA Rice Farm Survey-May, 2002 & Food Security Branch, NDAL

4.5.6 Direction of Progress in Rice Promotion for Self-Sufficiency & Village Marketing

Based on the data obtained from the surveyed farms, in order to increase paddy production the following directions on rice promotions are necessary.

- i. Increase current yields in the existing rice gardens by improving the methods and practices in rice production and post-harvest technology.
- ii. Increase the size of rice garden per household.
- iii. Increase the number of rice growing farm households.

Table 4.61 below is a comparison of the existing number of rice households, the actual rice area cultivated, the current average yield on one hand and the potentials for each case on the other.

The potential rice area in each of the four surveyed villages was based on visual estimates made during the survey because the available PNGRIS data for arable land is limited only up to the district level. It is possible to increase the cultivated area/household by providing hand tools such as axes, bushknives, spades, and hoes to the farm households. It is possible also to increase yield by 0.50 tonne/hectare if certified seeds in closer distances of planting ie 30cm x 20 cm, resistant varieties, small amounts of fertilizers and organic or inorganic insecticides were used. This will particularly work in Gelagela and Ngunguna. It is also possible to increase the current number of rice-growing households in the four surveyed villages as shown in Table 4.61 below.

Table 4.61. Comparison of current rice households with potential rice households, area planted and potential rice area, and average yield against potential yield

Surveyed Villages	Non-rice Farm H/holds	No. of Rice Household	Average farm area/ household (ha)	Total Area Planted (ha)	Potential rice area (ha)	Average Yield/ha (tonne)	Potential Yield/ha (tonne)
1. Raputput	18	15	0.04	0.60	5	2.00	2.50
2. Ngunguna	27	13	0.09	1.17	15	1.20	1.70
1. Gelagela	9	21	0.01	0.21	0.1	1.00	1.50
2. Talvat-Sikut	11	16	0.06	0.61	5	2.00	2.50

Source: Rice Farm Survey- May 2002

In summary, based on the information in the preceding table, the existing farm households can adopt the three directions to increase paddy production as shown in Table 4.62 below, but to a limited extent for Gelagela resettlement village.

Table 4.62. Feasibility of the three directions for existing farm households to increase rice production in the four surveyed villages

Surveyed Villages	Three Directions for Rice Promotion		
	1. Can current rice yields be increased?	2. Is there more arable land to increase farm size/household?	3. Are there more households who can grow rice?
1. Raputput	Yes	Yes	Yes
2. Ngunguna	Yes	Yes	Yes
1. Gelagela	Yes	No	Yes
2. Talvat-Sikut	Yes	Yes	Yes

Source: JICA Rice Farm Survey- May 2002

4.5.7 Problems and Constraints in Rice Promotion in ENB Province

The problems and constraints obtained in the farm survey are grouped in three major categories and briefly analysed according to causes and consequences in Table 4.63 below. This matrix is followed by a discussion of appropriate recommendations in the final topic, 4.5.8.

Table 4.63. Brief Analysis of Problems and Constraints

Areas	Problems and Constraints	Consequences	Causes
1. Production Technology	1. No farm capital 2. No certified seeds 3. Mature seeds shattering 4. Low soil nutrient content 5. Wide planting: 50cm x 35cm 6. Shortage of tools-axes, spades. 7. Insect pests & diseases 8. Insufficient rice know-how 9. No registered farmers association 10. Not enough land for rice- Gelagela	1. Low production 2. Low yield 3. Harvest loss 4. Low yield 5. Low yield 6. Small area cultivated 7. Nil or low yield 8. Low yield 9. Low production 10. Low production 11. Ununified farm inputs 12. Limited rice production	1. No credit facility for rice crop 2. No foundation seed 3. Variety weakness 4. No manures or fertilizers 5. No knowledge of upland rice. 6. No credit facilities 7. No sprayers & chemicals 8. Lack of tools & technical advise 9. Inherent high aluminum iron* 10. Lack of rice training 11. Lack of technical advise 12. Shortage of resettlement area.
2. Post Harvest Technology	1. No sickles, tarpaulins 2. No threshers & winnowers 3. Shortage of rice mills 4. No grain storage facilities	1. Low production 2. -do- 3. -do- 4. -do-	1. No credit facilities 2. -do- 3. No farm capital 4. -do-
3. Support Activities	1. No Nat'l Rice Resource Centre 2. No full-time project vehicle 3. PIP NFSP is for five years only	1. Low production 2. Slow rice promotion 3. Project uncertainty	1. No government funding 2. -do- 3. Low priority for rice promotion

Source: Based on JICA Rice Farm Survey- May, 2002

4.6 Summary of Current Rice Promotion in Surveyed Provinces

4.6.1 Table 4.65 Brief History and Participants of Rice Growing

Provinces	Brief History and Participants
1. Central	<p>Rice growing was introduced by the Australian Administration in <u>Abau District</u> at Ianu & Cocolands subdivisions in the 1960s. NDAL grew rice in Moreguina CRADP station in the 1980s and in Cocolands subdivision in 1990s. PDAL introduced rice in Tutubu and Amau in the 2000s.</p> <p>Roman Catholic Church missionaries introduced rice in PNG in <u>Kairuku District</u> in 1891. Australian Administration and NDAL pushed mechanized upland production and milling in 1930s to 1990s. PDAL/DDAL introduced upland rice in 2001 at Idoido village in Kubuna and at Yumuna village in Bakoiudu. Rice seeds did not germinate in Yumuna village.</p>
2. Morobe	<p>Lutheran Mission introduced irrigated lowland production in Gabmazung in 1970s. ROC, FAO, Trukai Industries, NDAL and PDAL intensified promotion of rice production in Huon and Kaiapit Districts in 1990s. Settlers started manual ground leveling and bunding and make-shift irrigation system for rain-fed lowland rice growing below the 3-5 Mile Resettlement Area in late 1990s.</p> <p>Rice growing was introduced in Morobe Province by German Administration, missionaries and plantation owners in early 1900s in <u>Finschafen District</u>. It spread inland to Bulolo, Garaina and Markham Valley in 1970s under the Australian Administration. Wareo and Salodi villages started growing upland rice in food gardens before World War II.</p>
3. Madang	<p>Origin of rice growing in Madang Province is undefined. It may have started in the North Coast before World War II. PDAL/DDAL started rice promotion program in 1999 with assistance from NDAL and JICA. PDAL & DDAL promoted upland rice growing in Lagaha and Umun in <u>Madang District</u> in 2000.</p> <p>PDAL & DDAL started promotion of rice as food crop in Danaro & Yakumbu in <u>Usino-Bundi District</u> in 2001 with steady results.</p>
4. East Sepik	<p>Australian Administration introduced rice in small labour-intensive food gardens as a cash crop, milled it in <u>Maprik</u> and sold it through cooperative societies in the 1950s to 1970s. NDAL & PDAL revived the industry in early 1990s with limited success.</p> <p>PDAL/DDAL started promotion of rice as a food crop in 2000 in <u>Wewak District</u> ie Muschu Island and Nienguanje.</p>
5. East New Britain	<p>Rice was introduced in ENB before the last war but was not promoted by the colonial German or Australian administrations. OISCA Training Centre introduced rice growing in its curriculum in late 1980s. Graduates had been encouraged to grow rice as a food crop in their villages after leaving school. PDAL and DDAL started promoting rice as a food crop and cash crop in Ngunguna & Makada Island in <u>Kokopo District</u> in 2000, and in Pomio District in the late 1990s. COSMO Oil Ltd of Japan assisted with four rice mills in 2001 & 2002.</p> <p>PDAL and DDAL introduced householder rice growing for food in resettlement blocks in Gelagela & Talvat-Sikut in 2000. Although located in Kokopo both resettlement areas are administered from <u>Rabaul District</u>.</p>

Source: JICA Rice Farm Survey, April-June, 2002 & Sources-mentioned in previous chapters.

4.6.2 Table 4.66 Rationale for Selecting Provinces, Districts and Villages for the Rice Study

Provinces	Districts	Villages	Criteria or Reasons
1. Central	1. Abau	1. Tutubu 2. Amau	Recommended for selection by Abau District Agriculture Program Manager due to successful planting of rice as food crop by 60 subsistence growers in Tutubu village.
	2. Kairuku	1. Idoido 2. Yumuna	Recommended by DDAL extension officer assigned to Kubuna area after successful planting of rice as food crop by 15 farm households in Idoido village.
2. Morobe	1. Lae	1. Poahum 2. 3-5 Mile	Lae has a peri-urban FSP in Poahum and 3-5 Mile. Poahum was selected by PDAL because rice has been grown as a cash and food crop in one large farmholding and in small blocks by landowners and local subsistence food growers. 3-5 Mile was selected by PDAL and DDAL because of the growing number of settlers engaged in manual leveling and bunding of old sago swampland and rain-fed lowland production of rice.
	2. Finschafen	1. Wareo 2. Salodi	Selected by PDAL and DDAL because of long history of growing rice as food crop even without government assistance.
3. Madang	1. Madang	1. Lagaha 2. Umun	Selected by PDAL and DDAL because of consistent production of rice as food crop among other food security projects and commercial tree crops.
	2. Usino-Bundi	1. Yakumbu 2. Danaro	Selected by PDAL and DDAL because of above reasons and strong support from District and LLG Administration for Agriculture Development Program.
4. East Sepik	1. Wewak	1. Warak 2. Nienguanje	Selected by PDAL because of initiative by local subsistence farmers to grow rice as food and cash crop since 2001.
	2. Maprik	1. Aupik I 2. Waikakum	Selected by PDAL and DDAL because of consistent number and production of rice growers in this district over several decades.
East New Britain	1. Kokopo	1. Raputput 2. Ngunguna	Selected by PDAL and DDAL because this district and two villages have consistently produced rice as food and cash crop since 2000. They have the support of the Provincial, District and LLG Administrations for production of food crops ie rice and cash crops ie cocoa, coconut and vanilla.
	2. Rabaul	1. Gelagela 2. Talvat-Sikut	Selected by PDAL and DDAL because this district and these two resettlement sites have a food security program in place ie rice production that is supported by Provincial, District, and LLG Administrations.

Source: JICA Rice Farm Survey, April-June 2002

4.6.3 Summary of Results of the Farm Survey

4.6.3.1 Table 4.67 Rice Eco-Systems and Cropping Patterns

Provinces	Districts	Villages	Rice cropping system	Next & final crops	Soil Rejuvenation
1. Central	1. Abau	1. Tutubu	Upland monocrop	Banana/sweet potato	Grass fallow
		2. Amau	-do-	Sweet potato/banana	Forest re-growth
	2. Kairuku	1. Idoido	-do-	-do-	Forest re-growth
		2. Yumuna	-do-	-do-	Forest re-growth
2. Morobe	1. Lac	1. Poahum	Rain-fed lowland	Rice	Grass fallow
		2. 3-5 Mile	-do-	-do-	-do-
	2. Finschafen	1. Wareo	Upland monocrop	Sweet potato	Forest re-growth
		2. Salodi	-do-	-do-	-do-
3. Madang	1. Madang	1. Lagaha	-do-	Sweet potato/yam	Forest re-growth
		2. Umun	-do-	Yam/taro/s-potato	-do-
	Usino-Bundi	1. Yakumbu	-do-	Sweet potato/yam	Kunai fallow
		2. Danaro	-do-	-do-	Kunai/forest regrowth
4. East Sepik	1. Wewak	1. Warak	-do-	C-taro/yam/s-potato	Forest re-growth
		2. Nienguanje	-do-	Yam/c-taro/s-potato	-do-
	2. Maprik	1. Aupik 1	-do-	Sweet potato/banana/Taro/yam	-do-
		2. Waikakum	-do-	-do-	-do-
5. East New Britain	1. Kokopo	1. Raputput	-do-	C-taro/s-potato/yam	Legume cover crop
		2. Ngunguna	-do-	C-taro/yam/s-potato	-do-
	2. Rabaul	1. Gelagela	-do-	Peanuts/s-potato/c-taro/yam	Peanuts /grass fallow
		2. Talvat-Sikut	-do-	S-potato/c-taro/yam	Forest re-growth

Source: JICA Rice Farm Survey, April-June, 2002

4.6 3.2 Production Technology

Table 4.68 . Methods of Land Preparation, Planting, Weeding, Seeds, Insecticides and Fertilizers Used

Provinces	Districts	Villages	Land preparation	Planting	Seeds used	Weeding	Insecticides	Fertilizers
1. Central	1. Abau	1. Tutubu	Slash & burn	Dibbling	Uncertified	Manual	Nil	Nil
		2. Amau	-do-	-do-	-do-	-do-	-do-	-do-
	2. Kairuku	1. Idoido	-do-	-do-	-do-	-do-	-do-	-do-
		2. Yumuna	-do-	-do-	-do-	-do-	-do-	-do-
2. Morobe	1. Lae	1. Poahum	Tractor	Transplant	-do-	-do-	-do-	-do-
		2. 3-5 Mile	Spade/fork	-do-	-do-	-do-	-do-	-do-
	2. Finschafen	1. Wareo	Slash & burn	Drilling	-do-	-do-	-do-	-do-
		2. Salodi	-do-	-do-	-do-	-do-	-do-	-do-
3. Madang	1. Madang	1. Lagaha	-do-	Dibbling	-do-	-do-	-do-	-do-
		2. Umun	-do-	-do-	-do-	-do-	-do-	-do-
	2. Usino/Bundi	1. Yakumbu	Slash & burn	Drilling	-do-	-do-	-do-	-do-
		2. Danaru	Tractor/hand tools	-do-	-do-	-do-	-do-	-do-
4. East Sepik	1. Wewak	1. Warak	Slash & burn	-do-	-do-	-do-	-do-	-do-
		2. Nienguanje	-do-	-do-	-do-	-do-	-do-	-do-
	2. Maprik	1. Aupik 1	-do-	-do-	-do-	-do-	-do-	-do-
		2. Waikakum	-do-	-do-	-do-	-do-	-do-	-do-
5. East New Britain	1. Kokopo	1. Raputput	-do-	-do-	-do-	-do-	-do-	-do-
		2. Ngunguna	-do-	-do-	-do-	-do-	-do-	-do-
	2. Rabaul	1. Gelagela	Hand tools/mulch	-do-	-do-	-do-	-do-	-do-
		2. Talvat-Sikut	Slash & burn	-do-	-do-	-do-	-do-	-do-

Source: JICA Rice Farm Survey, April-June, 2002

4.6.3.3 Area Cultivated, Yields, No. of Growers & Farm Machinery Used

Table 4.69. Area Cultivated, Yields, No. of Growers

Provinces	Districts	Villages	Average area planted (ha)	Average yield/ha (tonne)	No. of growers
1. Central	1. Abau	1. Tutubu	0.02	0.83	60
		2. Amau	0.08	1.87	1
	2. Kairuku	1. Idoido	0.05	1.18	15
		2. Yumuna	Nil	Nil	Nil
2. Morobe	1. Lae	1. Poahum	0.08	3.25	27
		2. 3-5 Mile	0.15	2.50	36
	2. Finschafen	1. Wareo	0.09	2.25	12
		2. Salodi	0.04	2.50	15
3. Madang	1. Madang	1. Lagaha	0.06	3.00	15
		2. Umun	0.08	3.25	24
	2. Usino/Bundi	1. Yakumbu	0.05	2.00	11
		2. Danaro	0.08	3.50	16
4. East Sepik	1. Wewak	1. Warak	0.03	1.20	12
		2. Nienguanje	0.15	2.00	25
	2. Maprik	1. Aupik 1	0.18	2.20	40
		2. Waikakum	0.20	1.00	37
5. East New Britain	1. Kokopo	1. Raputput	0.04	2.00	15
		2. Ngunguna	0.09	1.20	13
	2. Rabaul	1. Gelagela	0.01	1.00	21
		2. Talvat-Sikut	0.06	2.00	16

Source: JICA Rice Farm Survey, April-June, 2002

4.6.3.4 Agronomic Problems

Table 4.70. Pests, Diseases, Problems of Nutrition, Soil Conditions and Water Management

Provinces	Districts	Villages	Insect pests	Diseases	Plant Nutrition Problems	Soil Conditions	Water Management
1. Central	1. Abau	1. Tutubu	Leaffolder	Nil	Low intake	Low nutrient content	Nil
		2. Amau	-do-	Nil	Nil	Nil	Nil
	2. Kairuku	1. Idoido	-do-	Nil	Low intake	Low nutrient content	Nil
		2. Yumuna	-do-	Nil	Nil harvest	Nil harvest	Nil
2. Morobe	1. Lae	1. Poahum	-do-	Nil	Nil	Nil	Nil
		2. 3-5 Mile	Caseworm/leaffolder	Brown spot	Low intake	Alkalinity/thin soil	Faulty irrig. system
	2. Finschafen	1. Wareo	Leaffolder	False Smut	Nil	Slope/cloud cover	Nil
		2. Salodi	-do-	-do-	-do-	-do-	Nil
3. Madang	1. Madang	1. Lagaha	-do-	Nil	Nil	Steep slope/soil erosion	Nil
		2. Umun	Leaffolder/Rice bugs	Nil	Nil	Nil	Nil
	2. Usino-Bundi	1. Yakumbu	-do-	Nil	Nil	Nil	Nil
		2. Danaro	-do-	Nil	Nil	Nil	Nil
4. East Sepik	1. Wewak	1. Warak	-do-	Nil	Low intake	Low nutrient content	Nil
		2. Nunguanje	-do-	Nil	Nil	-do-	Nil
	2. Maprik	1. Aupik 1	Stem borers/Rice bugs	Nil	Nil	-do-	Nil
		2. Waikakum	-do-	Nil	Low intake	Water seepage	No perimeter drain
5. East New Britain	1. Kokopo	1. Raputput	Leaffolder/Rice bugs	Nil	Nil	Nil	Nil
		2. Ngunguna	-do-	Nil	Nil	Nil	Nil
	2. Rabaul	1. Gelagela	-do-	Brown spot	Low intake	Overcropping	Nil
		2. Talvat Sikut	-do-	Nil	Nil	Nil	Nil

Source: JICA Rice Farm Survey, April-June, 200

4.6.3.5 Table 4.1 Areas of Rice Promotion and Current Support at National, Provincial, District and LLG Levels

Areas of Rice Promotion	1. Central			2. Morobe			3. Madang			4. East Sepik			5. East New Britain		
	Sources of Support			Sources of Support			Sources of Support			Sources of Support			Sources of Support		
	Nat'l	Prov.	Dist	Nat'l	Prov.	Dist.	Nat'l	Prov.	Dist.	Nat'l	Prov.	Dist	Nat'l	Prov.	Dist.
1. Farm Credit Facility	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
2. Machinery for cultivation	2 Tractors ex NDAL	Nil	Nil	Tractor NDAL	Sprayers	Nil	P/tiller - JICA	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
3. Tools/materials-land prep	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
4. Post harvest tools & Machinery	Sickles & threshers	Nil	Nil	ROC thresher	Nil	Nil	Nil	Thresher	Nil	Nil	Nil	Nil	Nil	Nil	Nil
5. Farmer Advisory visits	FSB	Nil	Nil	FSB	PDAL	DDAL	JOCV	PDAL	DDAL	Nil	DDAL	DDAL	Nil	PDAL	DDAL
6. Staff/farmer leader trng	OISCA	Nil	Nil	OISCA	Nil	Nil	OISCA	Nil	Nil	OISCA	Nil	Nil	OISCA	Nil	Nil
7. Rice Resource Centre	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
8. Supply of certified seeds	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
9. Extension staff house in project site	1 w/ MOU Patikalana	Nil	Nil	Nil	1 in Wareo	1 in Poahum	Nil	2 in Us -Bundi	Nil	Nil	2 in Maprik	Nil	Nil	2 in Kokopo	Nil
10. Extension staff vehicle & rice project funds	Nil	Nil	Nil	1 x NDAL	1 x PDAL	1 x DDAL	1 x NDAL	1 x DDAL	1 x DDAL	1 x NDAL	Nil	Nil	Nil	1 x PDAL	1 x DDAL
11. Applied research on site	Nil	Nil	Nil	NARI	Nil	Nil	NARI	Nil	Nil	NARI	Nil	Nil	Nil	Nil	Nil
12. Organization of farmers															
13. Association/cooperative	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
13. Rice mills	NDAL, T.I. JICA, ROC	PDAL	Nil	NDAL & JICA	PDAL	M.P.	JICA	PDAL	Nil	JICA NDAL	Nil	M.P.	OISCA COSM O	Nil	M.P.
14. Storage/Marketing	Trukai	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
15. Irrigation design & project supervision	Patikalana PAU	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Source: JICA Rice Farm Survey; April-June, 2002

4.6.3.6 Certified Seed Multiplication and Distribution

Table 4.72. Agencies Currently Involved & Roles in Seed Multiplication and Distribution

Provinces	Districts	Villages	Importation of Foundation Seed	Multiplication of Foundation Seed	Distribution of Certified Seed	Remarks
1. Central	1. Abau	1. Tutubu	JICA	OISCA	NDAL/PDAL/DDAL	For 4 th Quarter, 2002 Distribution
		2. Amau				
	2. Kairuku	1. Idoido				
		2. Yumuna				
2. Morobe	1. Lae	1. Poahum	JICA	OISCA	NDAL/PDAL/DDAL	For 4 th Quarter, 2002 Distribution
		2. 3-5 Mile				
	2. Finschafen	1. Wareo				
		2. Salodi				
3. Madang	1. Madang	1. Lagaha	JICA	OISCA	NDAL/PDAL/DDAL	For 4 th Quarter, 2002 Distribution
		2. Umun				
	2. Usino-Bundi	1. Yakumbu				
		2. Danaro				
4. East Sepik	1. Wewak	1. Warak	JICA	OISCA	NDAL/PDAL/OISCA	For 4 th Quarter 2002 Distribution
		2. Nienguanje				
	2. Maprik	1. Aupik 1				
		2. Waikakum				
4. East New Britain	1. Kokopo	1. Raputput	JICA	OISCA	NDAL/PDAL/OISCA	For 4 th Quarter 2002 Distribution
		2. Ngunguna				
	2. Rabaul	1. Gelagela				
		2. Talvat-Sikut				

Source: JICA Rice Farm Survey; April-June, 2002

4.6.3.7 Post Harvest Technology

Table 4.73. Current Practices in Post Harvest Technology

Provinces	Districts	Villages	Harvesting	Threshing & Winnowing	Grain Drying	Grain Dehusking	Distance to Nearest Rice Mill (Km)	Grain Storage
1. Central	1. Abau	1. Tutubu	Hand/Knife	Manual/Wind	Sun	Mortar/Pestle/Jean	15*	House
		2. Amau	-do-	-do-	-do-	-do-	20-	-do-
	2. Kairuku	1. Idoido	-do-	-do-	-do-	-do-	0*	-do-
		2. Yumuna	-do-	-do-	-do-	-do-	12	-do-
2. Morobe	1. Lae	1. Poahum	-do-	-do-	-do-	-do-	15	-do-
		2. 3-5 Mile	-do-	-do-	-do-	-do-	7	-do-
	2. Finschafen	1. Wareo	-do-	-do-	-do-	-do-	0	-do-
		2. Salodi	-do-	-do-	-do-	-do-	7	-do-
3. Madang	1. Madang	1. Lagaha	-do-	-do-	-do-	-do-	20	-do-
		2. Umun	-do-	-do-	-do-	-do-	10	-do-
	2. Usino-Bundi	1. Yakumbu	-do-	-do-	-do-	-do-	10	-do-
		2. Danaro	-do-	-do-	-do-	-do-	8	-do-
4. East Sepik	1. Wewak	1. Warak	-do-	-do-	-do-	-do-	20	-do-
		2. Nienguanje	-do-	-do-	-do-	-do-	10	-do-
	2. Maprik	1. Aupik 1	-do-	-do-	-do-	-do-	10	-do-
		2. Waikakum	-do-	-do-	-do-	-do-	6	-do-
5. East New Britain	1. Kokopo	1. Raputput	-do-	-do-	-do-	-do-	0	-do-
		2. Ngunguna	-do-	-do-	-do-	-do-	12	-do-
	2. Rabaul	1. Gelagela	-do-	-do-	-do-	-do-	10	-do-
		2. Talvat-Sikut	-do-	-do-	-do-	-do-	8	-do-

Source: JICA Rice Farm Survey; April-June, 2002

* Rice mill was received after the survey.

4.6.3.8 Current Farm Machinery & Facilities for Post Harvest Technology

Table 4.74. Current Number, Locations and Sources of Farm Machinery for Post Harvest Technology in surveyed villages

Provinces	Districts	Villages	No of rice mill	Location	Capacity, etc	Source	Rice Sites Served
1. Central	1. Abau	1. Tutubu	1*	Kupiano Station	250 kg/hr milled rice, new	NDAL	Abau District
		2. Amau					
	2. Kairuku	1. Idoido	1*	Idoido village, Kubuna	50 kg/hr milled rice, old	NDAL	Kubuna area
		2. Yumuna					
2. Morobe	1. Lae	1. Poahum	1	Bubia ROC Station	200 kg/hr milled rice, old	ROC	Lae & Huon Districts
		2. 3-5 Mile					
	2. Finschafen	1. Wareo	1	Wareo Resource Centre	150 kg/hr milled rice, new	PDAL	Kotte LLG, Finschafen Dist
		2. Salodi					
3. Madang	1. Madang	1. Lagaha	1	Madang DDAL Warehouse	250 kg/hr milled rice	JICA	Madang District
		2. Umun					
	2. Usino-Bundi	1. Yakumbu	1	Dumpu	250 kg/hr milled rice, new	JICA	Usino-Bundi District
		2. Danaro					
4. East Sepik	1. Wewak	1. Warak	1*	Wewak PDAL Office	250 kg/hr milled rice, new	JICA	Wewak District
		2. Nienguanje					
	2. Maprik	1. Aupik 1	1	Hayfield PDAL Rice Shed	250 kg/hr milled rice, old	NDAL	Maprik District
		2. Waikakum					
5. East New Britain	1. Kokopo	1. Raputput	1	Raputput	150kg/hr milled rice, new	Community Dev. Services	Duke of York Islands
		2. Ngunguna					
	2. Rabaul	1. Gelagela	1	OISCA, Warongoi	250 kg/hr milled rice, old	OISCA	Kokopo District
		2. Talvat-Sikut					

Source: JICA Rice Farm Survey, April-June, 2002

* Rice mill was received recently.

4.6.4 Direction of Progress in Rice Promotion

Table 4.75. Comparison of Current Number of Rice Households, Area Planted and Average Yields with Respective Potentials

Provinces	Districts	Villages	Rice households	Non-rice households	Average area /household (ha)	Area planted (ha)	Potential rice area (ha)	Average yield/ha (Tonne)	Potential Yield/ha (Tonne)
1. Central	1. Abau	1. Tutubu	60	5	0.02	1.06	25	0.83	1.25
		2. Amau	1	25	0.08	0.08	50	1.87	2.25
	2. Kairuku	1. Idoido	15	11	0.05	0.80	28	1.18	1.50
		2. Yumuna	0	18	Yet to plant	Nil	10	Nil	1.50
2. Morobe	1. Lae	1. Poahum	27	20	0.08	3.25	75	3.25	3.75
		2. 3-5 Mile	36	32	0.15	5.45	15	2.50	3.00
	2. Finschafen	1. Wareo	12	15	0.09	1.08	10	2.25	2.75
		2. Salodi	15	19	0.04	0.60	12	2.50	3.00
3. Madang	1. Madang	1. Lagaha	15	14	0.06	0.90	5	3.00	3.50
		2. Umun	24	25	0.08	1.92	40	3.25	3.75
	2. Usino-Bundi	1. Yakumbu	11	18	0.05	0.55	4	2.00	2.50
		2. Danaro	16	12	0.08	1.28	15	3.5-	4.00
4. East Sepik	1. Wewak	1. Warak	12	8	0.03	0.36	7	1.20	1.75
		2. Nienguanje	25	10	0.15	3.75	20	2.00	2.50
	2. Maprik	1. Aupik 1	40	19	0.18	7.20	30	2.20	2.75
		2. Waikakum	37	15	0.20	7.40	40	1.00	1.50
5. East New Britain	1. Kokopo	1. Raputput	15	11	0.04	0.60	5	2.00	2.50
		2. Ngunguna	13	17	0.09	1.17	15	1.20	2.00
	2. Rabaul	1. Gelagela	21	19	0.01	0.21	0.50	1.00	1.50
		2. Talvat-Sikut	16	15	0.06	0.96	10	2.00	2.50

Source: JICA Rice Farm Survey, April-June, 2002

Table 4.76. Feasibility or Applicability of the Three Directions for Rice Promotion

Provinces	Districts	Villages	1. Increase yield in existing rice gardens or farms	2. Increase the garden or farm area a/household	3. Increase the number of rice farmers/site
1. Central	1. Abau	1. Tutubu	Yes	Yes	Yes
		2. Amau	Yes	Yes	Yes
	2. Kairuku	1. Idoido	Yes	Yes	Yes
		2. Yumuna	Yes	No	Yes
2. Morobe	1. Lae	1. Poahum	Yes	Yes	Yes
		2. 3-5 Mile	Yes	Yes	Yes
	2. Finschafen	1. Wareo	Yes	Yes	Yes
		2. Salodi	Yes	Yes	Yes
3. Madang	1. Madang	1. Lagaha	Yes	No	Yes
		2. Umun	Yes	Yes	Yes
	2. Usino-Bundi	1. Yakumbu	Yes	Yes	Yes
		2. Danaro	Yes	Yes	Yes
4. East Sepik	1. Wewak	1. Warak	Yes	Yes	Yes
		2. Nienguanje	Yes	Yes	Yes
	2. Maprik	1. Aupik 1	Yes	Yes	Yes
		2. Waikakum	Yes	Yes	Yes
5. East New Britain	1. Kokopo	1. Raputput	Yes	Yes	Yes
		2. Ngunguna	Yes	Yes	Yes
	2. Rabaul	1. Gelagela	Yes	No	Yes
		2. Talvat-Sikut	Yes	Yes	Yes

Source: JICA Rice Farm Survey, April-June 2002

Table 4.76. Feasibility or Applicability of the Three Directions for Rice Promotion

Provinces	Districts	Villages	1. Increase yield in existing rice gardens or farms	2. Increase the garden or farm area/household	3. Increase the number of rice farmers/site
1. Central	1. Abau	1. Tutubu	Yes	Yes	Yes
		2. Amau	Yes	Yes	Yes
	2. Kairuku	1. Idoido	Yes	Yes	Yes
		2. Yumuna	Yes	No	Yes
2. Morobe	1. Lae	1. Poahum	Yes	Yes	Yes
		2. 3-5 Mile	Yes	Yes	Yes
	2. Finschafen	1. Wareo	Yes	Yes	Yes
		2. Salodi	Yes	Yes	Yes
3. Madang	1. Madang	1. Lagaha	Yes	No	Yes
		2. Umun	Yes	Yes	Yes
	2. Usino-Bundi	1. Yakumbu	Yes	Yes	Yes
		2. Danaro	Yes	Yes	Yes
4. East Sepik	1. Wewak	1. Warak	Yes	Yes	Yes
		2. Nienguanje	Yes	Yes	Yes
	2. Maprik	1. Aupik 1	Yes	Yes	Yes
		2. Waikakum	Yes	Yes	Yes
5. East New Britain	1. Kokopo	1. Raputput	Yes	Yes	Yes
		2. Ngunguna	Yes	Yes	Yes
	2. Rabaul	1. Gelagela	Yes	No	Yes
		2. Talvat-Sikut	Yes	Yes	Yes

Source: JICA Rice Farm Survey, April-June 2002

4.6.5 Common Problems and Constraints in Rice Promotion in Five Surveyed Provinces

Table 4.77. Brief Analysis of Problems and Constraints

Areas of Rice Promotion	Problems and Constraints	Consequences	Causes
1. Production Technology	1. No farm capital	1. Low farm productivity	1. No credit facility for rice crop
	2. No certified seeds	2. Low yield	2. No foundation seed
	3. Shortage of hand tools	3. Small area/household cultivated	3. No credit facilities
	4. No small machinery for land prep.	4. -do-	4. -do-
	5. No manures or fertilizers	5. Low yield	5. -do-
	6. Low soil fertility	6. -do-	6. Poor soil aeration.
	7. Wide distances of planting	7. -do-	7. Lack of demonstration gardens
	8. Insect pests and diseases	8. -do-	8. Lack of training on IPM.
	9. Poor irrigation/drainage system	9. Water wastage	9. Lack of irrigation engineers
	10. Shortage of land in Gelagela, ENBP	10. Low yield	10. Lack of resettlement land
	11. Unutilized good wet areas in Umun and Danaro, Usino-Bundi, Madang	11. Lost opportunity to increase yield	11. No knowledge of rain-fed low land rice production.
2. Post Harvest Technology	1. No sickles, tarpaulins, & bags	1. Low farm productivity	1. No credit facility
	2. No small reapers	2. -do-	2. -do-
	3. No threshers & winnowers	3. -do-	3. -do-
	4. Shortage of rice mills	4. -do-	4. -do-
	5. No grain storage facilities	5. -do-	5. -do-
	6. No farmers association/cooperative	6. -do-	6. No training courses
3. Support Activities	1. No national rice resource centre	1. Low rice knowledge & extension	1. No government funding
	2. No provincial rice resource centre	2. -do-	2. -do-
	3. No extension staff housing in proj. site	3. Limited extension services	3. -do-
	4. No project vehicle	4. Insufficient extension services	4.-do-
	5. PIP NFSP is for five years from 2000.	5. Project management uncertainty	5. Low priority for rice promotion

Source: JICA Rice Farm Survey – April-June, 2002

4.6.6 Recommendations

Table 4.78. Summary of Recommendations for Common Problems and Constraints in Rice Promotion

Areas of Promotion	Problems and Constraints	Recommended Solutions	Implementing Agencies	National & Donor Agencies
1. Production Technology	1. No farm capital 2. No certified seeds 3. Shortage of hand tools 4. No small machinery for land preparation 5. No manures & fertilizers 6. Low soil fertility and aeration 7. Wide distances of planting 8. Insect pests & diseases 9. Poor irrigation & drainage systems 10. Shortage of land-Gelagela 11. Unutilized good wet areas	1. Establish Credit Facility. 2. Import/multiply foundation seed. 3. Hand tools 4. Power tillers 5. Legume seeds, compost & acid fertilizers 6. Dig perimeter drains 7. Rice training course 8. IPM training course. 9. Provide Irrigation Engineer 10. ENBP solution 11. Demonstration/technical advice	1. NDAL 2. NARI 3. NDAL/PDAL 4. -do- 5. PDAL/DDAL 6. NDAL/PDAL 7. -do- -do- -do- 8. PDAL 9. NDAL/PDAL	1. RDB of PNG 2. NDAL/PDAL 3. 2KR tools 4. 2KR machinery 5. 2KR fertilizers 6. 2KR materials 7. NDAL 8. NDAL/PDAL 9. NDAL & JICA 10. PDAL/DDAL 11. DDAL
2. Post Harvest Technology	No sickles/tarpaulins No small reapers No threshers/winnowers Shortage of rice mills No grain storage facilities Unregistered association & no cooperatives.	Hand tools. Small reapers Threshers Rice mills Grain storage facilities Register associations & hold training course on cooperatives	NDAL/PDAL -do- -do- -do- -do- -do-	1. 2KR tools 2. 2KR machinery 3. -do- 4. -do- 5. Grant-in-Aid 6. NDAL/PDAL
3. Support Activities	No natl resource centre No prov. Resource centre No staff house in site No project vehicle NFSP is for five years only	Build natl rice resource centres Build prov. Resource centres Build staff house in site. Provide project vehicle Establish Rice & Grain Authority	NDAL/PDAL -do- PDAL/DDAL -do- NDAL	1. Grant-in-Aid 2. -do- 3. PDAL/DDAL 4. -do- 5. NEC