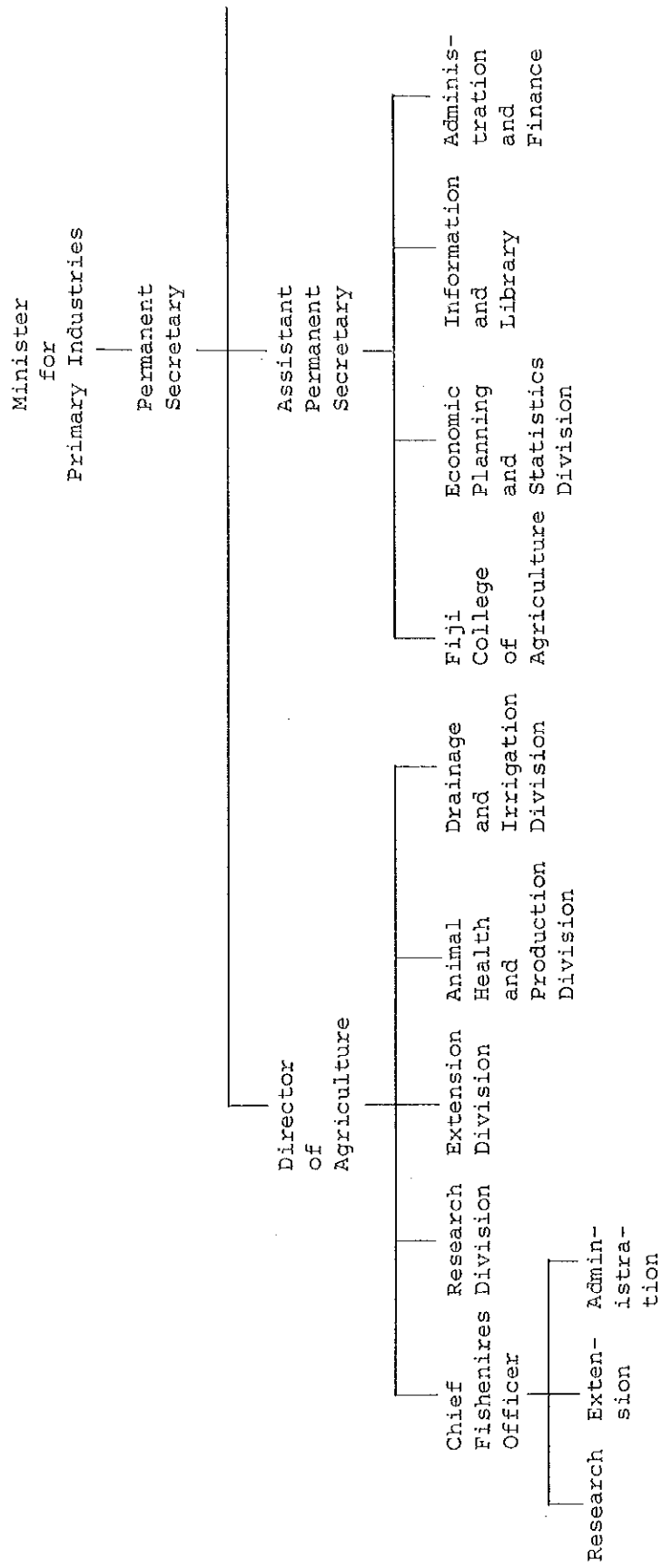


付 属 資 料

1. 第一次産業省組織図



2. 第1次プロジェクト・プロポーザル

JAPANESE ASSISTANCE FOR RICE RESEARCH
ADD DEVELOPMENT

1. Name of Project

Rice Research and Development

2. Name of Government Department incharge of Project

Research Division, Ministry of Agriculture and Fisheries, Fiji.

3. Project Sites

Koronivia Research Station and Dreketi Irrigation Scheme.

4. Purpose and background of request

Rice is one of the main food crop but over half the requirement about 21,400 tonnes is imported each year to meet the demand. The government policy in DPS is to become self sufficient in rice but to meet this target there are constraints including insufficient funds, staffs and facilities to develop and implement new technologies to improve rice production. Hence Japanese Aid is requested to upgrade the the research capability at Koronivia Research Station.

New Development in rice areas and production is planned for the Northern Division. At present it is difficult to mount site specific research for this area from Koronivia. Hence request is also made to set-up a unit to undertake research in this Division. It is expected that the unit will be based at Dreketi.

5. Period of Cooperation

Five years

6. Equipment Required and Costs

Koronivia Research Station

(a) For Field Work

1.	One 12" Ornel pump with spares for irrigation of rice field	\$8,000
2.	Two power tillers (Kubota) for field preparation	\$7,000
3.	One Tractor 35-45 hp for dryland rice cultivation	\$13,000
4.	One Tractor-mounted rice seed drill for dryland rice	\$6,000
5.	One Rice transplanter	\$1,000
6.	One Rice sample miller and huller	\$1,500
7.	Two Mist-blowers for insect control	\$1,500
8.	One Small rice harvester for harvesting research plots	\$8,000

(b) For Rice Seed Laboratory

9.	One Scientific Microscope	\$1,500
10.	One Zoom	\$1,000
11.	One Precision balance 200g x 0.5 mg.	\$1,000
12.	Seed Germinator for germination tests	\$3,000
13.	Dehumidifier for cold storage of seeds for breeding programme	\$1,000
14.	Distillation equipment	\$ 600

(c) For Training and Office

15.	Slide projector	\$1,000
16.	Photo coping machine	\$3,000
17.	Duplicating machine	\$2,000
18.	Camera - 35 mm.	<u>\$ 600</u>

Total for Koronivia \$60,700

Northern Division

1.	One power tiller (Kubota) for wetland cultivation	\$3,500
2.	One power tiller for dryland cultivation	\$3,500
3.	Two Mist-blowers for insect control	\$1,500
4.	One Vehicle (Twin Cab) for staff travel	\$14,500
5.	One portable soil pH meter to check field pH	\$ 600
6.	Field Kit for diagnosing soil and plant nutrient deficiencies	\$1,000
7.	Portable Conductivity meter to check salt concentrations	<u>\$1,000</u>
	Total for Northern Division	<u>\$25,600</u>

Total for Koronivia and Northern Division = \$86,300

7. Number of experts required and their particular field

At present there is only one rice breeder in Research. Two experts on Japanese aid is requested. One Rice breeder/Agronomist to work with the breeder at Koronivia and One Agronomist to work on rice in the Northern Division.

8. Number of Trainee and their particular fields

One local graduate will be provided to work with the Agronomist in the Northern Division. He will need to be trained. In addition to this there are four technical assistants who also need further training in rice.

9. Aid received from other projects

At present all the research carried out at is funded by the government. Occasionally funds are available from outside such as IRRI for staff training.

10. Position in the National Development Plan

Very high because one of the main objective in the National Plan is to make Fiji self-sufficient in food crops. Rice is one of the main food crop.

11. Priority if there are several request

Only one request

12. Request commencement and period of project

To commence in 1984/85 and run for a period of 5 years.

13. Allocation of running cost and workers

Fiji government will provide the bulk of the running cost and workers. In 1982 allocation for these was about \$103,000. Some assistance will be needed for running costs for the period of the project. It is estimated that about \$25,000 each year for the period of 5 years will be needed. It is requested that the Japanese government consider providing this.

14. Availability of necessary facilities

Office and laboratory space and some facilities will be provided by the Fiji Government.

15. Effectiveness of this project

The project will benefit all the rice farmers. There are nearly 10,000 farms in Fiji growing rice. All these farms will benefit from new technologies developed from research. Farmers growing rice all over the country will benefit from the research output. The project by providing better technologies for rice production and by finding means to overcome production constraints will improve rice production in the country. This project undoubtedly will be essential for Fiji to obtain self-sufficiency in rice production.

3. 第2次プロジェクト・プロポーザル



TEL. NO 312355

MINISTRY OF AGRICULTURE
AND FISHERIES
P O BOX 1292 SUVA

REF. NO. DI 1/11

DATE: 21/3/84

Mr Machida
C/o Embassy of Japan
Dominion House
SUVA

Dear Mr Machida

DRAFT PROPOSAL FOR DISCUSSION ONLY : IMPROVEMENT OF RICE PRODUCTION
TECHNOLOGY

....

I enclose herewith the draft proposal details for your consideration in preparation for our discussion on 22/3/84 at 2.00 p.m. at MPI Conference Room.

Yours faithfully

J. V. Nath
Assistant Director (D&I)
For Permanent Secretary for Primary Industries

FIRST DRAFT FOR DISCUSSION ONLY

1. Name of the Project

Improvement of Rice Production Technology.

2. Name of Government Organisation or Department in charge of the Project

Drainage and Irrigation and Research Divisions within the Ministry of Primary Industries.

3. Project Site

- (i) Research Component : Koronivia Research Station and Dreketi
- (ii) Training Component : Fiji College of Agriculture
- (iii) Production Component : Rewa, Tailevu, Navua, Western Macuata and Bua.

4. Background and Purpose of Request

Rice is one of the major staple foods for the majority of the people of Fiji. Average per capita consumption of rice has been 61 kg/annum during 1981-83 and it is expected that this level will continue to rise rapidly with increasing incomes and urbanisation. Local production has declined. Average annual output dropped from a peak of 24,000 tonnes during 1961-63 to 17,800 tonnes during 1981-83 a decrease of 26%. This has resulted in a growing dependence on imported rice to satisfy domestic demand. Hence, rice imports have risen from 4,000 tonnes to 24,000 tonnes over the same 20 year period. Imports of rice now accounts for 56% of total consumption and costs the country some F\$7.5 million in valuable foreign exchange in 1983, when the current account deficit had been F\$550 million. The value of rice imports, therefore, make up almost 15% of the current account deficit.

Purpose

- (a) Research : See attached submission on Research.
- (b) Training : (i) To provide training initially to the rice extension officers in the recommended package of cultural practices and the use of small farm machines and equipment appropriate for the cultivation of rice. The recommendations have emanated from the findings of the rice research carried out at Koronivia Research Station and Dreketi.

(ii) To extend the training to the farmers whose skills in the rice production technology need to be further improved particularly the small scale mechanisation and package of recommended practices.
- (c) Production: To intensify the agricultural use on already developed lands through increase in paddy planted area and yields both under dryland and wetland conditions; developing unused land for paddy cultivation; creating employment opportunities and developing farming capabilities on commercial lines on non-leased native lands through the provision of management services concomitant with appropriate training in rice production technology

This project conforms with the country's Development Plan 8 objective in that it will improve the technical and extension backing that are presently deficient in our current efforts to make rice farming more productive and rewarding. The ultimate goal is to increase the capacity for local rice production with a view to reduce rice imports and provide employment opportunities to the rural dwellers.

5. Period of Cooperation

At least 5 years (10 rice seasons) but preferably 7 years (14 rice seasons).

6. Equipment Required

The equipment required have been grouped as :

- (i) Research
- (ii) Operational
- (iii) Training
- (iv) Office Equipment

(i) Research : See attached submission on Research.

(ii) Operational:

- (a) Transport - Each expert should have a transport to ensure mobility as and when required. Preference to be given to 4 wheel drive, LWB vehicles and twin cabs diesel pick ups.

2 twin cab diesel pick up
5 4 WD/LWB diesel vehicles

(b) Field Machinery and Equipment

These are required for the 2 Agricultural Mechanisation Engineers :

<u>Items</u>	<u>No.</u>
. Tractor 30 HP 4WD	4
. Disc plough	4
. Rotovator	4
. Cage Wheels	16
. Planner/leveller	4
. Ditcher	4
. Grass Cutter	4
. Rice drills	4
. Rice transplanter - 5/6 rows with boxes	4

<u>Items</u>	<u>No.</u>
. Knapsack sprayers	4
. Mist blowers	4
. Combine harvesters - 3 rows	2
. Combine harvesters 4 rows	2
. Rice threshers	4
. Reaper Binder	4
. Water pumps 5 HP (disease)	4
. Land Planer	3
. Hand tools for field maintenance and repairs.	4 sets
. Fast moving spare parts for tractors and equipment.	4 sets

Note: Implements to be compatible with tractors.

(iii) Training:

(a) 1 Minibus with the seating capacity of 15 to 20 to transport trainees whilst undergoing training on the different aspects of rice crop production, including small scale agricultural mechanisation.

(b) Demonstrational:

. Visual Aids	
- Wall charts with diagrams/drawings	
- Part-sectioned machines and machine parts.	
. Audio-visual Equipment	<u>No.</u>
- film projector	2
- projector screen	2
- overhead projector	2
- Epidioscope	2
- Film strip projector	2
- 35mm camera with supplementary lenses	4
- Video deck	2
- Video screen - 2 metre square	2

- Video camera with necessary accessories 2
- Mini computer complete with CRT, disc drive, printer, plotter and other accessories 2
- Complete offset printing unit 1 set
- Small portable tape recorders 6

(c) Operational:

<u>Items</u>	<u>No.</u>
. Small tractors 4WD 30 HP	6
. Disc plough	6
. Rotovators	6
. Cage wheels	24
. Land planner/leveller	6
. Ditcher	6
. Grass cutter	6
. Rice seed drills	6
. Knapsack sprayers	6
. Mist blowers	6
. Combine harvester - diesel model 1800	4
. Rice threshers	4
. Reaper binder	6
. Water pumps 5 HP (Diesel)	3
. Rice transplanters 5/6 rows with boxes	3

(d) Repairs and Maintenance :

Workshop Equipment and tools

. Spanner sets	6
. Screw driver sets	6
. File sets	6
. Vices	6
. Work benches	6
. Pliers sets	6
. Electric bench drill	3
. Electric welding set	2
. Oxy-acetelene welding set	2
. Other miscellaneous workshop tools sets	2
. Mobile workshops	3

(e) Buildings:

The existing training facilities at Fiji College of Agriculture need upgrading and expanding to cater for the training envisaged. Therefore, upgrading of the workshop, classroom and dormitory facilities are essential. An estimated \$100,000 are needed for the purpose which includes the provision of a sheltered area for the storage of field machines, implements and equipments and other accessories associated with training; provision of a visual aids and projection room; and provision of dormitory facilities for the additional trainees.

(f) Office Equipment:

Two sets of office equipment will be required. One set at the location of the team leader and the other set at the training centre which will be at the Fiji College of Agriculture.

<u>Item</u>	<u>No.</u>
. Typewriters	2
. Photocopiers	2
. Electric stencil cutter	2
. Cyclostyling machine	2
. Calculators	6
. Filing cabinets	4

7. Number of Experts required and their particular fields

The project encompasses 3 components vizi: Research, Training and Production. Expertise is required in each of the components to supplement and strengthen the existing technical personnel and physical resources to ensure effective and timely attainment of the objectives of the proposed project.

The expertise envisaged will be :

- (i) Research : see attached submission from Research.
- (ii) Training and Production:
 - (a) 1 Agricultural Economist with emphasis on small farm management (Team Leader).
 - (b) 2 Agricultural Mechanisation Engineers (1 each for Central and Northern Divisions).
 - (c) 2 Extension Agronomist (1 each for Central and Northern Divisions).
 - (d) 1 Extension/Communication specialist.
 - (e) 1 Water Management Specialist with adequate experience in water management of paddy rice irrigation and paddy cultivation.

Note: The detail job description/duties are indicated in Appendix 'A'.

8. Number of Trainees and their particular field

A. Agricultural Extension Officers

(a) Irrigation Schemes

There are 3 irrigation schemes. These are listed as follows:

	<u>No. of staff</u>	<u>Total net/area</u>	<u>No. of farms</u>
1. Dreketi	3	140 ha	72
2. Lakena	3	310 ha	114
3. Navua	2	106 ha	29
	8	556	215
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(i) Farm Managers

A farm manager at each of the scheme is responsible for the overall operations of the scheme. This includes the supplies of agro-inputs to farmers on credit and its subsequent recovery (repayments), land preparation, water management, selection of seed paddy, research trials, harvesting operations and sale of paddy.

(ii) Extension staff

As farm advisors they are involved in crop establishment, crop management, transfer of improved rice crop management, technology through method result demonstrations and personal contact..

(b) Rainfed Rice Programme

(i) Central Division - Agricultural Development Project

Embraces an area extending from Navua, Rewa, Tailevu South, Lower Naitasiri and Natacaucau in Tailevu North. The project will concern itself with intensified agricultural production over 6,300 ha land. Whilst the development will centre around whole farm development rice will feature prominently and is programmed to give rise to an annual incremental production of 16,400 tonnes of paddy at the end of 8 years of construction.

Staff resources involved during the period of project construction period of 5 years are as follows:

	<u>Yr 1</u>	<u>Yr 2</u>	<u>Yr 3</u>	<u>Yr 4</u>	<u>Yr 5</u>
Extension staff					
locality and area supervisors	10	19	19	19	19
Group Farm Managers	2	4	8	13	22
	<u>12</u>	<u>23</u>	<u>27</u>	<u>32</u>	<u>41</u>

B. Locality and Area Supervisors

These extension supervisors will be involved with the transfer of improved rice production technology from the Research Division to farmers. They will do this by using method/result demonstrations and also formal training sessions using audio/visual aids and field demonstrations. These officers will be required to implement specific commodity programmes whilst carrying out whole farm development and farmer training programmes.

Group Farm Managers

As one of the strategies of agricultural development of the region a programme of developing mataqali land, currently not engaged in agricultural production will be instituted. The project will organise the setting up of 44x30 ha group farms. The group farms will firstly be set up as a legal entity. A group farm manager will be appointed to manage 2x30 ha farms. The development of the farms will be financed by funds from the Fiji Development Bank repayable over 5 years. The group farm manager will be responsible to operate the farm on purely commercial level and will have control of day to day operations of the farm. He will be responsible to a committee of mataqali members. Rice will feature prominently together with other crops viz: root crops, maize etc. as part of the cropping programme. The group farm development model calls for a substantial mechanisation of farm operations. This would include a 4 WDx30 HP tractor, disc plough, rotovator, rice threshers, reaper/binder machine, mist blowers, knapsack sprayers, water pumps, seed drills and drain ditching equipment.

Gravity Irrigation Schemes

Within the project area gravity irrigation will be set up on a total of 260 ha. Average individual scheme size would be 50 ha. The cropping programme would call for double cropping of rice. Unlike the declared irrigation project viz Lakena and Navua, farmers serviced by gravity irrigation would be responsible for their own land preparation and provision of agro-inputs. Staff providing extension

services to these farmers would require training in water management, wetland preparation and related agronomic disciplines. 6 Extension officers would be involved with providing advisory services in these schemes.

(ii) Western and Northern Divisions

Substantial areas of dryland (upland) rice is grown in the cane areas of the Western and Northern Divisions. In the Northern Division there are also areas where rice is the predominant crop and 6 extension officers are working exclusively with this commodity. In the Western Division some 9 extension officers would be involved with rice extension work.

B. Farmers Training

Farmers would also be involved in training programmes in an effort to transfer improved rice production technology. Demonstrations on complete package of practices, varieties and weed control demonstrations would be carried out as follows :

	<u>Yr 1</u>	<u>Yr 2</u>	<u>Yr 3</u>	<u>Yr 4</u>	<u>Yr 5</u>
(i) Agricultural Development Project	21	69	109	120	120
(ii) Northern Division	18	30	30	30	30
(iii) Western Division	18	27	27	27	27
Total No. of demonstrations	57	126	166	177	177
Total No. of farmers involved	2850	6300	8300	8850	8850

Method/Result demonstrations coupled with some formal training using appropriate visual aids will be used for the training farmers. Training resources would be mobile and would usually involve one day training sessions.

9. Aid received for the project from any other source

Nil.

10. Position in the National Development Plan

In the national development plan rice production for domestic needs has been given an extremely high priority rating. As such, rice production commands top priority rating in the Ministry of Primary Industries Drainage and Irrigation Division as well as Research Division.

11. Priority if there are several requests

Only one request

12. Requested commencement and period of the project

To commence in 1984/85 and continue for a period of at least 5 years, preferably 7 years.

13. Allocation of running costs and workers

Fiji Government will provide the bulk of the running cost and workers. However, some assistance will be needed for the running cost and maintenance of vehicles, machinery and equipment for the period of the project. It is estimated that an average of F\$60,000 each year, for a period of the project, will be required. It is requested that the aid donors consider providing this.

14. Availability of necessary facilities

(a) At Koronivia Research Station : see attached submission on Research.

(b) At Fiji College of Agriculture : Basic training facilities, such as dormitory, kitchen, classrooms, laboratory/workshop, farmlands for crops/livestock some machinery etc. are available.

(c) At the production level the various facilities that are available at Rewa, Navua and Dreketi Irrigation depots are indicated.

- Rewa Irrigation Depot

This is the centre for most Government activity in the Rewa and Tailevu areas. Activities principally hinge around the irrigated rice scheme of 326 ha. The facilities include a workshop and an administrative unit. The Nausori Drainage Board too has its office in the same compound. The rice extension staff under the direction of the Senior Agricultural Officer (SAO) operate from there. A team of 3 agricultural engineers operate from Lakena, under the direction of the Principal Engineer and attend to all matters related to irrigation and drainage.

- Navua Irrigation Depot

The Navua centre was initially set up to cater for the Navua irrigated rice scheme of 55ha. This area has recently been extended by 51 ha. The facilities include a workshop and an sub-administrative unit. After the Cyclone 'Wally' and 'Tia' the region of activity extends from Wainadoti to Navua and Navua to Korovisiolu. The Navua Drainage Board has its office in the same compound and the extension officers radiate from here. The engineering activities are controlled from Suva and executed by a Technical Officer.

- Dreketi Irrigation Depot

This station is on Vanua Levu and about 80 km from Labasa. The station was initially set up to service the construction operation and management of the Dreketi Irrigation scheme. The scheme was started to irrigate 25 ha of land. The water was pumped from the river into a high level main channel and supplied by gravity to the scheme area. The irrigated area was increased to 200 ha and plans exist to increase it to 2,000 ha. The pumping scheme was converted to a completely

gravity scheme by the construction of a concrete weir and extending the main channel upwards to the weir.

The facilities include a workshop and a sub administrative unit. The extension staff at Dreketi work mainly on the irrigation scheme. Extension staff for the non irrigated agricultural areas are each suitably located so as to service a reasonably large area. The engineering and administrative activities are directed from Labasa.

In the context of the above, office space and some facilities will be provided by the Government.

15. Effectiveness of this Project

The project will benefit all the rice farmers which have been estimated to be 10,000 families. The new and improved rice production technologies developed at the Research Stations will benefit the rice growers. It is expected that the findings of Research and the equipping of the extension officers with the appropriate knowledge and skills in rice technology, rice production will increase in the country.

Fiji is pushing ahead with its rice research, training and production programme and small scale farm mechanisation is one of the significant factors in achieving objectives of the programme. An estimated 6,300 ha of land on Viti Levu and 1,500 ha on Vanua Levu have been earmarked for intensification and expansion of rice and other selected horticultural crops.

This proposed project, therefore is considered to play a significant role in endeavouring to attain self-sufficiency in rice production in Fiji.

V Nath
Assistant Director
Drainage & Irrigation

APPENDIX A

AGRICULTURAL ECONOMIST (TEAM LEADER) - (1 POST)

The Agricultural Economist will coordinate the activities of the other team members to ensure that the objectives of the Rice Development Project are achieved. In doing so he will :

- (i) Review existing agricultural support services, extension and credit facilities for input supplies and provide details of measures to strengthen them;
- (ii) Review the existing policy of input subsidies especially in regard to fertilizers and agro-chemicals and its impact on paddy production in past and make appropriate recommendations in this regard.
- (iii) Evaluate project operation and maintenance requirements in terms of institutional arrangements, staffing requirements, communication equipment, vehicles, etc. and budgetary needs;
- (iv) Evaluate project economic viability based on estimated costs and benefits and calculate the economic internal rate of return and assess other non-quantifiable impacts.
- (v) Prepare farm budgets for present and future, with and without project, for the different farm sizes and for both leasehold and communally owned land.

Qualifications

A degree in Economics with specialisations in Agricultural Economics. At least 10 years experience in Agricultural development and rice development in particular. Previous experience in working in a team and experience outside the home country is an advantage.

Ability to establish and maintain good working relations with people of different national and cultural backgrounds.

Working knowledge of English is essential.

A. EXTENSION AGRONOMIST (2 POSTS)

- Prepare technical literature for use by extension officers engaged in disseminating improved rice production technology to farmers.
- Organise layout of Research/Extension trials on varieties, nutrition, weed control on farmers fields and evaluate such trials in close consultation with Research Agronomist.
- Maintain a close liasion between Extension and Research Divisions in an continuing effort towards the provision of high yielding varieties to farmers and accompanying package of practices.
- Organise the programme of method/result demonstrations in an effort to train farmers to adopt improved crop cultural practices. These demonstrations would cover; complete package of practices, variety comparisons and weed control.

B. EXTENSION/COMMUNICATIONS SPECIALIST (1 POST)

- Train extension officers in human relations and extension methods/communications. Arrange for extension officers to organise method/result demonstration so as to use it as an effective means for farmer training.
- Prepare and edit appropriate teaching/visual aids to enable extension officers to train farmers viz: use of flip charts, radio and mass media, use of video and collate technical information leaflets. Also collate and edit pamphlets and booklets for issue to farmers on relevant topics and commodities.

AGRICULTURAL MECHANISATION ENGINEER (2 POSTS)

To be responsible to the Team Leader and the duties will be to :

1. Supervise the operation and maintenance of agricultural machinery supplied by the Government of Japan and Fiji Government Machinery in the rice areas.
2. Propose type of machines necessary for Agricultural Development Works and to prepare technical specifications. To supervise thereafter the operation and maintenance of these machines.
3. Advise on the ordering of all spare parts and accessories necessary to ensure that the Japanese Aid machinery are kept in proper working conditions.
4. Carry out further development and modification of the agricultural equipment used in cultivation and harvesting as well as any earthmoving and excavation machines for Agricultural Development work.
5. Direct and supervise all mechanical operations so as to ensure that the rice development works done directly by aid and Government machinery are to schedule.
6. Expand the training programmes to provide the personnel for supervision, maintenance and operation of the agricultural and other machinery in the present and future development areas.
7. Perform any other professional duties required on drainage and/or irrigation schemes as directed by the Team Leader.

Qualifications

University degree in mechanical engineering with emphasis on agricultural mechanisation and earthworks machinery.

Ten years of professional experience in supervision, operation and maintenance of agricultural machinery as well as of any earthmoving and excavation machines.

Ability to organise workshops for maintenance and repairs of machines as well as to undertake training courses to provide personnel necessary to maintain and operate these machines.

Ability to establish and maintain good working relations with people of different national and cultural backgrounds.
Working knowledge of English is essential.

Water Management Specialist (1 Post)

The Water Management Engineer is to be responsible to the Team Leader and the duties will be to:

1. Examine the practices and procedures of operation and maintenance (O & M) for all existing irrigation systems in Fiji, and identify the problems experienced and examine them with a view to suggest appropriate solutions for the improvement of O & M on those systems.
2. Survey the existing irrigation schemes and determine the following
 - i) institutional and personnel requirements and their budget and other necessary facilities;
 - ii) primary data required during O & M of irrigation system including design of the necessary tables and forms for collecting information;
 - iii) assistance in setting up farmers' organization in the irrigation system;
 - iv) maintenance of irrigation and drainage facilities including on-farm and off-farm systems;
 - v) estimation of budget for O & M of each system in the Project area on a per hectare and aggregate basis with appropriate indexing for taking into account inflationary trend in the next 5 to 10 years;
 - vi) irrigation planning and irrigation schedule;
 - vii) monitoring of irrigation practices;
 - viii) methods of irrigation planning;
 - ix) evaluation of result of irrigation practices and feedback of evaluation to the next irrigation planning; and
 - x) other relevant aspects.

3. Recommend improvements to the water management system on the findings.
4. Prepare a manual for future use on the finding and recommendations.

Qualifications

The engineer should have a recognised university degree of civil and/or Agricultural Engineering academic background with at least 10 years' experience in the field of irrigation engineering, and 5 years experience in water management of paddy rice irrigation system and paddy cultivation.

Ability to establish and maintain good working relations with people of different national and cultural backgrounds.

Working knowledge of English is essential.

JAPANESE ASSISTANCE FOR RICE RESEARCH

Research Component.

1. Name of Project

Rice Research and Development

2. Name of Government Department incharge of Project

Research Division, Ministry of Primary Industries, Fiji

3. Project Sites

Koronivia Research Station and Dreketi Irrigation Scheme

4. Purpose and background of request

Rice is one of the main food crop but over half the requirement about 21,400 tonnes is imported each year to meet the demand. The government policy in DPS is to become self sufficient in rice but to meet this target there are constraints including insufficient funds, staffs and facilities to develop and implement new technologies to improve rice production. Hence Japanese Aid is requested to upgrade the research capability at Koronivia Research Station.

New Development in rice areas and production is planned for the Northern Division. At present it is difficult to mount site specific research for this area from Koronivia. Hence request is also made to set-up a unit to undertake research in this Division. It is expected that the unit will be based at Dreketi.

The rice research will be concentrated in these areas namely, dryland, wetland (irrigated and rainfed) and problem soils. Different varieties are to be developed for these kinds of situations for increase in yield. The improved agronomy has to be searched into to maximize the yield. In addition different climatic zones are to be taken into consideration such as dry, wet and intermediate in relation to farming systems. The insect and weed problems are to be taken into consideration in these diverse conditions. Therefore, rice research and development is a complex one.

5. Period of Co-operation

Five years are requested. This will give ample time to develop new varieties of rice be given to farmers. In addition production constraints will be identified and solved particularly in the field of agronomy, plant nutrition and soil chemistry. Emphasis will be laid on identifying varieties suitable to be grown under stress conditions because of the

nature of diverse ecology existing in the rice growing areas of Fiji.

6. Equipment Required and Estimated Costs

Currently rice research is handicapped by appropriate equipment both at the research stations and in farmers' fields. Therefore equipment requested are mentioned below in the order of priorities, High, Medium or Low.

For Koronivia Research Station

Item (High priority)	Cost Fiji dollars
(1) One 30 cm. pump with spades for flood irrigation of rice field	12,000
(2) Two power tillers (Kubota) for wetland	10,000
(3) One 4 wheel Drive Tractor 35-40 hp for dryland and wetland cultivation with rotabator and plough	18,000
(4) One tractor-mounted rice seed-drill for dryland rice work	11,000
(5) 2 Rice Transplanters	4,000
(6) One rice sample miller and huller	4,000
(7) 2 mist-blowers for insect control	1,500
(8) Rice harvester for research plot harvesting	10,000
(9) 2 winnowers for cleaning grains	10,000
(10) 2 Rice threshers for experimental plots	8,000
(11) 1 Tractor mounted PTO operated sprayer for application of pesticides with attachment	8,000
(12) Sprinkler irrigation-pipes and pump for dryland rice research	12,000
(13) Improvement of irrigation canals and infrastructures in the experimental field (materials only)	10,000
(14) Distillation equipment	600
(15) Slide projector	1,000
(16) Leaf Area Index (LAI) Machine	12,000
(17) 3 Balances for field and laboratory work	5,000
(18) 2 Saction traps for insect work in rice	2,000
(19) 2 light traps for insect work in rice	2,000
(20) one potters tower for insecticide work	2,500
(21) One Micro-tropical applicator for insecticidal study	15,000
(22) One Bionocular Microscope for insect study	4,000
(23) One 4 wheel drive landcruiser vehicle for transport	18,000
(24) One Mini computer for data analysis	20,000
(25) One camera with attachment - 35 mm.	1,000
(26) One slide projector with screen	500

(27) One Photocopying machine	3,000
(28) One Duplicating machine	2,000
(29) One Soil Grinder for rice soil analysis	15,000
(30) One Auto analyser Nitrogen determination complete with digestion and distillation sets for soil and plant analysis	18,000
(31) One Centrifuge, top speed 6,000 rpm for soil analysis	12,000
(32) 2 Shaker speed control for soil analysis	2,500
(33) 2 sets of fuel kits for rapid testing of pH and other nutrients in farmers' field	3,000
(34) One automatic cabinet water still	1,500
Total	245,600

Medium Priority

(1) One scientific microscope for seed work	2,000
(2) One zoom microscope for seed work	1,500
(3) One precision balance 200ga x 0.5 mg	1,500
(4) One Seed germinator for dormancy study	4,000
(5) One Distillator equipment for seed laboratory	1,000
(6) One Shimadzu Atomic absorption spectrometer for soil chemistry laboratory	30,000
(7) One Spectro photo-meter for analysis of phosphorus in rice soils and plant tissue	8,000
(8) 2 Electronic Top-loading Balance (10 mg accuracy)	5,000
(9) 2 pH meter portable for field work	2,000
(10) Conductivity meter (portable)	2,500
Total	57,500

Low Priority

(1) 2 Solarimeters for radiation study	8,000
(2) 2 Automatic rain gauge	1,000
(3) 2 drying oven (small ones)	3,000
Total	12,000

Northern Division - High priority

(1) One Power tiller (Kubota) for wetland	5,000
(2) One Power tiller (Kubota) for dryland	5,000
(3) 2 Mistblowers for Insect control	1,500
(4) 2 knapsack sprayers for Weed Control	3,000
(5) One vehicle (Twin cab) for transport for trials in farmers' fields	14,500

(6) One portable pH meter	600
(7) One field kit for diagnosing field problem	2,000
(8) Portable Conductivity meter to check salt concentration	1,000
(9) One rice thresher	2,000
(10) One Rice winnower	2,000
(11) One Rice drier	3,000
Total	36,900

Medium priority

(1) One light trap	1,000
(2) One experimental plot harvester	8,000
Total	9,000

Low priority

(1) One solarimeter for radiation study	4,000
(2) One automatic rain gauge	1,000
(3) One drying oven for ^y dormancing ^{breeding} breeding	3,000
Total	8,000

Total for Northern Division 53,900

GRAND TOTAL 367,000

7. Number of experts required and their particular field

Currently there is a rice breeder who is local and he is the head of rice research. To assist him, 2 Japanese experts are requested particularly for agronomic work biased towards soil and plant nutrition. One will be based at the Koronivia Research Station to cater for Viti Levu and another at Dreketi to cater for the Northern Region (Vanua Levu). They are expected to conduct field trials and farmers' field ⁱⁿ as well as at research stations.

A request for an agricultural engineer is also made who will be responsible to evaluate different machines for our total rice production system. He is also expected to develop workshop facilities for engineering work at the Koronivia Research Station because this particular section is at the infant stage of development. The current agricultural engineer is a new graduate.

8. Number of Trainee and their particular fields.

We need to have 2 types of training, short term and long term. The short term training would be the visit to Japan perhaps for 2 to 3 weeks by the senior scientists who are working in rice. This is merely to get more insight and interact with experienced scientists in Japan to generate new scientific concept. The other type of training envisaged is the long term one perhaps for 4 to 6 month for the junior staff who are involved in technical aspect. The experience gained will be in total rice production technology. Three to four junior staff and two to three senior staff to undergo training in Japan.

9. Aid received from other projects

At present all the research carried out at is funded by the government. Occasionally funds are available from outside such as IRRI for staff training.

10. Position in the National Development Plan

Rice Research and development plays an important part in the overall development plan. The reason being the country is draining its foreign exchange annually about \$7million. We have resources and these need to be exploited. In addition from food security point of view, it is the basic diet for the large population of the country. Fiji wants to be self sufficient rice.

11. Priority if there are several request

Only one request

12. Request commencement and period of project

To commence in 1984/85 and run for a period of 5 years.

13. Allocation of running cost and workers

The Fiji government will provide the running cost which involves inputs of various kinds, repair and maintenance of equipment providing labourers for the trial work and fertilizers and chemicals etc. In 1982 allocation for these were \$103,000 (Fijian).

14. Availability of necessary facilities

Office and laboratory space and some facilities will be provided by the Fiji Government.

15. Effectiveness of this project

The project will benefit all the rice farmers. There are nearly 10,000 farms in Fiji growing rice. All these farms will benefit from new technologies developed from research. Farmers growing rice all over the country will benefit from the research output. The project by providing better technologies for rice production and by finding means to overcome production constraints will improve rice production in the country. This project undoubtedly will be essential for Fiji to obtain self-sufficiency in rice production.

Currently the national average yield is 2 t/ha and this is considered as very low. With additional research inputs (experienced from other countries), the yield per unit area is expected to rise. In addition more land will come under rice by solving nutritional problem and developing suitable varieties of rice for marginal soils.

4. フィールドレポート

March 27, 1984

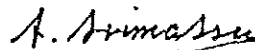
Dear Sir,

It is my pleasure to submit herewith the Summary Report on the Preliminary Study for the Technical Cooperation for the Improvement of Rice Cultivation Technology in Fiji, which is the result of our field survey and the earnest discussions held between the officials concerned of the Government of Fiji and our Study Team.

The Team will report to the Government of Japan on our views resulting from the preliminary study on our return home and convey, at the same time, the eagerness of the people and officials concerned of Fiji for the improvement of rice cultivation technology.

All the members of our Team wish to express heartfelt thanks to you and your staff for the hospitality and kind cooperation extended to us during our stay here to make the study a successful one.

Yours faithfully,


AKIRA ARIMATSU
Leader,
Preliminary Study Team,
Japan International Cooperation
Agency

Mr. J. Makasiale
Permanent Secretary
Ministry of Primary Industries
S U V A

c.c. Embassy of Japan

SUMMARY REPORT ON THE PRELIMINARY STUDY FOR THE
TECHNICAL COOPERATION FOR THE IMPROVEMENT OF RICE
CULTIVATION TECHNOLOGY IN FIJI

I. Introduction

In June 1983, the Government of Fiji requested the Government of Japan, through diplomatic channel, to extend technical cooperation on the Rice Research and Development to contribute to the raise of self-sufficiency rate of rice through increase of its production, which is given high priority in the Development Plan of Fiji.

In response to the request, the Japanese Government has sent the Preliminary Study Team for the Rice Research and Development Project (hereinafter referred to as the Team) headed by Mr. Akira ARIMATSU, Special Assistant to the President of the Japan International Cooperation Agency, through the Japan International Cooperation Agency (hereinafter referred to as JICA) which is a governmental organization for executing the Japanese Government Technical Cooperation Programme, to Fiji from March 10 to 28, 1984.

The Summary Report includes the results of field survey and a series of discussions with the officials concerned of the Ministry of Primary Industries.

NOTE: The title of the project has been changed tentatively to "the Improvement of Rice Cultivation Technology" through discussion.

II. Background of the Project

The demand of rice which is a staple food of the people of Fiji is increasing rapidly in recent years. However, because of the stagnation of domestic production of rice, Fiji is importing more than 50% of its yearly consumption at present.

In the Development Plan 8, the Government of Fiji aims to raise self-sufficiency rate of rice through increasing its production. This process will contribute to the improvement of balance of payments in this country through import substitution.

Along this line, the Ministry of Primary Industries holds Rice Week functions every year, and is implementing agricultural development projects for the increase of rice production in the Central and Northern Divisions. The Ministry also intends to strengthen the research and extension activities on rice cultivation technology.

In the Koronivia Research Station of the Research Division, the Department of Agriculture and Fisheries of the Ministry of Primary Industries, the research on rice cultivation technology including the subjects of breeding, cultivation method, weed control, plant protection, soil and fertilizer, agriculture mechanization is being conducted. In the Drainage and Irrigation Division of the said Department, extension officers are extending technical guidance to the rice producing farmers with the improved technology on rice cultivation obtained from the research activities of the Research Station.

III. Present Situation and Problem of Rice Cultivation Technology

In Fiji, rice is grown on the irrigated fields and rain-fed wet and dry lands in Central Division, Northern Division and other areas. The objective of increasing rice production will be attained by expansion of irrigated fields through the implementation of agricultural development projects as well as by improvement of rice cultivation technology through the strengthening of research and extension activities.

The present situation and the main problems of rice cultivation technology which the Team has observed are as follows:

1. Varieties and Seeds

Although the Uttam variety which was developed as an improved variety through breeding at the Koronivia Research Station is being rapidly introduced among farmers, local varieties which can be grown more easily in the rain-fed fields are still predominant. The Uttam variety which has the character of early maturation as well as stiffness of culm is a high yielding variety, but it is susceptible to insect infestation.

At the Koronivia Research Station, breeding and testing of some promising varieties like K127 adaptable for low pH soil in the Northern Division is being conducted. It also seems to be desirable to develop an easy threshability variety for mechanized cultivation.

At present, although farmers are getting their seed mainly from their own fields, it is desirable to increase seed farms to ensure steady supply of good quality seed and to prevent mixture of different varieties.

2. Cultivation Method

(1) Tilling, Puddling and Levelling

Using of animal and human power is still a dominating practice in the rice cultivation in this Country. However, the rotary tilling done by tractor with 25Hp is introduced in the irrigation project areas and the plowing done by tractor with 50Hp in some upland fields. There is observed certain degree of disparity in growth caused by uneven levelling in rain-fed wet lands and irrigated fields.

(2) Seeding and Transplanting

Random planting by man-power is predominant in rain-fed wet lands and broadcasting by man-power is predominant in irrigated fields. Many cases of sparse planting in random planting and of dense seeding in broadcasting are observed.

(3) Fertilizing

Local varieties are usually grown without fertilizer and in some cases with very little fertilizer. It is recommended to re-examine the amount and timing of applying fertilizer for each variety since it is conjectured that the recommended rate of application of fertilizer for the Uttam on the irrigated fields (urea, superphosphate and potassium chloride is to be 100kg per ha each) is rather broadly estimated and applied for other varieties with slight modifications.

Although the organic manure is not the least utilized, it is desirable to examine its applicability from the view point of maintaining soil fertility. In addition, it is necessary to study and develop a soil improvement technology for saline fields or low pH fields which are widely observed in the Dreketi Irrigation Project area.

(4) Water Control

No particular means of water control is being done either in rain-fed wet land fields or irrigated fields. However, it is desirable to establish proper method of water control in order to save water and sometimes to prevent excessive growth of plants, since the pump irrigation is costly and broadcast seeding of paddy in irrigated fields is inclined to lead to lodging.

In addition, efforts should be taken for removal of weed and protection of water leakage in the irrigation and drainage canals to preserve proper utilization of water.

(5) Weed Control

The amount of reduction in production of rice due to the generation of barnyard millet and cyperaceous weed seems to be considerable. Broad leaf weed is also observed in many fields. At present, the herbicides of STAM F 34 and MCPA are applied, but their effects for weed control are still insufficient. It is highly desirable to conduct further test of various kinds of herbicides in order to establish effective weed control method.

(6) Pest and Disease Control

Plant hoppers and leaf rollers which are main insects affecting rice in Fiji are controlled by Diazinon and Orthene. Although a napsack sprayer is widely used for spraying of chemicals, it is desirable to introduce a motor-driven sprayer or a motor-driven duster to enhance pesticide effectiveness and to avoid undesirable sanitary affections.

Although it has been told that there is no problem of diseases, conspicuous outbreak of brown spot of rice has been observed at some fields.

In addition, it is desirable to establish a forecasting and watching system of generation of pests and diseases.

(7) Harvesting and Drying

Harvesting of rice is usually done by hand with sickles, but combine-harvesters are introduced in irrigation project areas. There are considerable amount of head-loss through the use of combine-harvesters. In the case of hand cutting, small threshers are utilized and wind winowing is performed.

As solar drying of rice is predominant under frequent rains, high humidity and high temperature conditions, many problems such as discolouration and cracked rice are observed. The quality of local rice is yet to be much improved as compared with imported rice.

IV. Research Subjects for the Improvement of Rice Cultivation Technology

Based on the present situation and problems of rice cultivation technology mentioned above, the following research subjects should be considered as a matter of high priority:

1. Variety selection and Breeding
 - (1) Improvement of yielding ability, disease and insect resistance, lodging resistance, shattering habit, etc.
 - (2) Elucidation of variety ecology
2. Improvement of Cultivation Method
 - (1) Establishment of suitable amount of seeding rate and planting density
 - (2) Improvement of amount and method of application of fertilizer, and method of improvement of soil
 - (3) Improvement of water control method
 - (4) Test and selection of various kind of herbicides and establishment of weed control system
 - (5) Detecting of generating conditions of new pests and diseases and improvement of control method
 - (6) Mechanization of threshing and drying

We are impressed by the good work of research in connection with rice being carried out by quite a few but well qualified research staff at the Koronivia Research Station. However, if the strengthening of research capability on rice would be intended taking up those subjects as are suggested above, more emphasis should be put on the assignment of enlarged cadre of research staff there. Moreover, the equipment and facilities are rather insufficient for the effective conduct of research and experiment at the Station and amplified installments of these are desirable. Some field experiments to be conducted at the site of the rice producing area would also be desirable.

V. Present Situation and Problems on Extension Methods of Rice Cultivation

1. Present Situation of Extension Activities

Extension activities on rice cultivation are carried out with considerable intensity, and most farmers seem to have strong reliance on the extension officers. The system of utilizing the results of research activities at the Research Station and of feedback of technical problems arising out of farmers' practice seems to be working well.

2. Present Situation and Problems on the Training of Extension Officers

The Department of Agriculture and Fisheries have short term training courses for extension officers performed during students' holidays at the Fiji College of Agriculture. They are, however, too short for extension officers to get enough knowledge and technology of rice cultivation and furthermore training materials and equipment seem to be insufficient at the Fiji College of Agriculture.

The training of extension officers in the field of rice cultivation will be required not only to make the term of courses longer but also to include in the curriculum, the technology of soil investigation, growth diagnosis and pests inspection as well as the general cultivation technology. It is therefore important to improve the planning and methodology of training for extension officers and to increase training materials and equipment at the Fiji College of Agriculture.

VI. Framework of the Japanese Technical Cooperation Programme

The Team exchanged views and had a series of discussions with concerned Fiji authorities for the purpose of finding out the problems in connection with the rice cultivation technology after its field survey in the rice producing areas.

The Team recognizes the necessity of improving the system of rice cultivation technology contributing to attain the official target of increasing the rice production in DP8 of the Government of Fiji.

Therefore, the Team considers that it is important to strengthen the capability of applied research on rice cultivation specifically at the Koronivia Research Station and the extension activities jointly undertaken by the Irrigation and Drainage Division and the Research Division of the Department of Agriculture and Fisheries.

1. General Objectives of the Technical Cooperation

For those considerations mentioned above, the Team recommends that the "project type technical cooperation" is desirable to be implemented by the Government of Japan through JICA. The general objectives of the technical cooperation are as follows:

- (1) To extend technical cooperation on applied research to further develop and improve the system of rice cultivation technology focussing on cultivation method at on-farm level and farm machinery utilization
- (2) To give technical advice for field experiment based on the above-mentioned system of technology which will be carried out by the Government of Fiji at the sites of the agricultural development projects. e.g. The Dreketi Irrigation Project.
- (3) To give technical advice on the planning and methodology of training of extension officers conducted by the Government of Fiji

NOTE: "Project type technical cooperation" is a type of Japanese technical cooperation system to be implemented integratedly and systematically for a fixed period of usually 3 to 5 years, which has three basic components; training of counterpart personnel in Japan, dispatch of Japanese experts and the provision of equipment and materials.

2. Measures to be taken by the Japanese side

- (1) Dispatch of Japanese Experts

JICA will dispatch long term or short term Japanese experts in the following fields:

- 1) Agronomy (General Agronomy)
- 2) Agronomy (Water Management)
- 3) Soil and Fertilizer
- 4) Pests and Disease Control
- 5) Agricultural Machinery
- 6) Extension/Communication
- 7) Coordinator

- NOTE:
1. Maximum number of long term experts is four
 2. Team Leader will be assigned among the long term experts by JICA
 3. Japanese experts will be stationed at Koronivia Research Station
 4. Short term experts in other related fields may be dispatched if the necessity arises

(2) Training of Counterpart Personnel in Japan

JICA will receive about two counterpart personnel to train in Japan every year.

(3) Provision of Equipment and Machinery

JICA will provide equipment and machinery necessary for the implementation of the technical cooperation. The equipment and machinery to be requested will be utilized exclusively for the implementation of the technical cooperation in consultation with the Japanese experts.

3. Measures to be taken by the Fiji side

- (1) Provision of land and facilities including the experimental farm at Koronivia Research Station for the implementation of the technical cooperation
 - (2) Allocation of at least one counterpart personnel to each Japanese expert
 - (3) Allocation of Local Budget for the smooth implementation of the technical cooperation
4. Establishment of the Joint Committee

A Joint Committee will be established consisting of Japanese experts, representative of JICA and the officials of the authorities concerned of the Government of Fiji contributing to the smooth implementation of the technical cooperation and it would be desirable that the Committee be presided by the Permanent Secretary of the Ministry of Primary Industries as the Chairman.

(2) Management of the Technical Cooperation

It is hoped that the Director of Agriculture and Fisheries in the Ministry of Primary Industries will act as the Project Manager who will bear overall responsibilities to implement the technical cooperation.

5. Term of Technical Cooperation

The Team recommends that the term of technical cooperation for the improvement of rice cultivation technology in Fiji should be five years.

VII. Schedule until the Implementation of the Technical Cooperation

It is desirable to start the implementation of the technical cooperation project in the first quarter of 1985. In preparation of that, short term Japanese experts will be available in 1984 for the purpose of elaborating the master plan and tentative implementation plan.

5. 収集資料リスト

- 1) Fiji's Times, A History of Fiji. The Fiji Time and Herald Limited, 1983.
- 2) Pacific Island Year Book. Pacific Publications, 1981.
- 3) The University of the South Pacific, Calendar 1984 Volume 1. The University of the South Pacific, November 1983.
- 4) South Pacific Research Register 1982. University of the South Pacific, Pacific Information Centre 1982.
- 5) Report on the Census of Agriculture 1978 (by Robin Rothfield, FAO Agricultural Statistician and Bijai Kumar, Counterpart Statistician). Parliamentary Paper No. 28 of 1980.
- 6) Ministry of Agriculture and Fisheries, Annual Report of the Year 1981. Parliamentary Paper No. 26 of 1982.
- 7) Ministry of Agriculture and Fisheries, Annual Report of the Year 1982. Parliamentary Paper No. 66 of 1983.
- 8) Fiji Annual Research Report 1978, 1979, 1980, 1981, 1982. Department of Agriculture, Ministry of Agriculture and Fisheries.
- 9) Farm Management Manual Part I - Financial. Ministry of Agriculture and Fisheries, January 1983.
- 10) Farm Management Manual Part II - Technical. Ministry of Agriculture and Fisheries, December 1983.
- 11) National Rice Work - Fiji January 16-20, 1984, Rice Position Paper. Ministry of Agriculture and Fisheries November 10, 1983.
- 12) Fiji College of Agriculture Prospectus.

- 13) Research Division of Ministry of Agriculture and Fisheries:
Structure, Facilities and Activities (Brief Paper for CEMP Panel
Meeting September, 1983).
- 14) Hurricane Flood Rehabilitation Project, Agricultural Development
Programme, Main Report. Australian Agricultural Consulting and
Management Co. Pty. Ltd.
- 15) Current Economic Statistics. Bureau of Statistics, October 1983.

JICA