APPENDIX

APPENDIX

APPENDIX 1. MEMBER LIST OF STUDY TEAM

(1) Field Survey

Name	Speciality
Mr. Shoji SHIMBO	Leader and Grant Aid Planner Managing Director, Grant Aid Study and Design Dept., JICA
Mr. Hikaru NIKI	Rice Production Planner Agriculture Development Specialist, JICA
Mr. Hiroki TANAKA	Agricultural Planner Regional Coordination Officer, Office of Policy and Coordination, Hokuriku Regional Agricultural Administration Office, MAFF
Mr. Yasunori HASEGAWA	Rice Cultivation and Technique Extension Planner SANYU CONSULTANTS INC.
Mr. Isao MUKAI	Architectural Designer SANYU CONSULTANTS INC.
Mr. Masahiro IIDA	Facilities Planner SANYU CONSULTANTS INC.
Mr. Hironori TAKAHASHI	Land Consolidation Planner SANYU CONSULTANTS INC.
Mr. Yoshihisa ONISHI	Farming Machinery and Equipment Planner SANYU CONSULTANTS INC.
Mr. Toshifumi OKUBO	Cost Estimator SANYU CONSULTANTS INC.
Mr. Tadao ARAI	Interpreter SANYU CONSULTANTS INC

(2) Draft Report Explanation

Name	Speciality
Mr. Hikaru NIKI	Leader Agriculture Development Specialist, JICA
Mr. Eiji INUI	Project Coordinator First Basic Design Study Division, Grant Aid Study& Design Dept., JICA
Mr. Yasunori HASEGAWA	Rice Cultivation and Technique Extension Planner SANYU CONSULTANTS INC.
Mr. Isao MUKAI	Architectural Designer SANYU CONSULTANTS INC.
Mr. Hironori TAKAHASHI	Land Consolidation Planner SANYU CONSULTANTS INC.

APPENDIX 2. ITINERARY OF FIELD SURVEY

(1) Field Survey

Date	Day	Activities
Oct. 26 '92	Mon	Leave Tokyo, Arrive in Bangkok.
27	Tue	Leave Bangkok. Arrive in Phnom Penh. Courtesy call on Embassy of Japan and Ministry of Foreign Affairs.
28	Wed	Meeting with Ministry of Agriculture and IRRI.
29	Thu	Meeting with Agronomy Department, Hydrology Department and UNDP.
30	Fri	Move to Battambang. Inspection on Toul. Samrong Agricultural Technical Center. Second group (Mr. Iida, Mr. Onishi, Mr. Okubo) Leave Tokyo.
31	Sat	Move to Phnom Penh. Second group arrive in Phnom Penh.
Nov. 1	Sun	Office work
2	Mon	Inner meeting. Meeting with Agronomy Department. Second group move to Battambang.
3	Tue	Meeting with Ministry of Agriculture. Exchange of Minute of Discussion
4	Wed	Report to Ministry of Foreign Affairs and Embassy of Japan.
5	Thu	Government member leave Phnom Penh. Meeting with Ministry of Planning.
6	Fri	Mr. Hasegawa and Mr. Takahashi move to Battambang. Meeting with Agricultural Center. Site investigation
7	Sat	Meeting with Agricultural Center. Survey on water source.
8	Sun	Meeting with Agricultural Center.
9	Mon	Mr. Hasegawa, Mr. Mukai, Mr. Onishi and Mr. Okubo move to Phnom Penh. Interim report to Embassy of Japan.
10	Tue	Survey on existing irrigation facilities. Survey on construction material in Phnom Penh.
11	Wed	Survey on drainage facilities. Survey on construction labours and operators.
12	Thu	Leave Tokyo, Arrive in Bangkok.
13	Fri	Mr. Takahashi and Mr. Iida move to Phnom Penh. Meeting with Agronomy Department.
14	Wed	Report to Embassy of Japan. Mr. Onishi and Mr. Okubo move to Bangkok.
15	Sun	Survey on transportation condition in Thailand.
16	Mon	Meeting with receiving committee. Survey on construction condition in Thailand.
17	Tue	Meeting with Ministry of Agriculture
18	Wed	Report to Embassy of Japan. Mr. Takahashi and Mr. Hasegawa move to Bangkok. Other group in Thailand visit RID and PWD to get information on construction condition.
19	Thu	Leave Bangkok and arrive in Tokyo

(2) Draft Report Explanation

Date	Day	Activities
Mar. 29 '93	Mon	Leave Tokyo, Arrive in Bangkok.
30	Tue	Leave Bangkok. Arrive in Phnom Penh. Courtesy call on Embassy of Japan and Ministry of Foreign Affairs.
31	Wed	Explanation of Report to Ministry of Agriculture
Apr. 1	Thu	Discussion with Ministry of Agriuclture
2	Fri	Meeting with Agronomy Department
3	Sat	Meeting with Ministry of Agriculture & Signing of Minutes of Meeting. Mr. Niki and Mr. Inui leave Phnom Penh Supplemental Survey by Consultants Group.
4	Sun	Supplemental Survey
5	Mon	Meeting with Cambodia - IRRI Rice Project. Supplemental Survey. Report to Embassy of Japan
6	Tue	Leave Phnom Penh for Bangkok
7	Wed	Leave Bangkok and arrive in Tokyo

APPENDIX 3. LIST OF PERSONNEL CONTACTED BY THE STUDY TEAM

(1) Embassy of Japan

Mr. Yukio Imagawa	Ambassador
Mr. Katsuhiro Shinohara	Councilor
Mr. Yoshikazu Yamaguchi	First Secretary
Mr. Tooru Imamura	First Secretary
Ms. Noriko Abe	First Secretary

(2) JICA

Mr. Shuhei Kikuchi	Coordinator
Mr. Mitsuaki Takahashi	JICA Expert

(3) Ministry of Foreign Affair

Mme. You Ay	Director of Economic and Cultural Cooperation

(4) Ministry of Planning

Mr. Chhieu Nam	Deputy Director, Dept, of Economic Cooperation
Mr. Toshiyuki Kasai	Adviser Ministry of Planning
Mr. Haing Sitha	Director, Dept. of Labor and Salary

(5) Ministry of Finance

Mr. Man Ponn	Deputy Director, Dept. of Financial Affair
Mr. Heng Meng Hak	Deputy Director, Dept. of Planning

(6) Ministry of Agriculture

Eng. Chhea Song	Senior Vice Minister
Mr. Samreth Pech	Vice Minister

(7) Planning Department, Ministry of Agriuclture

Mr. Chea Kong	Director
Mr. Chan Tong Yves	Deputy Director
Mr. Leng Sophal	Vice Chief of International Cooperation
Miss Soy Bora	Staff of International Cooperation

(8) Agronomy Department, Minsitry of Agriculture

Mr. Ith Nody	Director
Mr. Try Meng	Vice Director
Mr. Kith Seng	Chief of Planning and Statistic Office
Mr. Sim Moeum	Chief of Administrative
Mr. Tea Neang	Chief of Food Crops Office
Mr. Tin Fesol	Head of International Cooperation, Planning and Statistic Office
Miss Sam Mayany	International Cooperation, Planning and Statistic Office

(9) Hydrology Department, Ministry of Agriculture

Mr. The Lim Thong	Vice Director

(10) Mechanization Department

Mr. Leang Sam Hat	Director
Eng. Meas Pyseeth	Vice Director

(11) Energy Department, Ministry of Industry

Mr. Nhek Chroeung	Director

(12) Provincial Planning Office, Battambang

Mr. Tes Heanth	Deputy Director

(13) Provincial Agricultural Services, Battambang

Mr. Sar Hai	Manager of Boung Raing Rice Research Station
Mr. Chiim Laosrun	Director of Hydrology
Mr. Pot Tok	Section Chief of Meteology
Mr. Lok Nhoung	Deputy Manager of Agricultural Engineering

(14) Provincial Public Works Office

Mr. Chuong Khva	Director

(15) Provincial Industry Office

Mr. Lak Haw	Director

(16) Toul Samrong Agricultural Technical Center

Mr. Shin Khen	Director
Mr. Cheang Meng	Chief of Research
Mr. Pok Yoeng	Chief of Machinery & Repair
Mr. Horn Samnang	Chief of Extension
Mr. Chou Chauon	Chief of Seed Production
Mrs. Touch Chahroean	Chief of General Service & Personnel Service
Mr. Tree Hong	Researcher
Mr. Neng Kra	Technician for Machinery & Repair
Mr. Sok Leang	Technician for Seed Production

(17) Cambodia - IRRI Rice Proejct

Dr. Harry Nesbitt	Project Manager

APPENDIX 4. MUNITES OF DISCUSSIONS

(1) Field Survey

MINUTES OF DISCUSSIONS

THE PROJECT FOR REHABILITATION OF
THE TOUL SAMRONG
AGRICULTURAL TECHNICAL
CENTER, BATTAMBANG

Based on the results of the Preliminary Study, the Japan International Cooperation Agency (JICA) decided to conduct a Basic Design Study on the Project for Rehabilitation of the Toul Samrong Agricultural Technical Center, Battambang(hereinafter referred to as "the Project").

JICA sent to Cambodia a study team, which is headed by Mr.Shoji Shimbo, Managing Director of Grant Aid Study and Design Department, JICA and is scheduled to stay in the country from October 27 to November 18, 1992.

The team held discussions with the officials concerned of the Government of Cambodia and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The team will proceed to further works and prepare the Basic Design Study report.

For Supreme National Council
of Cambodia

Mr. Shoji Shimbo
Leader
Basic Design Study Team
JICA

Mr. Chhea Song
Vice Minister,
Ministry of Agriculture
of Cambodia

ATTACHMENT

1. Objectives

The objective of the Project is to strengthen rice seed production system by rehabilitation of the Toul Samrong Agricultural Technical Center in Battambang.

2. Project Sites

The Project site is located in the Toul Samrong Agricultural Technical Center in Battambang. (Site map is attached as Annex I.)

3. Executing Organization

Ministry of Agriculture is responsible for the administration and the execution of the Project. (Implementation Organization Chart is attached as Annex II.)

4. Items requested by the Cambodian side

After discussions with the Basic Design Study team, the following items were finally requested by the Cambodian side.

(1) Rehabilitation and/or construction of buildings
- Main building(office, laboratory, etc.)
- Workshop
- Building for seed processing
- Building for guests and trainees
- Warehouse

(2) Improvement of infrastructure
- Building site
- In farm

(3) Procurement of machineries and equipments
- Farm machineries
- Thresher and seed processing machineries
- Laboratory equipments for seed testing
- Workshop machineries and equipments
- Office equipments
- Equipments for dissemination
- Vehicles

However, the final items of the Project will be decided after further studies.

5. Japan's Grant Aid system

(1) The Cambodian side has understood the system of Japanese Grant Aid explained by the team.

(2) The Government of Cambodia will take necessary measures, described in Annex III for smooth implementation of the Project, on condition that the Grant Aid Assistance by the Government of Japan is extended to the Project.

6. Schedule of the Study

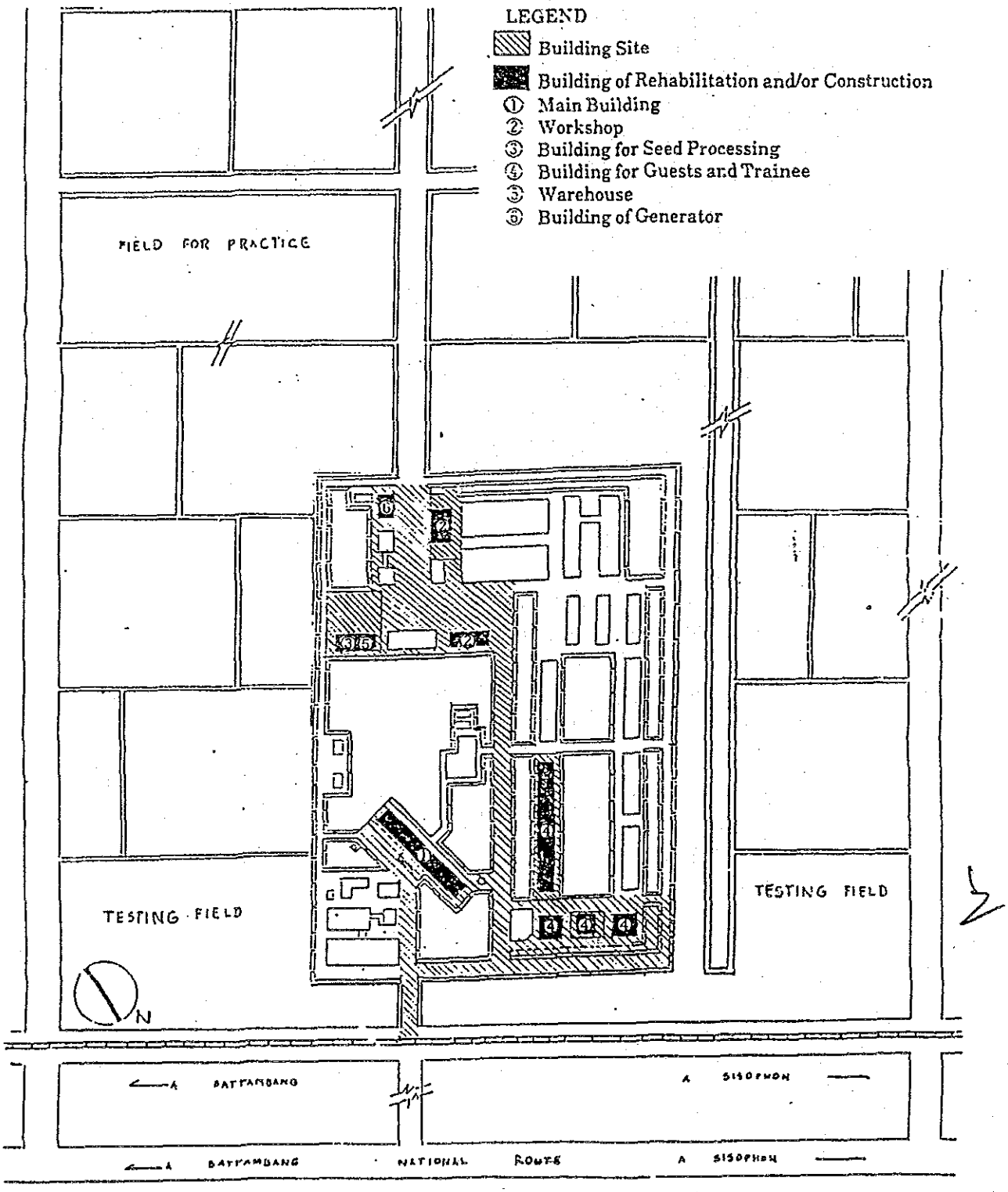
(1) The consultants will proceed to further studies in Cambodia until November 18, 1992.

(2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around March, 1993.

(3) In case that the contents of the report is accepted in principle by the Cambodian side, JICA will complete the final report and send it to the Government of Cambodia by May ,1993.

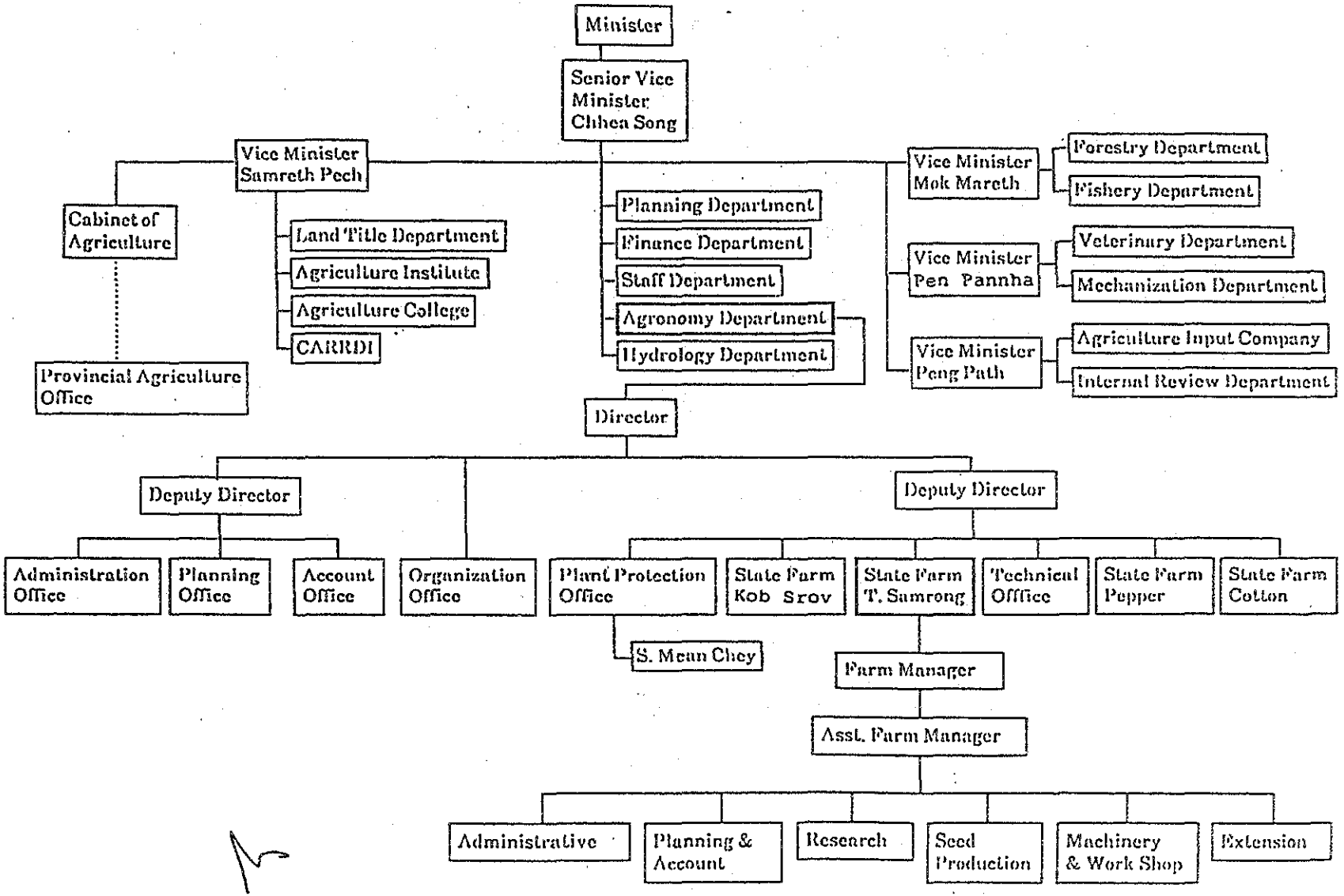
Annex I

SITE MAP OF FACILITIES



Annex II

IMPLEMENTATION ORGANIZATION



Annex III

UNDERTAKING BY THE CAMBODIAN SIDE

1. To secure the land necessary for the construction of the Project facilities and clear the site prior to commencement of the Project.

2. To provide necessary facilities outside the site.

3. To ensure speedy unloading, tax exemption, custom clearance of the products under the grant as the port of disembarkation.

4. To accord Japanese national whose services may be required in connection with the supply of the products and the services under the Verified contracts such facilities as may be necessary for their entry into the Cambodia and stay therein for the performance of their work.

5. To exempt Japanese national involved in the Project from customs duties, internal taxes and other fiscal levies may be imposed in Cambodia with respect to the supply of equipment /machines and services under the Verified contracts;

6. To bear commissions, advising commission and payment commission, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

7. To bear all expenses, other than those to be covered by the Grant Aid necessary for the execution of the Project.

8. To assign exclusive counter part engineers,technicians, for the project.

9. To use and maintain properly and effectively the facilities constructed and equipment purchased under the Grant.

(2) Draft Report Explanation

MINUTES OF DISCUSSIONS
THE BASIC DESIGN STUDY ON THE PROJECT FOR
REHABILITATION OF THE TOUL SAMRONG
AGRICULTURAL TECHNICAL CENTER, BATTAMBANG
IN CAMBODIA
(CONSULTATION OF DRAFT REPORT)

In response to the request of Supreme National Council(S.N.C.) of Cambodia, Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for Rehabilitation of the Toul Samrong Agricultural Technical Center, Battambang (hereinafter referred to as "the Project") to Cambodia from October 27th to November 18th 1992. Through discussion, field surveys, and technical examination of the results in Japan, the team has prepared draft report of the study.

In order to explain and to consult the Cambodian side on the components of the draft report, JICA sent to Cambodia a study team (hereinafter referred to as "the team") headed by Mr.Hikaru Niki, Development Specialist, JICA, from 29th March to 4th April,1993.

As a result of discussions, both parties have confirmed the main items described on the attached sheets.

Phnom Penh, April 3rd,1993

for H.E.Hor Namhong,
Member of S.N.C.
Coordinator for Economic Cooperation
with Japan

Mr. Hikaru Niki
Leader,
The Draft Report Explanation Team
JICA

Mr.Chhea Song
Vice Minister,
Ministry of Agriculture
of Cambodia

ATTACHMENT

1. Components of Draft Report

Cambodian side has agreed and accepted in principle the components of the Draft Report Proposed by the team.

2. Japan's Grant Aid System

1) Cambodian side has understood the system of Japanese Grant Aid Program explained by the team.

2) Cambodian side will take the necessary measures described in Annex for smooth implementation of the Project on condition that the Grant Aid by the government of Japan is extended to the Project.

3. Further schedule

1) The team will prepare the final report in accordance with the confirmed items, and sent it to Cambodia by the end of May 1993.

2) Both sides have comfirmed that for the implementation of the Project under the Grant Aid Program by the government of Japan, security in the Project area should be maintained.

Annex

Undertakings by the Cambodian side

1. To secure the land necessary for the construction the Project facilities and clear the site prior to commencement of the Project.

2. To provide necessary facilities outside the site.

3. To ensure speedy unloading, tax exemption, custom clearance of the products under the grant at the port of disembarkation.

4. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the Verified Contracts such facilities as may be necessary for their entry into the Cambodia and stay therein for the performance of their work.

5. To exempt Japanese national involved in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Cambodia with respect to the supply of equipment/machines and services under the Verified Contracts.

6. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

7. To bear all expenses, other than those to be covered by the Grant Aid necessary for the execution of the Project.

8. To assign exclusive counterpart engineers/technicians, for the Project.

9. To use and maintain properly and effectively the facilities constructed and equipment purchased under the Grant.

APPENDIX 5. TABLES AND FIGURES

5. 1 TABLES

5. 2 FIGURES

TABLE 5-1 CROP PRODUCTION IN NORTHWEST REGION AND CAMBODIA (1991)

Crop	Battambang		Pursat		Banteay Meanchey		Siem Reap		Preah Vihear		Total		Cambodia	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
1. Paddy	132,453	229,195	80,407	98,970	100,000	125,100	153,380	153,790	12,943	20,480	479,183	627,535	1,871,540	2,400,000
Wet Season	131,758	224,170	80,307	98,780	100,000	125,100	146,300	150,900	12,943	20,480	471,308	619,430	1,721,840	2,030,000
Dry Season	695	2,085	100	190	-	-	7,080	2,890	-	-	7,875	5,165	149,700	370,000
2. Corn	706	705	266	310	264	192	895	615	-	-	2,131	1,822	46,485	40,905
3. Cassava	134	1,143	100	1,030	84	1,000	1,475	4,300	-	-	1,793	7,473	10,652	55,685
4. Sweet Potato	237	1,266	81	475	110	585	980	1,890	50	225	1,458	4,441	9,065	39,262
5. Mung Bean	1,172	684	385	230	139	71	1,595	695	-	-	3,281	1,680	26,778	12,525
6. Groundnut	205	92	105	55	40	12	-	-	-	-	350	159	6,478	3,532
7. Sesame	29	13	92	45	45	23	464	1,840	-	-	630	1,921	15,530	7,521
8. Sugarcane	211	5,200	105	3,160	57	1,035	335	10,795	-	-	708	20,190	6,515	145,013
9. Jute	723	59	5	-	295	24	-	-	-	-	752	83	1,245	103
10. Tobacco	-	-	1	-	-	-	-	-	-	-	1	-	17,370	8,830
11. Others	1,266	8,020	444	4,800	225	3,000	1,895	7,455	-	-	3,830	23,275	30,389	214,128
Total	137,136		81,991		101,249		161,019		12,993		501,992		2,042,056	

Note : Area means planted area
Source : Ministry of Agriculture

TABLE 5-2 PLANTED AREA OF RICE BY PROVINCE (1980-1991)

(unit : '000 ha)

Province	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
Phnom Penh (M)	3	2	3	3	3	3	10	10	12	12	13	11
Kandal	80	86	84	81	74	73	77	63	69	91	97	95
Kompong Cham	147	152	156	160	143	133	164	125	159	177	178	180
Savy Rieng	88	104	119	134	84	107	137	117	170	151	151	168
Prey Veng	189	206	232	233	211	219	234	216	250	261	265	267
Takeo	168	128	153	168	145	148	183	165	217	211	215	219
Kompong Thom	101	94	116	118	97	102	99	99	136	137	140	134
Siem Reap	142	150	162	168	160	150	156	128	180	162	164	153
Battambang	223	260	288	295	182	117	203	203	129	148	150	132
Pursat	44	57	65	75	51	62	60	46	71	77	78	80
Ban Teay Mean Chey									121	110	113	90
Kompong Chhnang	40	49	50	52	34	42	62	39	60	61	66	69
Kompong Som(M)	9	12	15	14	9	10	8	9	10	9	10	10
Kampot	79	81	93	96	97	99	93	89	124	102	105	114
Koh Kong	8	8	8	8	8	8	5	5	6	5	5	5
Kompong Speu	68	51	70	73	59	66	62	48	74	79	69	70
Preah Vihear	13	13	19	14	11	12	14	12	15	13	14	17
Stung Treng	8	8	10	10	9	9	7	7	8	7	10	12
Rattanakiri	10	11	14	13	15	14	14	9	13	12	13	11
Mondulkiri	3	3	13	5	5	6	5	4	5	5	5	4
Kratie	18	18	4	20	21	22	25	24	28	29	29	34
Total	1,441	1,493	1,674	1,740	1,418	1,402	1,618	1,428	1,865	1,646	1,634	1,875

Source : Dept. of Planning, Ministry of Agriculture

TABLE 5-3 PRODUCTION OF RICE BY PROVINCE (1980-1991)

(unit : '000 ton)

Province	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
Phnom Penh (M)	3	3	4	6	6	5	13	16	19	21	21	19
Kandal	97	125	158	154	108	147	140	142	124	178	190	177
Kompong Cham	195	211	204	251	118	169	234	187	215	250	266	257
Savy Rieng	87	90	113	117	47	108	146	91	190	161	183	154
Prey Veng	202	186	267	279	154	228	320	244	321	344	328	275
Takeo	116	118	152	204	120	193	268	226	323	313	291	293
Kompong Thom	130	71	114	126	73	92	109	116	166	161	162	149
Siem Reap	173	141	184	162	156	160	159	131	220	212	195	169
Battambang	303	246	312	276	144	232	270	264	180	210	197	226
Pursat	39	43	79	97	35	84	69	53	92	100	97	99
Ban Teay Mean Chey									161	150	145	125
Kompong Chhnang	46	54	71	63	41	57	74	47	85	88	88	96
Kompong Som(M)	13	17	19	13	13	14	12	16	17	16	15	15
Kampot	93	71	102	126	133	140	113	140	197	164	124	148
Koh Kong	10	7	8	8	10	11	6	5	7	6	6	8
Kompong Speu	95	44	79	81	26	78	64	52	95	97	78	87
Preah Vihear	13	13	24	15	16	20	22	18	22	19	19	20
Stung Treng	10	10	17	11	9	13	14	11	15	11	14	16
Rattanakiri	11	13	16	16	21	19	13	10	14	19	20	18
Mondulkiri	3	3	20	6	7	9	5	5	6	8	8	5
Kratie	28	24	6	28	23	33	42	41	50	45	53	44
Total	1,717	1,490	1,949	2,039	1,260	1,812	2,093	1,815	2,519	2,573	2,500	2,400

Source : Dept. of Planning, Ministry of Agriculture

TABLE 5-4 UNIT YIELD OF RICE BY PROVINCE (1980-1991)

(unit : '000 ha)

Province	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
Phnom Penh (M)	1.16	1.18	1.66	1.86	1.98	1.70	1.29	1.55	1.58	1.75	1.61	1.72
Kandal	1.21	1.45	1.89	1.91	1.46	2.01	1.82	2.24	1.79	1.96	1.95	1.86
Kompong Cham	1.32	1.39	1.31	1.57	0.82	1.27	1.43	1.47	1.20	1.41	1.49	1.42
Savy Rieng	0.97	0.87	0.95	0.87	0.56	1.00	1.06	1.16	1.11	1.07	1.21	0.91
Prey Veng	1.06	0.90	1.15	1.20	0.73	1.04	1.36	1.18	1.28	1.32	1.23	1.02
Takeo	0.98	0.92	1.00	1.21	0.83	1.30	1.46	1.45	1.48	1.48	1.35	1.33
Kompong Thom	1.27	1.12	0.98	1.07	0.76	0.89	1.11	1.17	1.22	1.18	1.15	1.11
Siem Reap	1.22	0.94	1.13	0.96	0.98	1.06	1.02	1.11	1.22	1.31	1.18	1.10
Battambang	1.35	0.90	1.08	0.93	0.79	1.31	1.33	1.30	1.39	1.42	1.31	1.28
Ban Teay Mean Chey									1.33	1.36	1.28	1.38
Pursat	0.89	0.75	1.23	1.29	0.68	1.37	1.15	1.15	1.29	1.30	1.20	1.39
Kompong Chhnang	1.12	1.16	1.43	1.21	1.20	1.38	1.19	1.19	1.40	1.44	1.33	1.39
Kompong Som(M)	1.44	1.39	1.30	0.97	1.54	1.40	1.50	1.81	1.70	1.76	1.50	1.50
Kampot	1.17	0.88	1.10	1.31	1.37	1.41	1.22	1.58	1.58	1.61	1.18	1.29
Koh Kong	1.20	0.94	1.10	1.01	1.26	1.40	1.11	1.03	1.17	1.20	1.20	1.60
Kompong Speu	1.49	0.73	1.13	1.11	0.43	1.17	1.03	1.08	1.28	1.23	1.13	1.24
Preah Vihear	1.04	0.95	1.27	1.07	1.47	1.60	1.63	1.51	1.47	1.16	1.35	1.53
Stung Treng	1.29	1.17	1.74	1.17	1.03	1.40	1.98	1.50	1.88	1.57	1.40	1.33
Rattanakiri	1.10	1.20	1.13	1.20	1.37	1.40	1.35	1.22	1.08	1.58	1.53	1.63
Mondulkiri	1.01	1.00	1.50	1.20	1.48	1.45	1.17	1.18	1.20	1.60	1.60	1.25
Kratie	1.55	1.31	1.30	1.46	1.14	1.47	1.69	1.71	1.79	1.55	1.82	1.29
Total	1.19	1.00	1.17	1.17	0.89	1.24	1.29	1.32	1.36	1.38	1.32	1.28

Source : Dept. of Planning, Ministry of Agriculture

TABLE 5-5 FOOD BALANCE BY PROVINCE (1991)

(Unit : '000 ton, '000 person)

Province	Paddy Production			Amount of Paddy by Usage		Food Supply in White Rice			Food Demand in White Rice		Balance
	Wet Season	Dry Season	Total	For Seeds & Animal Feed	Consumption	In White Rice	Food From Subsidary Crops	Total	Population	Rice	
1. Phnom Penh	16.2	3.0	19.6	2.9	16.7	10.3	0.8	11.1	721.4	117.0	-105.9
2. Kandal	77.2	100.0	177.2	26.6	150.6	93.4	6.6	100.0	873.9	1,142.0	-42.0
3. Kampong Cham	206.1	46.0	252.1	37.8	214.3	132.9	8.9	141.8	1,300.0	2,210.6	-68.8
4. Svay Rieng	150.6	4.0	154.6	23.2	131.4	81.7	4.4	85.8	414.1	67.1	+18.7
5. Prey Veng	206.7	68.0	274.7	41.2	233.5	144.8	2.8	147.6	817.1	147.6	0.0
6. Takeo	196.6	85.0	281.6	42.2	239.4	148.4	6.0	154.4	675.8	109.5	+44.9
7. Kampong Tom	148.0	7.0	155.0	23.3	131.8	81.7	3.4	85.1	502.3	81.4	+3.7
8. Siem reap	158.0	14.0	172.0	25.8	146.2	90.6	2.3	93.0	572.9	92.8	+0.2
9. Banteay Meanchey	125.1	1.0	126.1	18.9	107.2	66.5	1.3	67.7	392.2	63.0	+4.7
10. Battambang	224.1	4.0	228.1	34.2	193.9	120.2	2.5	122.7	605.2	97.0	+25.7
11. Pursat	98.8	1.0	99.8	15.0	84.8	52.6	0.8	53.3	401.4	65.0	-11.7
13. Kampong Chhang	78.7	16.0	94.7	14.2	80.5	49.9	1.4	51.3	299.4	48.5	+2.8
14. Kampong Som	14.7	-	14.7	2.2	12.5	7.8	0.9	8.7	78.2	12.7	-4.0
15. Kampot	146.2	4.0	150.2	22.5	127.7	79.1	2.6	81.7	460.6	74.6	+7.1
16. Kehkong	5.5	-	7.5	1.1	6.4	4.0	0.3	4.3	45.8	7.4	-3.1
17. Kampong Speu	83.8	4.0	87.8	13.2	74.6	46.3	3.0	49.3	464.5	75.2	-25.9
18. Preah Vihear	20.5	-	20.5	3.1	17.4	10.8	0.2	11.0	96.8	15.7	-4.7
19. Rattanak Kiri	18.1	-	18.1	2.7	15.4	9.5	0.1	9.6	62.9	10.2	-0.6
20. Stung Treng	16.3	-	16.3	2.4	13.9	8.6	0.4	9.0	55.8	9.0	0.0
21. Mondol Kiri	5.5	-	5.5	0.8	4.6	2.9	0.0	2.9	21.8	3.5	-0.6
22. Kratie	30.9	13.0	43.9	6.6	37.3	23.3	1.5	24.6	210.9	34.2	-9.6
Total	2,030.0	370.0	2,400.0	360.0	2,040.0	1,264.8	50.0	1,314.9	9,073.0	1,484.0	-169.1

Source : Ministry of Agriculture

Note : (1) Paddy amount for seeds & Animal Feed = Paddy Production × 15%

(2) White Rice = Paddy Amount × 62%

TABLE 5-6 HARVESTED AREA AND PROUDCTION OF PADDY BY VAREITY (1991)

	Battambang			Pursat			Banteay Meanchey			Siem Reap			Preah Vihear			Total			Cambodia		
	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production
	(ha)	(ton/ha)	(ton)	(ha)	(ton/ha)	(ton)	(ha)	(ton/ha)	(ton)	(ha)	(ton/ha)	(ton)	(ha)	(ton/ha)	(ton)	(ha)	(ton/ha)	(ton)	(ha)	(ton/ha)	(ton)
Wet Season	131,537	1.70	224,110	66,166	1.49	98,780	86,910	1.44	125,100	148,800	1.06	158,010	12,593	1.63	20,480	440,003	1.42	626,480	1,571,927	1.29	2,030,000
IR & Early	3,576	2.79	10,012	8,366	1.29	10,875	6,600	2.20	14,520	23,030	0.90	20,727	-	-	-	41,572	1.35	56,134	285,813	1.27	363,372
Medium	16,808	2.00	33,616	18,015	1.45	26,122	15,533	1.40	21,797	53,290	1.20	63,978	-	-	-	103,646	1.40	145,483	521,299	1.30	675,443
Late	103,711	1.64	170,810	33,646	1.59	53,808	52,077	1.40	72,908	55,950	1.08	60,703	12,048	1.64	19,799	257,432	1.47	378,028	662,032	1.31	865,874
Upland	79	1.29	102	40	1.12	45	-	-	-	4,435	1.20	5,322	545	1.24	681	5,099	1.21	6,150	29,310	1.27	37,171
Floating	7,360	1.30	9,570	6,099	1.30	7,930	12,700	1.25	15,875	6,095	1.19	7,310	-	-	-	32,254	1.26	40,685	73,473	1.20	88,140
Dry Season	695	3.0	2,085	80	2.00	160	-	-	-	1,080	1.53	10,884	-	-	-	7,855	1.67	13,129	147,000	2.52	370,000
Total	132,229	1.71	226,195	66,246	1.49	98,940	86,910	1.44	125,100	149,880	1.13	168,894	12,593	1.63	20,480	447,858	1.43	639,609	1,718,927	1.40	2,400,000

Source : Department of Planning, Ministry of Agriculture

TABLE 5-7 PADDY SEED PRODUCTION BY VARIETY IN EACH NATIONAL SEED FARM (1991)

Station	Total Farm Area	IR 42		IR 54		Neang Ming Ton		Toul Samrong No. 2		Total	
		Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
	(ha)	(kg)	(kg)	(ha)	(kg)	(ha)	(kg)	(ha)	(kg)	(ha)	(kg)
1. Kop Srov (Phnom Penh Muniparity)	100	3	4,488					79	86,617	82	91,105
2. Toul Krasang (Kandal Province)	115							100	* 50,051	100	* 50,051
3. Toul Samrong (Battambang Province)	210	40	63,936	0.5	1,440	17	28,800	152	226,800	209.5	320,976
計	42	43	68,424	0.5	1,440	17	28,800	331	363,468	391.5	462,132

Note: * Damaged by flooding
Source : Department of Agronomy

TABLE 5-8 RESULTS OF PADDY SEED DISTRIBUTION BY MINISTRY OF AGRICULTURE (1991)

(unit: ton)

Provincial	IR Varieties	Neang Minh Ton	Toul Samrong II & Others	Total
1. Collected and Distributed by Provincial Agricultural Office	1,600	400	900	3,000
(1) Phnom Pen	100			100
(2) Kandal	100			100
(3) Kampong Cham	100		200	300
(4) Svay Rieng	50			50
(5) Prey Veng	150			150
(6) Takeo	250	100 (1)	300	650
(7) Kampong Thom	100		100	200
(8) Siem Reap	50		100	150
(9) Banteay Meanchey	100	100 (1)	100	300
(10) Battambang	150	200 (1)	100	450
(11) Pursat	100		100	200
(12) Kampong Chnang	100			100
(13) Kampong Som	10			10
(14) Kampot	100			100
(15) Kampong Spen	100			100
(16) Kratie	40			40
2. Collected by Provincial Agricultural Office for Ministry of Agriculture	700 (2)	300 (2)		1,000
(1) Kampong Spen	200			200
(2) Takeo	400	200		600
(3) Dept. of Agronomy	100	100		200
Total	2,300	700	1,000	4,000

Source: Ministry of Agriculture

(1) Collected by AIC
(2) Collected by AIC with contract for the collection between Dept. of Agronomy and COCMA

TABLE 5-9 BUDGET OF AGRONOMY DEPARTMENT IN 1991 AND 1992

Item	1991	1992
1. Budget		
(1) National Budget approved by Ministry of Finance	100,543,256	181,977,056
(2) Income from selling agricultural product and materials	121,355,455	73,240,397
(3) Other income (Interest from bank)	635,132	62,236,396
Total	222,533,843	317,454,149
2. Expenditure		
(1) Salary	117,029,490	229,939,363
(2) Seeds, fertilizer and pesticides	60,507,238	87,933,964
(3) Small repair	8,118,576	9,607,110
(4) Electricity, water and telephone	10,434,318	353,100
(5) Return to national government	2,286,000	4,103,558
Total	198,375,622	331,937,095

Note : 1. The budget and expenditure are estimated on the basis of those form January till September in 1992
Source : Department of Agronomy

TABLE 5-10 PRESENT AND PROPOSED PADDY SEED PRODUCTION

Variety		Present (1991)			Proposed		
		Planted Area	Unit Yield	Production	Planted Area	Unit Yield	Production
		(ha)	(ton/ha)	(ha)	(ha)	(ton/ha)	(ha)
1. IR & Early	Transplanting	-	-	-	30	4.0	120
	Direct Seeding	40	1.60	64	-		
Sub-Total		(40)		(64)	(30)		(120)
2. Medium	Direct Seeding	-	-	-	20	3.5	70
		-	-	-	15	1.8	27
Sub-Total					(35)		(97)
3. Late	Transplanting	-	-	-	44	3.5	154
	Direct Seeding	160	1.50	240	91	1.8	164
Sub-Total		(160)		(240)	(135)		(318)
Total		200		304	200		535
4. Foundation Seed and Experiment Field		9	1.65	15	9	3.5	32
Grand Total		209		319	209		567

Source : Department of Agromony

TABLE 5-11 NUMBER OF STAFF BY ROOM

Division/Section	No.	Building	Room
1. Director	1	Main Building	Administration
2. Deputy Director	1	-do-	-do-
3. Administration			
(1) Chief	1	Main Building	Administration
(2) General Service & Personnel			
Section Chief	1	-do-	-do-
Typist	1	-do-	-do-
Personnel Service	1	-do-	-do-
Kindergarten Teacher	2	-do-	-do-
Subtotal	5		
(3) Planning & Account			
Section Chief	1	Main Building	Administration
Clerk	1	-do-	-do-
Subtotal	2		
Total	8		
4. Research			
(1) Chief	1	Main Building	Administration
(2) Seed Quality Lab.			
Section Chief	1	-do-	Seed Quality Lab.
Researcher	1	-do-	-do-
Subtotal	2		
(3) Varietal Performance Lab.			
Section Chief	1	Main Building	Varietal Performance Lab.
Researcher	1	-do-	-do-
Subtotal	2		
(4) Seed Protection Lab.	1	Main Building	Seed Protection Lab.
Total	5		
5. Seed Production			
(1) Chief	1	Main Building	Administration
(2) Technologist	1	-do-	-do-
Subtotal	2		
6. Machinery & Repair			
(1) Chief	1	Workshop	Building for Seed Processing
(2) Technologist	1	-do-	-do-
(3) Mechanic	3	-do-	-do-
7. Extension			
Chief	1	Main Building	Administration
Total	5		
Grand Total	23		

TABLE 5-12 LIST OF EQUIPMENT (1)

Item No.	Equipment	Standard	Q'ty
1.	Farm Machinery		
1.1	4-Wheel Tractor Set		
1.1.1	4-Wheel Tractor	80PS, Diesel, w/Cage wheel	2 units
1.1.2	Bottom Plow	16", 3 blades	2 units
1.1.3	Disc Plow	26", 4 discs	2 units
1.1.4	Rotary Harrow	78 blades	2 units
1.1.5	Disc Harrow	20", 26 discs	2 units
1.1.6	Power Sprayer	500lit, w/100m hose	2 units
1.1.7	Trailer	Dump type, 5 ton loading	2 units
1.1.8	Grain Drill	16 gangs	1 unit
1.2	Hand Tractor Set		
1.2.1	Hand Tractor	12PS, Diesel, w/Cage wheel, Rotary	1 unit
1.2.2	Trailer	0.5 ton loading	1 unit
1.3	Sprayer Set		
1.3.1	Manual Sprayer	Napsack type, 15 lit	10 units
1.3.2	Engine-driven Sprayer	Gasoline, 26 lit	1 unit
1.4	Combine Harvester	80PS, Diesel	2 units
1.5	Reaper	120 cm	2 units
1.6	Engine Pump	12PS, Diesel, w/Hose	1 unit
2.	Seed Processing Machinery		
2.1	Thresher	10PS, Diesel, 1.5 ton/hr	2 units
2.2	Seed Processing Mini-Plant		
2.2.1	Precleaner	1 ton/hr, w/Receiving hopper, etc.	2 lines
2.2.2	Cleaner	1 ton/hr, w/Bucket elevator, etc.	2 lines
2.2.3	Platform Balance	150kg, 500kg	1 unit
3.	Laboratory Equipment for Seed Testing		
3.1	Laboratory equipment for Seed quality test		
3.1.1	Seed Moisture Meter	Battery type, w/Grinder	2 units
3.1.2	Trier	For No.6 sack	5 pcs
3.1.3	Magnifier	×10, ø 100 mm	10 pcs
3.1.4	Weight-to-Volume Meter	Burauel type	1 unit
3.1.5	Grain Divider	1.2 lit	1 unit
3.1.6	Grain Test Tray	ø 180 mm, Black	30 pcs
3.1.7	Top-pan Balance	Max 20 kg, Graduation 50g	1 unit
3.1.8	Double Beam Balance	Max 2 kg, Graduation 1 g	1 unit
3.1.9	Table Balance	Max 200 kg, Sensibility 0.1 g	1 unit
3.1.10	Thermometer	0~100°C, Graduation 0.2°C	10 pcs
3.1.11	Sampling Bottle	200 cc, Plastic made	500 pcs
3.1.12	Glassware		
	(1) Desiccator	10 lit. w/Silica gel	80 pcs
	(2) Petri Dish	ø 100 mm, w/Lid	500 pcs
	(3) Beaker	10, 50,100 pcs for 1000, 500, 250 cc, respectively	1 set
	(4) Conical Flask	30 pcs for 500, 250, 50 cc, respectively	1 set
	(5) Cylinder	15 pcs for 2000, 1000, 500, 100, 50 cc. respectively	1 set
	(6) Test Tube	ø 25 mm	500 pcs
	(7) Pipet	5 pcs for 20, 10, 5, 2 cc, respectively	3 set

TABLE 5-12 LIST OF EQUIPMENT (2)

Item No.	Equipment	Standard	Q'ty
3.1.13	Bunsen Burner	Propane type, w/Gas Tank, Stand, Tripod, Wire net	3 sets
3.2	Laboratory equipment for seed quality and variety performance tests		
3.2.1	Test Winnower	South Dakota type, 100g/time	1 unit
3.2.2	Test Width/Thickness Grader	600g/time	1 unit
3.2.3	Infrared Moisture Meter	300g, Min Graduation 0.01%	1 unit
3.2.4	Compound Micrometer	×40	1 unit
3.2.5	Drying Oven	96 lit	1 unit
3.2.6	Weighing Can	50 cc, Aluminum made	500 pcs
3.2.7	Grain Sieve Set	Slotmesh 8pcs/set, Roundmesh 5pcs/set	1 lot
3.2.8	Grain Crack Meter	50 rice grain	2 units
3.2.9	pH meter	Battery type	1 unit
3.2.10	Meteorological Equipment	Shelter, Max & min thermometer, Polymeter, Earth thermometer, Portable anemometer, Evaporation pan, Rain Gauge, Sunshine recorder	1 lot
3.2.11	Soil Test Kit		1 set
4.	Workshop Machinery and Equipment		
4.1	Engine tools		
4.1.1	Valve cylinder Tool Set	Valve sheet grinder, lifter, Bore gauge, High temp thermometer, Puller	1 set
4.1.2	Piston Ring Tool		
4.2	Chassis Tools		1 set
4.2.1	Tire Gauge		1 set
4.2.2	Tire Service Tool	Wrench, Valve repair tool, Plier, Hammer, Tire lever, Wire brush, Spreader, Wheel cap tool, Tire remover	1 set
4.2.3	Foot Operated Air Pump		
4.2.4	Compressor	100 lit, 7kg/m^2, w/3PS engine	1 unit
4.2.5	Portable Tire Inflator	10 lit	1 unit
4.2.6	Chassis Tool Set	For large machines, w/Tool box	1 unit
4.2.7	Chassis Lubricator	Lubricator, Grease gun, Micro hose,	1 set
		Oil pump, Oil measure	1 set
4.2.8	Garage jack	2 ton	1 unit
4.3	Electric Tools		
4.3.1	Electric Tool Set	Nipper, Plier, Screwdriver, Hex key wrench, Soldering iron, Solder	1 set
4.3.2	Battery Check Apparatus	Battery tester, Multitester	1 set
4.3.3	Battery Charger	w/Cables	1 unit
4.4	Measurement Tools		

TABLE 5-12 LIST OF EQUIPMENT (3)

Item No.	Equipment	Standard	Q'ty
4.4.1	Straight Rules	Stainless made, 1 m	1 pc
4.4.2	Tachometer	Non-contact type	1 unit
4.4.3	Torque Wrench		1 set
4.4.4	Micrometer	w/Magnet stand, dial indicator,	1 unit
4.4.5	Surface Plate	900×900 mm, w/V-block	1 unit
4.4.6	Gauge	Thickness gauge, Screw pitch gauge	1 unit
		Caliper	1 set
4.5	General Maintenance Tools		
4.5.1	High Pressure Washer	w/Engine	1 unit
4.5.2	Chain Block	2 ton	1 unit
4.5.3	Portable Gantry Crane	For 2 ton, w/slings	1 unit
4.5.4	Parts Cleaner		1 unit
4.6	Fabricating Machines		
4.6.1	Electric Drill, small	250w motor input	1 unit
4.6.2	Electric Drill, large	1,100w motor input	1 unit
4.6.3	Bench Drill Press		1 unit
4.6.4	Disc Grinder, small	590w motor input	1 unit
4.6.5	Disc Grinder, large	1,700w motor input	1 unit
4.6.6	Bench Electric Grinder	w/Pedestal	1 unit
4.6.7	Spray Gun	w/Hose	1 unit
4.6.8	Hand Nibbler		1 unit
4.6.9	Hand shear		1 unit
4.6.10	Gas Welder	w/Oxy & acety tank, carrier	1 unit
4.6.11	Engine Welder	w/Diesel Engine, Shield, Earth cord, Clip, Hammer, Gloves, Rod	1 set
4.6.12	Body Fender Tool Set		1 set
4.6.13	Blacksmith Tool	Tongs firing, Cast iron block, etc.	1 set
4.7	Disassemble Tools		
4.7.1	Heavy Mechanical Tool Set	Wrenches, Drivers, etc.	1 set
4.7.2	Tool Cabinet		1 set
4.7.3	Light Mechanical Tool Set	File, Reamer, Hacksaw, etc.	1 set
4.7.4	Supporters	Vise, Clamp, etc.	1 set
4.7.5	Torch lamp		1 pc
5.	Office Equipment		
5.1	English Typewriter	Manual	1 unit
5.2	Khmer Typewriter	Manual	2 units
5.3	Mimeograph Machine	Manual & Electric w/Stencil cutter	1 unit
5.4	Base-station for Wireless Communication	HF	3 units
5.5	Handy Transceiver	FM	6 units
5.6	Transceriver for Station Wagon	HF	1 unit
6.	Vehicles		
6.1	Station Wagon	4WD, Diesel, Rear Bench Seat	1 unit
6.2	Motorcycle	100~125 cc	3 units
6.3	Pick-up Truck	4WD, Diesel, Double Cab	1 unit

TABLE 5-12 LIST OF EQUIPMENT (4)

Item No.	Equipment	Standard	Q'ty
7.	Supporting Equipment		
7.1	Portable Belt Conveyor	3PS Engine, 12 m length	2 units
7.2	Monocycle	0.2 m^3	5 units
7.3	Ladder		2 units
7.4	Step Ladder		2 units
7.5	Plastic Sheet	10×10m	20 pcs
7.6	Agricultural Technical Book English		20 books
8.	Furniture		
8.1	Furniture for Main Building		1 lot
8.1.1	Furniture for Crop Room		1 lot
8.1.2	Furniture for Test Seed Storage Room		1 lot
8.1.3	Furniture for Conference Room		1 lot
8.1.4	Furniture for Director Room		1 lot
8.1.5	Furniture for Deputy Director Room		1 lot
8.1.6	Furniture for Administration Room		1 lot
8.1.7	Furniture for Seed Quality Laboratory		1 lot
8.1.8	Furniture For Variety Performance Laboratory		1 lot
8.1.9	Furniture for Seed Protection Laboratory		1 lot
8.2	Furniture for Workshop		
8.2.1	Furniture for Office		1 lot
8.2.2	Furniture for Stock Room		1 lot
8.2.3	Furniture for Workshop		1 lot
8.3	Furniture for Guest house		1 lot

TABLE 5-13 ANNUAL FUEL COST OF EQUIPMENT

Table Estimation of Annual Fuel Cost

Equipment	Q'ty	Operated Area (ha)	Operating Width (m)	Operating Velocity (m/hr)	Operating Rate (ha/hr)	Operating Efficiency	Required Time (hr/unit)	Required Days (Days)	Engine Output (Days)	Loading Rate	*1 Fuel Consumption (lit)	*2·3 Annual Fuel Cost includ. oil ($)	Remarks
1. Farm Machinery													
1.1 4-Wheel Tractor Set													
1.1.1 4-Wheel Tractor	2 units										14,984	7,012.31	a
1.1.2 Bottom Plow	2 units	205*1/3	1.23	5,500	0.677	70%	72.15	9.0	80	60%	1,593	745.56	1 time/3yrs
1.1.3 Disc Plow	2 units	205*2/3	1.14	6,500	0.741	70%	131.74	16.5	80	60%	2,909	1,361.32	2 times/3yrs
1.1.4 Rotary Harrow	2 units	97*2	2.80	4,000	1.120	70%	123.72	15.5	80	60%	2,732	1,278.50	2 times/1yr
1.1.5 Disc Harrow	2 units	205*2	3.00	8,000	2.400	70%	122.02	15.3	80	45%	2,021	945.69	2 times/1yr
1.1.6 Power Sprayer	2 units	205*2	15.00	1,500	2.250	70%	130.16	16.3	80	45%	2,155	1,008.74	2 times/1yr
1.1.7 Grain Drill	1 unit	50*1	3.20	2,000	0.640	70%	111.61	14.0	80	45%	924	432.48	
1.1.8 Trailer	2 units						160.00	20.0	80	45%	2,650	1,240.01	
1.2 Hand Tractor Set											278	129.93	b
1.2.1 Hand Tractor	1 unit	4	0.65	1,600	0.104	70%	54.95	6.9	11.5	60%	87	40.81	
1.2.2 Trailer	1 unit	(entented distance ↓)					160.00	20.0	11.5	45%	190	89.13	
1.3.2 Engine-driver Sprayer	1 unit	4*1	45.00	800	3.600	70%	1.59	0.2	2.4	45%	0.5	0.28	c
1.4 Combine Harvester	2 units	205*1	2.50	2,400	0.600	70%	244.05	30.5	80	60%	5,389	2,521.85	d
	Q'ty	Discharge (ton)	Performance (ton/hr)				Required Time (hr)						
1.5 Engine Pump	1 unit	2,900	150				19		12.5	60%	33	15.61	e
2. Seed Processing Machinery				*4									
	Q'ty	Harvested Area (ton)	Yield (ton/ha)	Threshed Vol. (ton)	Performance (ton/hr)		Required Time (hr)						
2.1 Thresher	2 units	9	3.5	54.3	1.5		18		10	60%	70	32.53	f
	Q'ty	Processing Vol. (ton)	Performance (ton/hr/line)				Required Time (hr)						
2.2 Seed Processing Machinery		565	1.00				283	28	45	60%	1,754	821.02	g
3. Laboratory Equipment for Seed													*5
4. Workshop machinery and Equipment							(31.3PS,27.0PS,19.5PS,15.4PS,12.0PS for (25KVA,20KVA,15KVA,10KVA,7.5KVA,respectively)						
5. Office Equipment													
	Q'ty						Operating Time(hr/day)	Operating day(day/yr)	Engine Output (PS)	Loading Rate	Fuel Consumption (lit)	Annual Fuel Cost includ. oil ($)	
	1 lot						2	180	105	45%	3,620	1,834.44	h
6. Vehicles													
	Q'ty								Distance (km/yr)	Fuel C.R. (km/lit)	Fuel Consumption (lit)	Annual Fuel Cost includ. oil ($)	
6.1 Station Wagon									15,000	8	1,875	877.50	i
6.2 Motorcycle									8,000	26	923	432.00	j
6.3 Pick-up Truck									20,000	8	2,500	1,170.00	k
7. Supporting Equipment													
	Q'ty						Operating Time(hr/day)	Operating day(day/yr)	Engine Output (PS)	Loading Rate	Fuel Consumption (lit)	Annual Fuel Cost includ. oil ($)	
7.1 Portable Belt Conveyor	2 units						2	60	3	60%	138	64.70	l
Total	a+b+c+d+e+f+g+h+i+j+k+l											14,912.16	

*1 : Diesel Oil (lit) = unit × operating time (hr) × engine output (PS) × 0.23 × loading rate (%)

*2 : the fuel cost includes lubrication (+30%)

*3 : The fuel price is 0.36$ (Jan, 1993)

*4 : The threshed volume is considered moisture content of seed (25% to 14.5%)

*5 : The horsepower are referred to the estimation conditions published by Association of Japanese Construction Mechanization.

TABLE 5-14 OPERATION COST OF DRAINAGE PUMP STATION

1. Hourly Fuel Consumption

Equation $q = b \times ps/r$

Where: q : Hourly fuel consumption (lit/hr.)
b : Fuel consumption rate (0.22 kg/ps.hr.)
ps : Necessary engine power (ps)
r : Specific gravity of oil (0.89 kg/lit)

$q = 0.22 \times 60/0.89$
$= 14.8$ lit/hr/set

2. Operation Hours

2.1 Case-A : In case of 1/10 provable rainfall (= 151 mm/day)

When the provable rainfall with a return period of 1/10 occurs, the operation time will be 191.9 hr.

Total runoff = 337,336 m^3
Operation hour = 337,336/29.3 m^3/min = 11,513 min = 191.9 hr.

2.2 Case-B : In case of 1/2 provable rainfall (= 84 mm/day)

When the provable rainfall with a return period of 1/2 occurs, the operaton time will be 112.7 hr.

Total Runoff = 2.294 m^3/sec × 86,400 = 198,202 m^3
Operation Hour = 198,202/29.3 m^3/min = 6774.5 min = 112.7 hr.

3. Total Fuel Consumption

Base on the above conditions, the total fuel consumption is calculated at as follows,

Case-A : 29.6 lit/hr. × 191.9 hr. = 5,608.2 lit
Case-B : 29.6 lit/hr. × 112.7 hr. = 3,335.9 lit

4. Fuel Cost of Drainage Pump Station

Case-A : 5,680.2 × 0.34 $/lit = 1,931.3 US$
Case-B : 3,335.9 × 0.34 $/lit = 1,134.2 US$

5. Operation Cost for Case-B

1,134 US$ × 1.3 (Cost including lubrication oil) = 1,474 US$

TABLE 5-15 ESTIMATION ON POPULATION TO BE BENEFITED FROM PROJECT (1990)

Provine	Total	Rural Area
Battambang	512,552	418,140
Pursat	224,648	202,385
Banteay Meanchey	425,654	358,613
Siem reap	595,278	518,844
Prea Vihear	89,046	89,046
Total	1,847,178	1,587,028

Source : Ministry of Planning

FIGURE 5-1 METEOLOGICAL CHARACTERISTICS (BEK CHAN STATION)

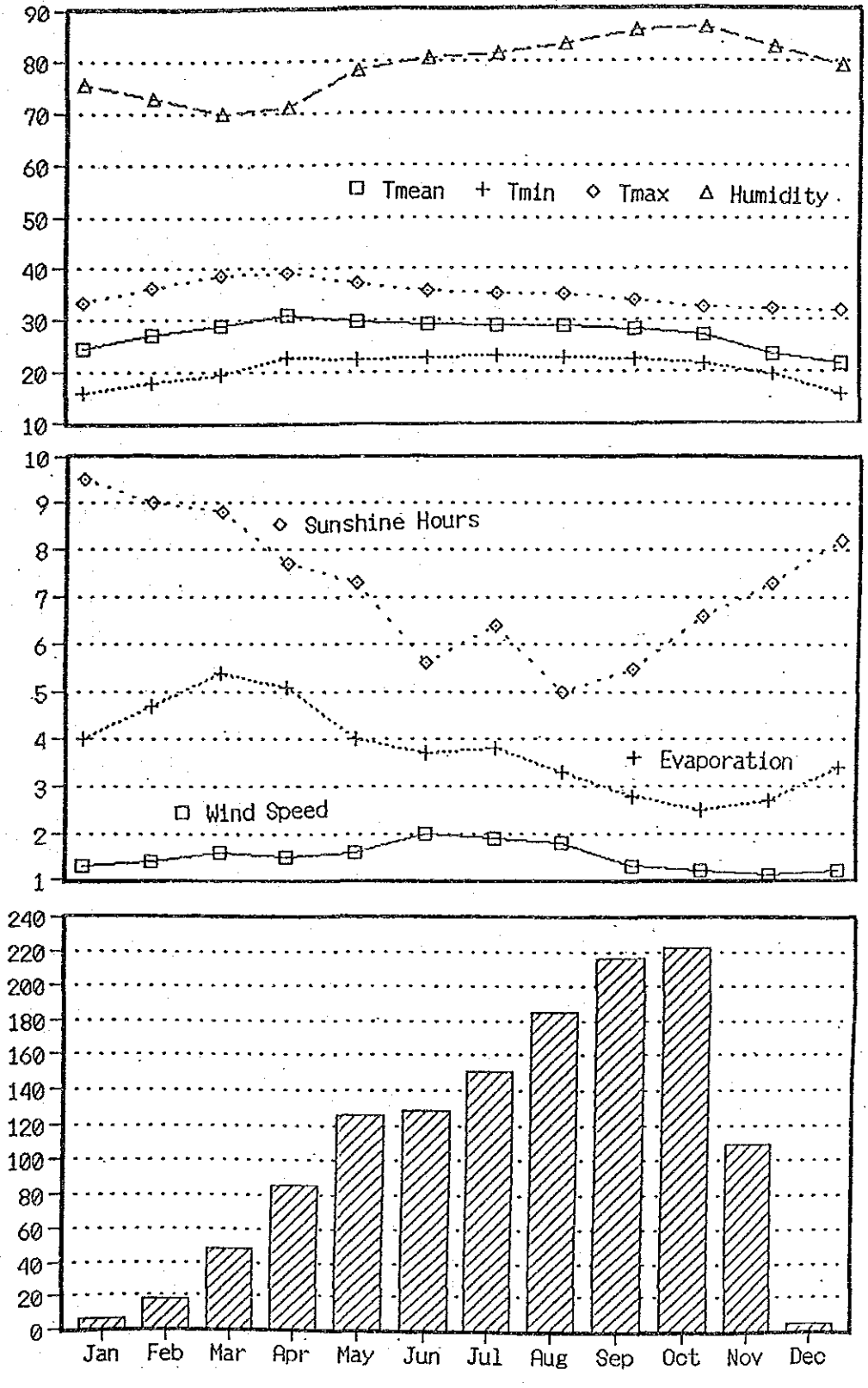
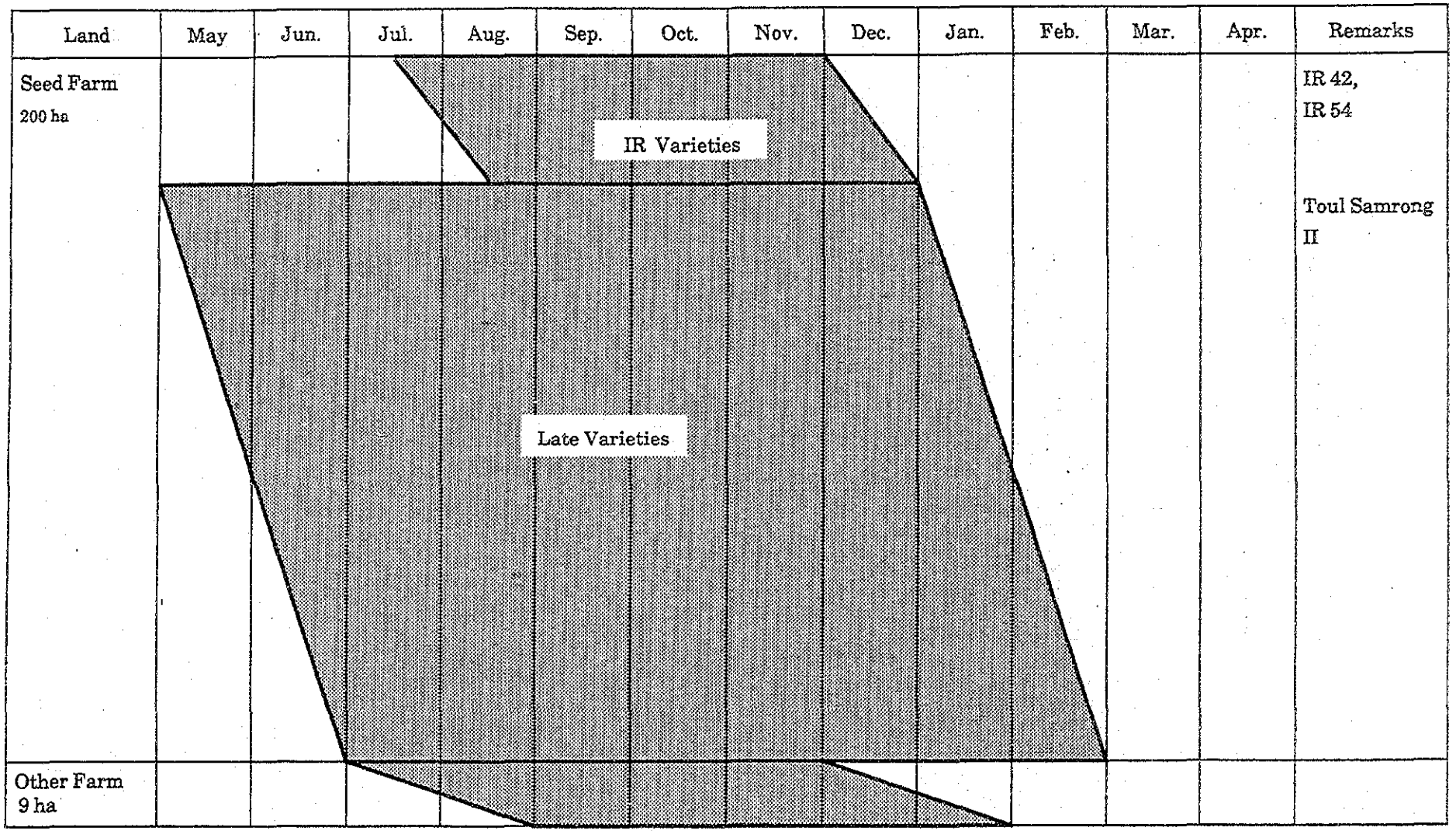


FIGURE 5-2 PRESENT CROPPING PATTERN OF TOUL SAMRONG AGRICULTURAL TECHNICAL CENTER



Foundation Seed and Research Farm

APPENDIX 6. LIST OF COLLECTED DATA

1. Questionnaires for the Basic Design Study on the Project of Rehabilitation of the Toul Samrong Agricultural Technical Center, Battambang Cambodia, Replied by Receiving Committee on the project, Ministry Agriculture, 1992.

2. Reconnaissance Landuse map, Mekong Secretariat, 1991.

3. Annual Research Report, Cambodia - IRRI Rice Project, 1992.

4. Rice Germplasm Catalog of Cambodia, 1992.

5. Electricity Generation by Municipality and Province, EDC, 1989.

6. Climatological Data, Battambang Station Hydrology Section of Battambang Provincial Agricultural Service, 1992.

7. Development Objectives of Agricultural Machinery, Dept. of Mechanization, Ministry of Agriculture.