percentage of infected hills) at this stage. Area infected by RTV in the first-half of wet season is predictable with the number of infected locations in the second-half of dry season. Outbreaks of RTV were triggered by the sporadic occurrence of severely infected paddy fields in RTV-endemic areas at around the beginning of wet season. Severaly infected fields (>60% infected hills) occurred under such condition that 1) percentage of infected hills in young rice stages is more than 4 times as large as the control threshold, and 2) the transplanting is done when the mean infective vector index in migrant producing fields (5-9 WAT) in the asynchronous transplanting area is more than 15 (per 25 net strokes per 100 hills).

As a step to the development of control and management system, a control threshold based on the forecasting of rice-yield reduction by RTV was established. The infective vector index at young rice stages was found most reliable in predicting the cumulative infection. Yet, any control threshold involving accurate GLH population census was considered to be impractical for farmers. Therefore, control thresholds based solely on the precentage of infected hills bearing visible, leaf-yellowing symptoms were developed for 2 to 5 WAT on empirical bases. Immediate control action is to be taken if RTV incidence exceeds the control threshold.

Besides,a study on the morphology and biology of Nephotettix species was conducted in Bogor. Methods of classification and identification among species and larval instars in Nephotettix was established.

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3.2.3. Palawija mainly soybean pests

Research activities of the palawija group aim to establish forecasting systems and control measures of soybean pests in order to increase and stabilize soybean production.

In the study on the relationship between the pest occurrence and cropping system, pests of soybean were divided into two groups on the bases of the relationship between the total area of soybean fields and the rate of area infested by each species of pests to the total area. One is the group of pest species which have such a tendency that the rate of area infested by each of them increases as the total area of soybean fields increases. These species can easily colonize in a new area and increase the population density rapidly. They are considered to be key pests in the area where soybean is cultivated once a year. These key pests are Spodoptera litura, Etiella zinckenella, E hobsoni, Heliothis armigera, and Chrysodeixis spp.

If soybeans are cultivated all the year round, all the insect pests are supposed to increase as much as to cause damage. Therefore, cultivation of soybeans should be limited once a year.

Critical period for controling Eliella spp. were presented in terms of days after planting for several soybean varieties. Isoxathion was effective for controlling Eliella spp. The adequate sample size of Etiella spp. and other three pest species was calculated for the sampling program on the bases of their spatial distribution patterns.

Economic injury level (EIL) and control threshold (CT) of Spodoptera litura were presented as numbers of larvae per hill.

Effect of natural enemies on Spodoptera litura were evaluated with the result showing wingless predators mainly affect the survival rate of the pest.

Cultural control of the bean fly, Ophiomia phaseoli was achieved by straw mulching on soybean fields as a practical method.

Chemical control method of grass weeds in soybean fields was established, in which the treatment of selective post emergence herbicides such as fluazifop-butyl was very effective.

3.2.4. Rice disease

An attempt was made to establish the forecasting method of rice blast disease, Pyricularia oryzae CAVARA, and to get the informations on the other main diseases of rice in Indonesia.

(1) Epidemiology of rice blast disease

Results of field survey on blast epidemic in Jatisari (low land area) and Tasikmalaya (high land area) gave the following informations. The dispersal of conidiospores occurred throughout the year in field but the dispersal pattern varied with time, season and locality. For instance, the diurnal pattern of spore dispersal had two peaks around midnight and the following morning. It means that climatic conditions such as temperature and dew formation period per day on leaf blade (wetness) are important factors for the occurrence of rice blast. The wetness of leaf lasted about 9-11 hours a day at both Stations, although the duration of dew period at Tasikmalaya is relatively longer than Jatisari. In addition there were 2 patterns of blast disease progress in the field, 1) low land type (Jatisari type) and 2)

high land type (Tasikmalaya type). The high land type usually indicated a pattern of severe occurrence of panicle blast, while the low land type indicated light occurrence. The recognition of these patterns will provide the basis for forecasting technology in future.

(2) Pathogenic race of rice blast fungus

To forecast the occurrence of blast disease, the prevalence and distribution of pathogenic races in each area were studied. A new set of rice varieties (consists of 7 varieties) was proposed as the Indonesian race differentials and based on the reaction of differentials, 27 races were identified in Indonesia. Races 001, 113, 013, 003, 201, 041, 101 and 133 were prevalent. Based upon the reaction to the representative isolates of blast fungus, the main Indonesian varieties of rice were classified into 12 groups. After that field resistance (horizontal resistance) of Indonesian varieties was estimated by a nursery-bed method in field.

(3) Epidemiology of bacterial red stripe disease of rice

A new disease, bacterial red stripe (BRS), was discovered by Mogi in 1987. BRS disease is widely distributed in Indonesia with yield loss ranging 16-72%. The causal agent is a bacterium of rod-shaped, 1-2 polar flagella and Gram negative. Colonies on potato agar plate are faint yellowish milky white.

Although the organism is Pseuomonas sp., the specific name is not determined yet. Primary lesions occur on leaf, sometimes on upper part of sheaths, the shape is a small circular or elliptical spot having red-yellow or red-brown yellow color.

(4) Development of forecasting system and control measure of BRS

The causal organism is a kind of seed-borne pathogen and the disease cycle of BRS were conjectured through the investigation. It can be detected by using selective medium. These information will be useful to develop the method for forecasting BRS occurrence. In addition to the use of healthy seeds, the application of the seed treatment were recommended for controlling BRS. Calcium hypochlorite (Cl contents 65%) was useful for seed treatment. In field, Cu+Kasumin was shown more effective than other chemicals.

3.2.5. Rat control

(1) Identification and biological characters of rat

It was reported that about 150 species of murid rodents were found in Indonesia and nine of them were economically harmful. Morphology, distribution, habitat and habit of the 9 species were described. The most prevalent and harmful species was the rice-field rat, Rattus argentiventer. To make the study efficient, a breeding method was devised by using the rice-field rat from Indonesia. It was basically same with the conventional method for breeding rat. By using the method it took about 8 weeks for the rice-field rat from mating to weaning. Some useful methods for estimating the age of rat were also investigated.

(2) Population dynamics of rat

It was found that seasonal change of the population density of rat in rice field was influenced by the growth stage of rice plant. Breeding season was followed by the increase of the population of rat and occurred twice a year during the generative stage. The population density of rat was also fluctuated by migration of rat from the surrounding areas. Sexual maturity of female was more faster than male. The abundance of hole/nest in each habitat varied with the stage of rice plant. At ripening to harvesting stage of rice plant, the abundance of hole/nest and population density were so high that it was easy to find the hole/nest.

(3) Assesment of rat damage

Yield loss of rice caused by rat was disastrous and ranged from 5 to 60%. Food preference of rat varied with the growth stage of rice plant. Accordingly the distribution pattern and intensity of rat damage were different in each stage. The critical point of rice plant is in heading stage with the density level of about 10-20 individuals per hectare and in panicle-initiation stage with density of about 20-45 individuals per hectare for dry season and wet season respectively.

(4) Control measures of rat

Effective methods for controlling rat in nursery-bed or paddy field were developed. The main control methods were 1) the cultural control such as synchronizing planting, minimizing the

refuge of rats and burning the straws after harvest, 2) combined use of plastic fence and multicapture-traps (Bubu), and 3) the application of rodenticide during tillering stage to the end of maximum tillering stage. Trapping was also useful to estimate the population density of rats in field.

The effectiveness of rodentisides was tested. Brodifacoum (0.05%) and Ikari Neo Ratte (0.05% VD_3+0.025% Warfarin) were effective for controlling rat. The toxicity of Ikari Neo Ratte to rat was determined as acute toxicity of indirect anticoagulant. The value of oral acute LD_{50} was 3.0909 mg/kg for male and 31.8489 mg/kg for female. The treated rats were dead in 1 to 5 days and the majority of them in 2 days.

3.3. Improvement of pesticide analysis

3.3.1. Study on composition of pesticide formulation

For levelling up the techniques of pesticide analysis for quality control of formulation and the residues in food, soil etc., the modern analyzers, i.e. Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Spectrophotometer, and Gas Chromatography Mass Spectrophotometer (GC-MS) were installed.

Using these analyzers, training of officers for analytical technology and inspection of marketed pesticides were carried out. Pesticides were collected from the market and active ingredient of these samples were analyzed. As the result, it was found that 4.9 - 15% of the pesticide was abnormal.

There was also incident of the distribution of adulterated pesticides which were ineffective to insect pests, and was feared

to give damage to rice plant. Therefore, importance of quality control of pesticides, monitoring and guidance to farmers was recognized.

Pesticides registered officially in Indonesia was analyzed by methods of Association of Official of Analytical Chemists (AOAC), Collaborative International Pesticides Analytical Council (CIPAC) etc. Various kind of compounds are used for pesticide, and are continuously developed now. Then further improvement of quality inspection of pesticide will be necessary to be continued, and analytical technique for new compounds especially biological control agents and antibiotics should be studied.

Among analyzers, GC, HPLC, and Spectrophotometer are made use of without difficulty. These analyzers are well maintainned and effectively used for pesticide analysis. However GC-MS needs continuous support for the maintenance of equipments, the operation, and analytical technique.

3.3.2. Establishment of safety use of pesticide

(1) Residue analyses of pesticides

Residue analyses of some pesticides were conducted in samples of crops, soil, water, and others. Several kinds of pesticides such as organophosphorous and carbamate compounds were detected in crops. In water samples of river and sea, residue analyses were carried out with method of Sep-Pak cartridge. Besides, residue analysis was conducted on cultured prawn.

Analyses of different kind of pesticides in crops and other materials are being continued now. In future, laboratory of

pesticide residue analysis will be necessary to separate from formulation laboratory. Studies of the monitoring of pesticide residue and fate of pesticides in environments are necessary. Then establishment of the upper limit of pesticide residue in food crops and environments will be required.

(2) Study of mode of action

Buprofezin, an insect growth regulator, has inhibition action to ecdysis of planthoppers. Since it has not insecticidal action and harmful effects to mammals or natural enemy such as spiders and insects except target pest, it's use to control of plant or leafhoppers is considered to be safe for environments. Mode of action of this chemical was studied. It was clarified that the chemical inhibits biosynthesis of some steroid of symbiont in BPH.

3.4. Other Acivities

3.4.1. Exchange of Information, speciments and reports

The Project provides policy-making and executing organs with technical guidance on crop protection.

The Project counterparts and experts occasionally give lectures about the research results at conferences and seminars held by scientific societies and Ministry of Agriculture, provincial offices and so on.

Japanese experts of entomology was assigned in Crop Protection Center VII in Bali. He monthly gave lectures on tungro diseases at institutions concerned around Bali.

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International Congress of Ecology was held in Japan, August 1990 and three experts presented the research results to it.

It is also involved in National Plant Protection Consultation Meeting. The meeting is annually held by Ministry of Agriculture since 1989 to discuss how to manage the network system of crop protection.

At present the Project is concentrating its efforts on preparing final reports of the research results. The reports will be reviewed at a final seminar held at the Jatisari Center in February, 1992. The officials concerned will participate in the seminar and new guideline for crop protection in Indonesia will be formulated.

3.4.2. Advice on training for food crop protection staff and workers.

Training programs are implemented at Jatisari Pest Forecasting Center. The National Training Course on Pest Surveillance and Forecasting has been held since 1988.

Assistant counterparts instruct the trainees from Crop Protection Center all over the country. The texbooks for the course contain the research results obtained through the project activities and they are formulated by the counterparts (see Appendix 5).

The project provides two types of course. Long-term course aims at developing practical skills of the staff in Crop Protection Centers and the directors of Field Laboratories. The trainees are expected to obtain the capability to conduct experiments by themselves.

Short-term course aims at encouraging executives such as the directors of Crop Protection Centers and those of extension in Provintial Offices to make a future strategy of how to apply the research results to the actual level.

The Project also provides International Training Course on Pest Surveillance and Forecasting. It was held from January 28 through March 3, 1991, with 10 participants from 5 Asian countries.

It was the first training course designed by the project and assisted by the Training Course in Developing Countries Program of JICA. It lasts for five years till 1994.

The Project also accept trainees for their practical skills. They are officials engaged in crop protection and sent to domestic universities for one year.

4. IMPACTS OF THE PROJECT

It is clear that the Project contributes largely to crop protection in Indonesia. The effects can be seen from following aspects.

(1) Counterparts level

Counterparts have become capable of managing the research activities. Basic skills have been transferred to them. Assistant counterparts instruct the participants of both National and International Training Course. The trainees express admiration for counterparts' expertise.

At Field Laboratory in Celuk, assistant counterparts have the capacity to give lectures to students of a local state university.

Assistant counterparts are working with much drive and show discipline under the guidance of Japanese experts. Five ex-assistant counterparts were promoted to the Directors of Crop Protection Centers. Counterparts' incentives to work hard on the Project should be esteemed highly and be sustained even after the end of the Project.

(2) Regional level

The Project has been developing practical countermeasures against pests and diseases of rice and soybean. Some developed techniques are applied to provincial level. Especially study results on brown planthopper are now put into farm experiment on a large scale.

The Project copes with infestation at actual fields. The Project warned a serious outbreak of brown planthopper and predicted at least 400 thousand tons of paddy would decrease in 1987. The President instructed the Government to take emergency countermeasures and requested Japan to provide the newly-developed pesticide, Buprofezin. The pesticide had been found to be more effective by the Project through areal spraying tests. Japan provided the Grant Aid in responce and as a result, the outbreak of brown planthopper has been prevented so far.

White stem borer increased explosively and attacked about 200 hectares of paddy in northern part of West Java in February 1988. The pest expanded over the northern part and damaged the paddy for three seasons. The Project conducted intensive monitoring survey and warned the pest occurrence. Macro-forecasting group of the Project keeps on tackling the problem.

(3) Policy-making level

The progressive activity of the Project should be a good example to both governments for future technical cooperation.

Computer working group accumulates and analyzes data on pest forecasting and control. The data is based on periodical report from 2,800 pest observers in 1,500 forecasting districts all over Indonesia. The data base system will contribute to formulating nation-wide policy on crop protection.

5. MANAGEMENT OF THE PROJECT

A joint committee was held once every year since 1987. The commitee reviewed the overall progress of the project and exchanged views on major issues, and its decision was substantionally reflected in the activities of the Project.

The Project comprises 7 research groups and keeps close linkage among the groups. Central office at the Directorate of Food Crop Protection in Pasarminggu conducts pesticide analysis and data accumulating and filing by computer.

Pest Forecasting Research Center in Jatisari, 130 kilometers away from Pasarminggu, has five research groups such as Brown Planthopper, Rice disease, Green leafhopper and Tungro disease, Rat control, and Palawija pests. Training programs are also implemented at the Center. Jatisari Pest Forecasting Center should be placed as a key center among a nation-wide network of crop protection.

The food Crop Protection Center I in Medan in North Sumatra povince researches on brown planthopper, while the center VII in

Denpasar in Bali province researches on green leafhopper and tungro disease (see Appendix 9). Some study on green leafhopper are conducted at Bogor Research Institute for Food Crops.

Food and Agriculture Organization (FAO) and United States Agency for International Development (USAID) provide the Government of Indonesia with assistance for Integrated Pest Management (IPM) since 1989 for three years.

The FAO-IPM project is being implemented under the Agency for National Development Planning (BAPPENAS) and emphasizes on pests control with natural enemies and use of less pesticides through field training of farmers and extension workers.

The Project experts and counterparts exchange knowledge and information occasionally with the FAO-IPM project for the mutual benefit.

VII. Recommendations

1. On the assumption that the cooperation project will terminate on March 31, 1992, the Project should place emphasis on following acivities until the end of cooperation.

(1) To provide intensive technical guidance by Japanese expert to Indonesian counterparts for the fields for which progress is rather slow, and to foster counterparts concerned to be more self-relient.

(2) To compile the achievement so far so that it can be utilized as a guideline for national crop protection measures. To print and distribute result of the study and research to authorities concerned.

(3) For the purpose of effective use of the achievement, to exchange views sufficiently with authorities concerned on the future development of the similar project, crop protection measures, relevant research activities etc.

2. After the termination of the cooperation project, following measures shall be taken by the Government of Indonesia.

(1) To respect the results of the cooperation project which lasted about 12 years including the first phase, and to make best efforts in improving and putting them into practical use for the benefit of the people and preferably to sustain and further develop similar activities.

(2) To secure finacial resource and human resource for the above-mentioned activities and also for the effective use of equipment and facilities provided so far by Japan.

Appendix 1

PRODUCTION OF RICE AND SOYBEAN IN INDONESIA

Year	Harvested Area (million hectare)		Product Amount (million ton)		Yield per hectare (t/ha)	
	Rice	Soybean	Rice	Soybean	Rice	Soybean
1970	8.14	0.70	25.27	0.50	3.11	0.72
1975	8.50	0.75	29.20	0.59	3.44	0.79
1980	9.00	0.73	29.60	0.65	3.29	0.89
1981	9.38	0.81	32.77	0.70	3.49	0.87
1982	8.99	0.61	33.60	0.52	3.74	0.86
1983	9.16	0.64	35.30	0.54	3.85	0.84
1984	9.76	0.85	38.10	0.77	3.91	0.90
1985	9.90	0.90	39.00	0.82	3.96	0.98
1986	9.99	1.25	39.70	1.23	3.97	0.98
1987	9.92	1.10	40.10	1.16	4.04	1.06
1988	10.14	1.18	41.70	1.27	4.11	1.08
1989	10.53	1.20	44.70	1.32	4.25	1.10
1990	10.50	1.33	45.20	1.49	4.30	1.11

Source : Central Bureau of Statistics, "Statistical Yearbook of Indonesia"

Appendix 2

LIST OF JAPANESE EXPERTS

(LONG - TERM EXPERTS)

NAME	FIELD	PERIOD
Dr. Socho Nasu	Leader	1 Apr.1987 - 31 Mar.1992
Dr. Hiroichi Sawada	Coordinator/Crop protection	1 Apr.1987 - 31 Mar.1992
Dr. Yoshito Suzuki	Entomology	1 Apr.1987 - 31 Mar.1991
Dr. Shizuo Mogi	Plant Pathology	22 Apr.1987 - 31 Mar.1992
Dr. Kohji Hirano	Entomology	8 Apr.1988 - 31 Mar.1992

(SHORT - TERM EXPERTS)

NAME	FIELD	PERIOD
Mr. Okimasa Murakami	Rat Control	30 Jul.1987 - 12 Sep.1987 28 Jul.1988 - 12 Sep.1988 30 Mar.1989 - 28 Jun.1989 31 Oct.1989 - 25 Dec.1989 10 Apr.1990 - 25 May.1990 10 Apr.1991 - 31 Jul.1991
Dr. Kouji Yamamura	Computer	8 Apr.1988 - 8 Jun 1988
Mr. Chikanori Kubota	Supervision	12 Jul.1988 - 23 Dec.1988
Mr. Yasushi Ousato	Supervision	10 Aug.1988 - 7 Nov.1988
Prof. Dr. Satoshi Wakimoto	Plant Pathology	30 Mar.1989 - 14 Apr.1989

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Appendix 2 (continued)

Prof. Dr. Sumio Tojo	Entomology	12 Sep.1989 - 30 Sep.1989
Mr. Hidemitsu Nagayoshi	Pesticide analysis	10 Apr.1990 - 8 May.1990
Mr. Hisashi Naito	Pesticide Analysis	22 Apr.1991 - 21 May.1991
Mr. Kazuhiko Konishi	Soybean Pest	21 Aug.1991 - 15 Sep.1991
Dr. Shunichi Miyai	Computer	20 Nov.1991 - 25 Dec.1991

Appendix 3

LIST OF EQUIPMENT PROVIDED BY JAPAN

Fiscal Year				
1987	1988	1989	1990	1991
Amount 34 (million yen)	64	63	13	39 (Estimate) Total 213
(Main Equipment) Vehicle, Computer system, Stabilizer Sole, Inoculate Incubator,Automatic drying Sterilizer, Glass incubator, Electric incubator, Uniformity inoculation, Air conditioner, Disease resist.test apparatus, Binocular microscope, Rat fence, Scientific book, etc.	Jeep,Motorcycle, Drying apparatus model, Balance Model, Stereo microscope, Behaviour meter model,Solar power Condition, Camera, Laboratory Unit Portable pH meter Voltage Stabilizer, Vaccum freezing dryer,Personal Computer, etc.	Consentration Meter, Video system, Receiver, Microscope, Automatic recording Hygrothermometer, Full automatic camera, Perfection desicator Personal computer Jeep, Motercycle, Sola stabilizer, Farmcop, etc.	Vehicle, Motorcycle, Rat trapping, Photo-copy machine, Stereoscopic Microscope Electric balance Temp.& hum.meter, Portable recorder,thermograph Large sledge, Microtomers, Thermo-hygrograph, Camera, Personal computer,Power Supply model, etc.	Colony counter, Te-Her contiuance injector, Dew meter, Area meter, Drying machine Autothermohygrographs, Stereo microscope, Degital pH meter, Personal computer, Refrigerator, Photo copy machine, etc.

Appendix 4

LIST OF INDONESIAN PERSONNEL TRAINED IN JAPAN

NAME	ASSIGMENT	PERIOD
Ir. Ellen E.	Japanese language	2 Oct.1987-31 May.1988
Ir. Dadi Hudiya	Study tour	29 Mar.1988-20 Apr.1988
Ir. I.G.Ngurah Astika	ditto	ditto
Ir. Wiyadi Laksono	ditto	ditto
Ir. Belman S.	ditto	ditto
Drs. Ruswandi	Rice pest & disease control	1 Jun.1988-24 Dec.1988
Ir. Djoned A.S.	Computer System	22 Sep.1988-13 Mar.1989
Ir. Sukmana S.	Study tour	12 Nov.1988-20 Nov.1988
Ir. T.B. Suhaedi Wiraatmadja	ditto	ditto
Dr. A.Muin Pabinru	ditto	ditto
Dr. M.Satta Ws.	ditto	ditto
Ir. Siswanto. M	Japanese Language	31 Mar.1989-7 Apr.1989
Ir. Sugandhi Zaenuddin	Rice pest & disease control	1 Jun.1989-8 Dec.1989
	Rice blast	9 Dec.1989-31 Mar.1990
Ir. Hatmawati Ugelta	Japanese Language	28 Sep.1989-28 May.1990
Ir. Harsiwi T.	Rat Control	1 Mar.1990-17 May.1990
Ir. Eva Manjas	Brown planthopper	18 Mar.1990-17 Nov.1990
Ir. Anik K.	Rice cultivation	4 Mar.1991-25 Jan.1992
Supardjilah, BSc.	Pesticide	10 Sep.1991-17 Mar.1991
H a s r i	Pesticide	10 Sep.1991-17 Mar.1991
Ir. I.G.N. Aryawan	Tungro disease	23 Sep.1991-29 Mar.1992

Appendix 4 (continued)

(Japanese Government Scholarship)

Dr. Ayi Kusmayadi (Brown Planthopper Group)	Master Program at Kyoto University	Oct.1985 - Mar.1988
	Doctor Program at Kyoto University	Apr.1988 - Sep.1991
Ir. Catur Putra Budiman M.Sc. (Pesticide Group)	Master Program at Kobe University	Apr.1986 - Mar.1989
	Doctor Program at Tokyo University of Agriculture	Apr.1989 - Mar.1992
Ir.I Nyoman Widiartha,M.Sc. (Green Leafhopper Group)	Master Program at Okayama University	Apr.1987 - Mar.1990
	Doctor Program at Okayama University	Apr.1990 - Mar.1993

Appendix 5

PERFORMANCE OF NATIONAL TRAINING ON PEST SURVEILLANCE & FORECASTING

	Fiscal Year 1988 (1st)	1989 (2nd)	1990 (3rd)	1991 (4th)
(Long-term Course)				
No. of trainees	40	23	23	29
Period	11 Apr.- 6 Aug.	24 Jul.- 30 Mar.	18 Jun.- 9 Mar.	23 Sep.- 8 Feb.
(Short-term Course)				
No. of trainees	10	10	10 *(19)	10
Period	5 Sep.- 9 Sep.	11 Dec.-15 Dec.	19 Nov.- 23 Nov. *(18 Jun.- 23 Jun.)	8 Feb.-11 Feb.
No. of participants	18	86	54	51

* Course on soybean pests

Appendix 6

FERMORMANCE OF MISSIONS DISPATCHED BY JICA

1. Consultation Study for making up the 5-year plan in detail	12 Dec. 1987 - 22 Dec. 1987
2. Technical Guidance Team for discussing progress and future plan of research activities	29 Jan. 1990 - 10 Feb. 1990
3. Technical Guidance Team for discussing progress and future plan of reasearch activities	26 Mar. 1991 - 7 Apr. 1991

Appendix 7

PERSONNEL ASSIGNMENT OF THE PROJECT IN 1991

	Counterparts	Assistant counterparts	Supporting staffs	Total
Head of Project	1	-	3	4
Working group				
Brown planthopper				
(Jatisari)	1	3	11	15
(Petarukan)	-	1	21	22
Rice disease **)	1	2	7	10
Computer	-	1	3	4
Palawija *)	1	2	10	13
Rat *)	(1)	2	6	8
Tungro				
(Jatisari) **)	(1)	2	5	7
(Denpasar)	-	7	7	14
(Bogor)	1	1	3	5
Pesticide analysis	1	6	5	12
Total	6	27	81	114

*) : One official is concurrently assigned.
**) : One official is concurrently assigned.

Appendix 8

BUDGET ALLOCATION BY INDONESIAN GOVERNMENT

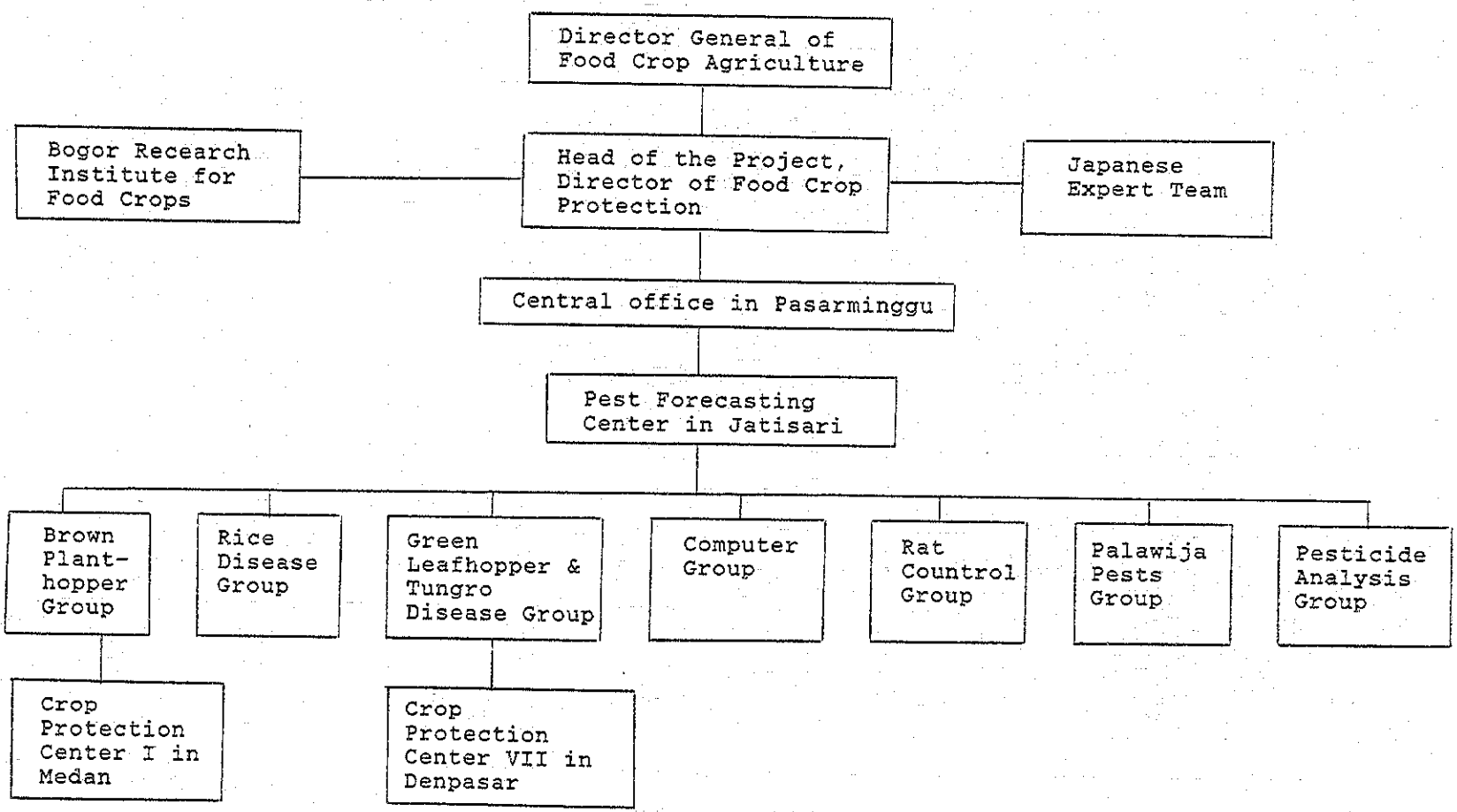
(Unit : Million Rupiah)

	Fiscal Year					
	1987	1988	1989	1990	1991	Total
Routine budget	12	25	28	30	37	132
Development budget	0	20	20	32	40	112
Others (Natinonal training course)	10	15	20	30	37	112
Total	22	60	68	92	114	356

* Remarks : Fiscal year in Indonesia Government starts in April.

Appendix 9

STRUCTURE OF THE PROJECT



② 協力活動実施状況

（農業開発協力部平成３年８月作成）

協力項目 (T.S.I.)	'87／'88	'88／'89	'89／'90	'90／'91	'91／'92
1．作物保護策定に対する技術的指導					
1) 作物保護のためコンピューターシステムの利用					
(1) データ集積、ファイリング及び病害虫管理に必要な情報処理					
(2) 予察モデルの開発					
(3) 農薬登録					
2) 病害虫防除計画の展示					
3) 稲病害虫の総合的管理技術の構築と実証試験					
2．稲及びパラウィジャ主に大豆の病害虫の発生予察、監視調査、					
防除遂行のための野外及び研究室における研究					
1) トビイロウンカ（ＢＰＨ）					
(1) 個体群動態に関する研究					
(2) バイオタイプに関する研究					
(3) 予察モデル及び監視システムの構築					
(4) 防除と管理システムの開発					
2) タイワンツマグロヨコバイ及びツングロ病					
(1) 個体群動態に関する研究					
(2) ツングロ病伝播過程の分析					
(3) 予察モデル及び監視システムの構築					
(4) 防除と管理システムの開発					
3) 水稲病害					
(1) いねいもち病の疫学的研究					
(2) いねいもち病菌レースに関する研究					

協　力　項　目　(T.S.I.)	'87／'88	'88／'89	'89／'90	'90／'91	'91／'92
(3) 他の病害の疫学的研究					
(4) 予察システムと防除法の開発					
4) 野ソ					
(1) 分類及び生物学的特性に関する研究					
(2) 個体群動態に関する研究					
(3) 野ソによる被害解析					
(4) 予察と防除システムの開発					
5) パラウィジャ主に大豆病害虫					
(1) 主要病害虫の調査					
(2) 個体群動態に関する研究					
(3) 予察モデル及び監視システムの構築					
(4) 防除法の開発					
3．農薬分析の改善					
1) 農薬組成成分に関する研究					
2) 農薬の安全使用の確立					
4．他　の　活　動					
1) 情報、標本及びレポートの交換					
2) 作物保護スタッフ及び作業員に対する訓練についての指導					
3) その他					

協　力　項　目　(T.S.I.)	'87／'88	'88／'89	'89／'90	'90／'91	'91／'92
日本側の対応					
1．専門家の派遣					
1) 長期派遣					
(1) チームリーダー			奈須		
(2) 専門家　昆虫			鈴木		
昆虫			平野		
植物病理			茂木		
(3) 調整員　植物防疫専門家			沢田		
2) 短期派遣　関連分野の短期専門家は必要が生じた時に派遣					
2．日本におけるインドネシア人C／Pの受入れ					
1年に2～4名					
3．機材供与					
インドネシア側の義務					
1．カウンターパート及び管理者の配置					
1) 本計画の責任者					
2) 日本人専門家へのカウンターパート					
3) 研究室アシスタント					
4) 圃場作業員					
5) 事務員及びサービス係					
2．土地、建物及び他の必要な設備					
3．必要な予算配分					

③　無償資金協力概要

稲病害虫発生予察防除計画（Ⅰ，Ⅱ，Ⅲ期）

（一期）　1986年～1987年－施工　昭和60年度無償　　20.6億円

（二期）　1987年～1988年－施工　昭和61年度無償　　12.3億円

（三期）　1987年～1989年－施工　昭和62年度無償　　19.8億円　　計　52.7億円

インドネシアの10州を対象とし

ＰＥＣ……Pest Forecasting Center　病害虫発生予察センター（ジャチサリ　1箇所）

ＦＣＰＣ……Food Crop Protection Center　食用作物保護センター（609～665㎡）

管理事務室、技師室、実験室、会議室、図書室、倉庫、作業場

ＦＬ……Field Laboratory　発生予察実験所（340～412㎡）

管理事務室、実験室、会議兼討論室、倉庫、作業場

ＰＬ……Pesticide Laboratory　農薬検査所（343㎡）

建物のみならず車輌を含む必要機材も供与

無償対象施設一覧

州	第1期 施設	第1期 箇所数	第2期 施設	第2期 箇所数	第3期 施設	第3期 箇所数
アチェ	—	—	—	—	FL	2
北部スマトラ	—	—	—	—	FCPC FL	1 2
南部スマトラ	—	—	—	—	FCPC FL	1 1
ランプン	—	—	—	—	FL	2
西部ジャワ	PFC FCPC FL	1 1 4	—	—	—	—
中部ジャワ	—	—	FCPC FL	1 5	—	—
東部ジャワ	FCPC FL	1 3	FL	1	—	—
バ　リ	FCPC FL	1 2	—	—	—	—
南部カリマンタン	—	—	—	—	FCPC FL	1 2
南部スラウェシ	—	—	—	—	FCPC FL	1 2
施設箇所合計		13		7		15

PFC　1
FCPC　8
FL　26
計　35

インドネシア

実施年度	60	案件名	稲病害虫発生予察防除計画（Ⅰ期） Pest and Disease Forecasting Control Project	

要請の背景および経緯	インドネシア政府は農業開発分野において特に米増産に力を入れているが、これに基づき稲病害虫発生予察防除を効果的かつ経済的に実施するために必要な「発生予察と防除」に関するネットワーク造りを進めてきた。今回そのネットワークの根幹である病害虫発生予察センター（西部ジャワ）、作物保護センターや予察実験所（西部、東部ジャワおよびバリ州）の建設を要請越したもの。

		調査実績	
供与額	20.61 億円 (総額 52.69)	区分	期間
交換公文署名日	61. 2.28	事前調査	59. 6.20～ 6.29
相手国受入機関	農業省食用作物総局	基本設計調査	60. 8. 6～ 9.12
施設等所在地	西部・東部ジャワ バリ州	報告書説明	60.12.10～12.17
着工(船積)年月日			
完工(引渡)年月日	62. 3. 8		

協力の概要

施設

(1) 発生予察センター（床面積計 3,261㎡）
本館、寄宿舎、網室、倉庫、乾燥床

(2) 食用作物保護センター（ＦＣＰＣ）
・バンドン　（床面積合計 737㎡）
・スラバヤ　（　〃　871㎡）
・デンパサール（　〃　871㎡）

(3) 発生予察実験所
・ＩＡタイプＦＬ 682㎡
・ＩＢタイプＦＬ 610㎡

注）建設は、Ⅰ・Ⅱ期に分けられる。

インドネシア

実施年度	61	案件名	稲病害虫発生予察防除計画（Ⅱ期） Pest and Disease Forecasting Control Project	

要請の背景および経緯	我が国は、インドネシアの農業分野における安定的な自給体制の確立のために、食糧増産援助とそれにかかわる稲病害虫発生予察防除関係の技術協力を実施してきており、多大な成果をあげている。同国政府も病害虫防除を効果的に実施するために「発生予察と防除」に関するネットワーク造りを進めているが、本件はその一環としてネットワークの根幹である病害虫発生予察センター、作物保護センターや予察実験所の建設と必要な資機材の供与を要請越したもの。

		調査実績	
供与額	12.30 億円 (総額 52.69)	区分	期間
交換公文署名日	61. 8.20	事前調査	
相手国受入機関	農業省	基本設計調査	60. 8. 6～ 9.12
施設等所在地	中部・東部ジャワ州	報告書説明	60.12.10～12.17
着工(船積)年月日			
完工(引渡)年月日	63. 3		

協力の概要

施設

食用作物保護センター　732㎡
発生予察実験所
Aタイプ（682㎡、2実験所）
Bタイプ（610㎡、4　〃　）

機材

実験機材
気象観測機材
教育普及機材
統計機材
車輌
通信機材
圃場機材

インドネシア

実施年度	62	案件名	稲病害虫発生予察防除計画（Ⅲ期） Pest and Disease Forecasting Control Project	

要請の背景および経緯	インドネシア政府は'75年前後から大発生した稲の病害虫対策として予察防除技術と農薬管理技術に関する技術協力を我が国に要請し、現在プロ技協を継続中であるが、更に稲作地9州を対象として病害虫発生予察と防除活動の全国ネットワークシステムの確立を目的として本計画が策定され、今回は第3期分として外領稲作6州に対する施設の建設および機材の供与を要請越したもの。

		調査実績	
供与額	19.78 億円 (総額 52.69)	区分	期間
交換公文署名日	62. 7. 2	事前調査	
相手国受入機関	農業省	基本設計調査	61.12.21～62. 1.27 62. 1.17～ 1.27
施設等所在地	アチェ、 北部スマトラ 他	報告書説明	62. 3.25～ 4. 3
着工(船積)年月日			
完工(引渡)年月日	64. 3		

協力の概要

施設 (約12,908㎡)

(1) 食用作物保護センター（4ヶ所、約220㎡、173㎡、168㎡、200㎡）
(2) 発生予察実験所 (11ヶ所)
(3) 農薬検査所 (1 〃)

機材

実験機材、気象観測機材、教育普及機材、統計機材
車輌機材、圃場機材、農薬検査用機材