

資料 6

BRIEF REPORT OF EVALUATION
ON
JAPAN-INDONESIA JOINT FOOD CROP RESEARCH PROGRAM

July 20, 1978

JAPAN-INDONESIA JOINT FOOD CROP
RESEARCH PROGRAM EVALUATION TEAM

JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN

CONTENTS

	(Page)
Introduction	164
I.I. Achievements in Joint Research Program	165
1. Survey Items	
2. Method of Survey	
3. Outline of Survey Results	
3-1 Evaluation of Research Activities	
3-2 Evaluation of Research Facilities and Equipment	
3-3 Problems Encountered in the Progress of Joint Research Program	
3-4 Impact of Joint Research Program on Agricultural Research Administration in Indonesia	
3-5 Research Activities in the Residual Period of Joint Research Program	
3-6 Problems in the Training of Counterparts	
3-7 Utilization of Research Facilities and Equipment	
II. Comments and Proposal concerning Research Cooperation after Termination of Present Research Program	176
III. Time Schedule up to Commencement of New Project	180
IV. Japanese Master Plan of New Project	181
V. Conclusions	182
Table 1. Plan of Operation of Present Program for 1978 (Draft)	
Table 2. Research Plan for New Project (1978 ~ 1983)	
Table 3. Expert Dispatch Plan for New Project (1978 ~ 1983)	
Table 4. Plan of Training and Study Tour of Indonesian Researchers in Japan (1978 ~ 1983)	
Annex. List of Research Results of Indonesia-Japan Joint Food Crop Research Program (1970 ~ 1978)	

Itinerary of Japanese Evaluation Team in Indonesia

<u>Date</u>	<u>Day</u>	<u>Description</u>
July 7	Fri.	Courtesy call on AARD and BAPPENAS.
10	Mon.	Courtesy call on CRIA. Arrangement of the schedule of the Japanese Evaluation Team and presentation of the Japanese master plan of R/D on the New Project.
11	Tue.	Meeting with the Japanese expert team.
12	Wed.	Explanation of the Japanese master plan of R/D on the New Project. Evaluation of entomological researches and discussion meeting with the related counterparts.
13	Thu.	Evaluation of plant physiological researches and discussion meeting with the related counterparts.
14	Fri.	Evaluation of plant pathological researches and discussion meeting with the related counterparts.
15	Sat.	Evaluation of agronomical researches and discussion meeting with the related counterparts and visit for the Muara Sub-station of CRIA.
17	Mon.	Seminar on entomology and agronomy.
18	Tue.	Seminar on plant pathology.
19	Wed.	General meeting at CRIA.
20	Thu.	Making report.
21	Fri.	Presentation of a brief evaluation report to CRIA.
24	Mon.	Report of the survey result to AARD and BAPPENAS.

MEMBER LIST OF THE JAPANESE EVALUATION TEAM
ON
THE INDONESIA-JAPAN JOINT FOOD CROP RESEARCH PROGRAM
(from July 6 to July 25, 1978)

Leader (Plant Physiology)	Mr. Shigetada MATSUMI Deputy Director, Tohoku Agricultural Experiment Station, Ministry of Agriculture and Forestry (MAF)
Plant Pathology	Dr. Shoji YOSHIMURA Head, Division of Plant Pathology, National Institute of Agricultural Sciences, MAF
Entomology	Dr. Socho NASU Chief, 4th Laboratory of Entomology (Forecasting Program for Insect Pests), Division of Entomology, National Institute of Agricultural Sciences, MAF
Agronomy	Dr. Kanenori NAKAYAMA Chief, 1st Laboratory of Upland Operation System, Division of Upland Farming, Central Agricultural Experiment Station, MAF
Cooperation Planning	Mr. Komei YAMAMOTO Overseas Technical Cooperation Officer, International Cooperation Division, International Affairs Department, Economic Affairs Bureau, MAF
Coordination	Mr. Eiji HASHIMOTO Officer-in-charge, Technical Cooperation Division, Agricultural Development Cooperation Department, Japan International Cooperation Agency (JICA)

BRIEF REPORT OF EVALUATION
ON
JAPAN-INDONESIA JOINT FOOD CROP RESEARCH PROGRAM

Introduction

The Final Japanese Evaluation Team for Japan-Indonesia Joint Food Crop Research Program, organized by Japan International Cooperation Agency, was sent to Indonesia for a period of three weeks from July 6 to 25, 1978 under the leadership of Mr. Shigetada Matsumi.

The objectives of this six-member evaluation team were as follows.

- 1) Make comprehensive evaluations of the achievements and problems in the Japan-Indonesia Joint Food Crop Research Program (hereafter referred to as the "Joint Research Program" or the "program") which has been implemented for more than seven years in the past since October 23, 1970 at the Central Research Institute for Agriculture, Bogor (hereafter abbreviated to "CRIA").
- 2) Incorporate the results of evaluations in the forthcoming New Joint Research Project (hereafter referred to as the "New Project") which will be started in autumn this year.
- 3) Present the Japanese draft of the master plan of R/D on the New Project to the Indonesian government, and adjust and finalize the schedule of prior arrangements for the New Project through discussions with the pertinent Indonesian authorities.

During its stay in Indonesia, the team had a series of discussions with the following Indonesian officials and research staffs who were concerned with the Japanese-Indonesian joint research scheme, and also conducted relevant evaluation surveys. Throughout these discussions, candid and constructive opinions were exchanged concerning the above-mentioned objectives of the team, rendering it possible for the team to discharge its mission successfully.

Mr. Sadikin Sumitawikarta

Head

Agency for Agricultural Research and Development

Dr. Marah Rusli Hakim
Director,
Central Research Institute for Agriculture

Staffs of Divisions of Agronomy, Pest and Diseases
and Plant Physiology,
Central Research Institute for Agriculture

I. Achievements in the Joint Research Program, and Evaluations

1. Survey Items

- a. Research subjects and achievements in each field covered by the Joint Research Program
- b. Problems encountered in the progress of the Joint Research Program, and analysis of their causes and measures taken for their solution
- c. Impact of the Joint Research Program on the agricultural research administration in Indonesia
- d. Research activities to be conducted in the residual period of the Joint Research Program
- e. Problems in the training of the Indonesian counterparts

2. Method of Survey

- a. Collection and analysis of the research reports and papers which were either published or presented at seminars, symposia and meetings of academic societies in the past
- b. Interviews and discussions with the CRIA's staffs and other Indonesian counterparts
- c. Inspection of research facilities and equipment in specific reference to their utilization condition

3. Outline of Survey Results

3-1. Evaluation of Research Activities

The research subjects and achievements in each field covered by the Joint Research Program are shown in the attached Annex (List of Research Results of Indonesia-Japanese Joint Food Crop Research Program, 1970-1978).

The Joint Research Program was instituted under an agreement between

the governments of Japan and Indonesia with the view to enhancing research cooperation between the two countries in the following three fields which are concerned mainly with plant protection.

- 1) Ecological aspects and control of main diseases of food crops
- 2) Occurrence forecasting of insect vectors of virus diseases of food crops
- 3) Physiological disorders of food crops, and their plant physiological research

In 1975, the program was extended for three years, whereby some sectors of entomology and agronomy were added to the above research fields. Accordingly, the program now covers the following five research fields which are shown in detail in the Annex.

- A. Plant pathological and virological researches
- B. Plant physiological researches
- C. Entomological researches
- D. Rat
- E. Agronomical researches

In the field of A. Plant pathological and virological researches, the following subjects were covered.

- 1) Disease survey on food crops
- 2) Rice diseases
- 3) Upland crop diseases (corn, legume, cassava, and sweet potato)
sweet potato)

- 1) Disease survey on food crops: Main diseases of food crops in Indonesia were identified. However, there is possibility that diseases not covered by the survey or new in Indonesia will be detected in future. It is therefore necessary to continue the captioned survey on a long-term basis.
- 2) Rice diseases: Very elaborate studies were made on sheath blight, bacterial leaf blight, Penyakit habang, and Kerdil Hampa.
- 3) Upland crop diseases: Researches of downy mildew of corn, mung bean scab, and virus/mycoplasma diseases of legume plants were conducted in a very efficient and systematic way.

These surveys and researches were not only advanced but also highly

elaborate and up-to-date in nature. The results were reported in many publications including "Report of Japan-Indonesia Joint Food Corp Research Program, 1970 - 1975" which was issued in 1977, "Contribution of CRIA," "Annals of the Phytopathological Society of Japan," "Phytopathology," "Virology," "TARC Symposium Series," and "JARQ," or at various international meetings and symposia including "Indonesian Phytopathological Society Meeting," and enjoyed high international evaluations. It deserves attention that mung bean scab and Kerdil hampa of rice are the new diseases discovered by the joint research team. Downy mildew of corn (Sclerophthora maydis), one of the most important disease of that crop, was studied electron-microscopically and the basic information mechanism of the causal organism. This will be useful for the consideration of control method in the future. It was also suggested that a system fungicide may be effective for the control of the disease. The achievements in the researches concerning the varietal resistance of bacterial leaf blight and the strain of Xanthomonas, its pathogenicity in particular, are expected to contribute largely to the Indonesian breeding program of high yielding varieties. Indonesian isolates of blast fungus (Pyricularia oryzae), an important pathogen of upland rice, were tested for their pathogenicity to Indonesian rice varieties as well as to International and Japanese differentials. The result suggested that the relation between varieties and isolates is so complicated that further studies will be needed to establish a differential system for this country.

One of the problems to be solved in future is the need for which no control method is established yet such as downy mildew of corn, maize mosaic virus, and virus diseases of legume plants especially in soybean.

In the field of B. Plant physiological researches, the following subjects were pursued.

- 1) Surveys and studies on physiological disorders of rice plants
- 2) ~ 5) Nutrition of inorganic elements and yield of rice
- 6) Utilization of organic matters on lowland rice
- 7) Nutritional studies on upland crops
- 8) Physiological examination of rice plants
- 9) Other studies

- 1) Surveys and studies on physiological disorders of rice plants: Main physiological diseases in rice growing areas in Indonesia were brought to light, and their causes were clarified with effective countermeasures also proposed for their control. It was found that solution can be brought with relative ease for physiological diseases resulting from the deficiency of inorganic elements, but the control of those disorders ensued from poor environmental condition such as excessive soil moisture and heavy metals calls for further studies aimed at the establishment of an adequate environmental improvement policy. It was also found that studies on physiological disorders need to be continued in future because it is possible that new problems will arise if the survey area is extended. The joint research revealed that deficiency or excess of inorganic elements bears closely upon the occurrence of pathological diseases of rice, and succeeded in detecting Helminthosporium stem rot on potassium-deficient rice plant. It is therefore hoped that joint researches covering plant pathological fields and nutrio-physiological aspects will be conducted in future.
- 2) Effective utilization of nitrogenous fertilizer: Studies were made on economical appliccation of nitrogenous fertilizer with account taken of soil condition, which produced many useful results including the confirmation of the effect of slow released ball fertilizer in reducing "autumn decline (Akioichi)" of rice plants and in mitigating the occurrence of Helminthosporium leaf spot. About 70% of nitrogenous fertilizer applied on some soils was lost without being absorbed by rice plants. It is therefore hoped that further studies will be made on such soils in connection with suitable fertilization period and method and adequate form and kind of nitrogenous fertilizer in order to attain an increase in recovery and yield.
- 3) Effect of phosphatic fertilizer on rice plants: Detailed studies were made in the fields and by pot tests to find out the effect of phosphatic fertilizer on rice by soil type. In these studies, the tripartite relationship involving soil - phosphatic fertilizer -

rice plant was clarified using main types of soils distributed in Indonesia, whereby the importance of nutrition of phosphate was confirmed. Studies to be made in future include the researches for improving the fertilizer response of those soils which tend to aggravate phosphorus deficiency and the phosphorus response test of soils which were not covered by the joint research.

- 4) Studies on potassium nutrition of rice plants: Researches on physiological disorders of rice and cultural tests of high yielding varieties were conducted, which made it clear that one can no longer entertain the conventional notion that the potassium requirements of rice varieties grown in Indonesia can be met sufficiently by naturally supplied potassium contained in soil and irrigation water. It was confirmed that rice plants short of potassium content presents a symptom of heavy manganese sufficient disease, but not only the damage due to the disease can be alleviated but also the yield can be increased if potassium is applied on the diseased rice plants. While only nitrogenous and phosphatic fertilizers are used at present, it is necessary to identify the soil groups demanding potassium application in order to be able to attain increased rice production by the application of three elements.
- 5) Studies on sulfur and manganese deficient soils: Soils presenting sulfur deficient symptoms which are similar to nitrogen deficient symptoms were identified, and the effect of sulfur application on such soils was demonstrated. As soils in many places of the outer territories excluding Java are poor in chemical condition and susceptible to various nutritio-physiological disorders resulting from the excess or deficiency of manganese or other elements, it is hoped that the joint research on this subject will be expanded to cover a new and broader field.
- 6) Application of organic matters in paddy fields: In planning the application of organic matters in paddy fields, some apprehensions were entertained about the reduction problems of paddy field and possible occurrence of physiological disorders which could be caused by growth inhibition of roots. In ordinary paddy fields,

however, all varieties excepting a few were subjected neither to growth inhibition at the initial stage nor to yield drop because of rapid decomposition of rice straw, thus indicating that potassium deficiency of rice plant can be made up for by the application of rice straw. Further studies should be made to classify the application effects of organic matters according to the soil type and to determine optimum dosages.

- 7) Nutritional studies on upland crops: In these studies conducted on soybean and groundnuts, the absorption rate of various inorganic elements was made clear for soybean, and various data useful for future soybean production were also obtained. However, since the researches covered a rather small number of upland crops, it is necessary to clarify the nutritional characteristics at each growing stage and requirement of each element for upland crops, leguminous crops in particular, in order to provide a guide to their fertilization control. It is also desirable that studies will be made on the water metabolism of upland crops and root nodule bacteria of leguminous crops.
- 8) Physiological examination of rice plants: The differences in the root ability of paddy varieties were made clear, and useful data on rice cultivation and breeding were also produced. In addition, applicability of urea fertilizer was examined by conducting tests on Biuret using seedlings. In future, it is hoped that researches will be conducted on the translocation and metabolism of nutrients by employing isotope techniques for nutrient tracing so that the fundamental knowledge of plant nutrition and physiology will be made deeper and broader.

Joint research covering both physiological disorders and agronomical aspects of crops in high-yielding culture is an important research subject to be undertaken in future in addition to those mentioned above. Specifically, the relationship between the fertility of different soils and the plant nutrition will have to be clarified for analysis of conditions for high-yielding culture.

In the field of C. Entomological researches, the research subject was

limited to the vectors of virus and mycoplasma diseases, so that studies were made on the insect transmission of yellow dwarf, grassy stunt and Penyakit habang of rice as well as on the seasonal prevalence of leafhoppers and planthoppers.

While six species of stemborers (Lepidoptera) of rice were identified with their distribution in Indonesia made clear, studies were also made on the effect of insecticides against useful insects and egg parasite of brown planthopper (Nilaparavata lugens). As for virus and mycoplasma diseases of leguminous crops, it was confirmed that Aphis glucines and Aphis craccivora (a kind of aphid) caused vector transmission of stunt, dwarf and yellow mosaic of soybean, peanut mottle, mung bean mosaic, crinkle leaf and aphid-borne mosaic of cowpea. The joint entomological researches also revealed that the transmission of peanut mosaic and witches broom of leguminous crops was caused by a kind of leafhopper (Orosius argentatus).

These achievements were reported in the "Report of Japan-Indonesia Joint Food Crop Research Program" and "Contribution of CRIA" and also presented at "Southeast Asia Reg. Symposium" and "Staff meetings of CRIA."

What is most required in future in this research field is to promote intensive and concentrated studies on a limited number of crucially important problems such as the occurrence forecasting method of Nilaparavata lugens, ecology of the vector of Kerdil hampa, and insecticide application method in Indonesia. As for the vectors of legume virus, the seasonal prevalence of aphid and leafhopper in upland fields must be studied. These studies will make it possible to acquire a good grasp of the transmission period and suitable control period of virus or mycoplasma diseases.

As regards insecticide resistance of vectors, it will be necessary to clarify the problems encountered in Indonesia at present and shape the course of future research activities.

In the fields of D. Rat control researches which were just started in this year, basic researches and surveys should be prompted in future.

In the field of E. Agronomical researches which were started only about

two years ago (March 1976), all research subjects are still at the Intermediate stage of progress. Nevertheless, some achievement have already been recorded. For example, it was discovered that the water requirement varies by season or variety, and nitrogenous fertilizer exhibits the highest fertilization effect if applied twice in the growth period, i.e., at the tillering stage and at the young ear formation stage. While agronomical experiments need to be repeated time and again to obtain reproducible results, it will be necessary to make an ecological and physiological approach to such experiments in order to make the results more reliable. If agronomical researches are conducted in the field, reproducible results can hardly be obtained unless the research workers and assistants take for themselves all measures for maintaining the test condition such as management and care of the field and also conduct observation and survey of growing condition. The team wishes to point out that it is very important to make clear the interrelations between the presently conducted researches and the related research plans incorporated in the New Project which will be started in October this year.

3-2. Evaluation of Research Facilities and Equipment

Under the Joint Research Program, research facilities and equipment worth a total of 260 million yen (additional budgetary cost in 1978, approx. 100 million yen) have been supplied to CRIA in the last seven years.

At the outset, it was found difficult to secure places suited for installation of these facilities and equipment. Several research laboratory building, however, has been constructed by the Indonesian government since 1970, one after another in CRIA, it possible to arrange them in a well-planned manner, permitting them to be used frequently in various research fields. Recently, completion of the Plant Protection Research Building constructed with Japanese aid under a grant basis rendered it makes an effort to fill up the facilities and equipment of CRIA.

As a problem for future, it may be pointed out that the maintenance, - repair and management system of the facilities and equipment needs

further improvement. The team felt that all facilities and equipment having been thus made available in a well-consolidated state, the question now consisted in how efficiently they would be utilized in future research activities.

3-3. Problems Encountered in the Progress of Joint Research Program, and Analysis of Their Causes and Measures for Their Solution

a. As many research facilities and equipment were supplied under the program, there arose the difficulty in securing suitable places for their installation at the outset and it was found necessary to improve the power and water supply facilities.

However, this problem was solved by the increase in the budgetary appropriation for CRIA's facilities and equipment from the Indonesian government.

b. Supply of spare equipment and parts should be planned for those facilities and equipment which have been utilized frequently in the past. As a phenomenal increase is expected in the supply of various equipment and materials with the expansion of the joint research scheme, it will also be necessary to recruit electricians and mechanics for the exclusive purpose of providing satisfactory maintenance and repair services for electrical and other equipment to be used under the New Project.

c. The survey disclosed that there was a case where a period of several months was required for the repair of an important research equipment. Periodical itinerant maintenance services of a Japanese manufacturers' service group or groups should therefore be considered for certain specific and costly equipment.

3-4. Impact of Joint Research Program on Agricultural Research Administration in Indonesia

The Joint Research Program has been implemented with the view to strengthening CRIA's plant protection research system, amplifying its research activities, and improving the technical level of its research staffs. By reason of the outstanding achievements recorded in the last seven years, the program is evaluated as one of the most successful

technical cooperation projects ever conducted at CRIA, and has gained an appreciable recognition of the competent authorities in both Japan and Indonesia.

The following may be cited as most conspicuously exemplifying the impacts of the program.

- 1) The program has induced CRIA's research staffs and counterpart scientists to exhibit greater volition for research activities, encouraging them to contribute more actively to the CRIA's Report and to hold intra-division meetings and seminars more frequently. It has also stimulated them to positive participation in symposia and meetings held by international organizations or neighbouring countries.
- 2) Compared to the level at the start of the program, the budgetary appropriation of the Indonesian government for CRIA's Plant Pathology Sub-division increased remarkably, the growth rate being six times larger as compared with the start of present Program.
- 3) The number of regular research staffs of CRIA's Plant Diseases and Pests Division nearly doubled as compared with the level at the start of the program, with the entire staff of the division enabled to work in a lively and active atmosphere.

3-5. Research Activities in the Residual Period of Joint Research Program

The agreement on the current Joint Research Agreement will expire on October 22, 1978. Table 2 shows the research activities to be conducted in the remaining period of the program, together with the research subjects, names of Japanese experts, equipment supply plan, and duration of stay in Japan of visiting Indonesian scientists.

3-6. Problems in the Training of Counterparts

a. Awarding of Degree

Hopes were expressed time and again in the past by Indonesian officials concerned for enabling Indonesian scientists to obtain an academic degree in Japan. During the present evaluation survey, too, CRIA's staffs presented this problem and asked about the

progress of the "cooperating universities plan" in Japan. However, this plan is still at the stage of preliminary coordination between the Ministry of Foreign Affairs and the Ministry of Education, Science and Culture, so that the system for its operation is not established yet.

Under an agreement recently concluded with Bogor Agricultural University, it is expected that Tokyo University of Agriculture, a non-governmental agricultural university, will act as a "core" university which, under the "cooperating universities scheme," is responsible for organizing a group of cooperating universities or research institutions. Under this agreement, Tokyo University of Agriculture will provide research guidance and extension services in order to enable the persons of Bogor Agricultural University to obtain a degree. This "core" university system is irrelevant to that proposed for government-level promotion of scientific exchange and research cooperation, and its operation is intended to allow the persons of Bogor Agricultural University to obtain a degree while on its register and for this purpose, four Japanese professors will visit Indonesia and provide itinerant research guidance.

It is not certain, however, whether CRIA's staffs can enjoy the same privilege as persons under this system. It is hoped that the qualifications and procedures for receiving research guidance under this system will be clarified for CRIA's staffs.

- b. Training of counterparts and assistances should be continued to secure a sufficient number of capable scientists in future. The New Project calls for the services of counterparts capable of making necessary observations and surveys, forming judgement, and formulating future plans according to the progress of research activities, as well as for the services of research assistants who can be fully entrusted with daily experiments and field tests without detailed instructions. Qualitative improvement of these counterpart personnel should be enhanced with the progress of the New Project from a long-range point of view.

c. Hopes were expressed that the following improvements be effected in connection with the training of Indonesian counterparts in Japan

- 1) Extension of the period of their stay in Japan to enable them to obtain a degree from a Japanese university.
- 2) Increase of research expenses of visiting Indonesian scientists. (It was desired that the research expenses including power and water supply charges would be increased on a sliding-scale according to the commodity price escalation.

II. Comments and Proposals concerning Research Cooperation after Termination of the Present Joint Research Program

1. The present Joint Research Program was initiated on October 23, 1970 for completion in a period of five years. Under an agreement concluded between the governments of Japan and Indonesia, it was planned that the program would be implemented for joint plant protection researches in the following three specific fields.
 - 1) Ecological aspects and control of main diseases of food crops
 - 2) Occurrence forecasting of insect vectors of virus diseases of food crops
 - 3) Physiological disorders of food crops, and their plant physiological researches
2. For the purpose of joint researches in the above three fields, the Japanese government contributed to the program by dispatching experts to provide research guidance, by receiving their Indonesian counterparts for training in Japan, and by supplying facilities and equipment necessary for the program implementation. These cooperation activities were conducted in an effort to upgrade CRIA's research system and capabilities in the said three fields and to promote the qualitative improvement of Indonesian scientists.
3. Prior to its termination, the agreement on the program was extended for three years on the basis of the findings of two interim surveys (1974

and 1975) and a pre-evaluation survey as well as in conformity to the strong desire expressed by the Indonesian Agency for Agricultural Research and Development and CRIA. As a result of this extension, the scope of research cooperation was expanded to cover some sectors of agronomy and entomology. The cumulative total of Japanese experts who participated in the Joint Research Program numbered 12 for long-term experts including Dr. Y. Iwata and 12 for short-term experts.

4. The Indonesian government gave extremely high evaluations to the program and in March 1977, CRIA expressed the hope that a new joint research project be implemented in continuation of the present program upon termination of its agreement. In November 1977, the Japanese government sent a survey team to discuss with CRIA's staffs regarding the background of this request and details of cooperation fields. At a meeting with CRIA's staffs, the team pointed out that the Indonesian government should forward an official request to the Japanese government in order to get the New Project started in time. Consequently, an official request for the New Project was sent to the Japanese government through Mr. S. Sadikin, Head of Agency for Agricultural Research and Development.
5. The official request for the New Project was identical in contents to the request received in March 1977. Specifically, it was a request for continued research cooperation in the cultivation, water management, fertilization and weed control of main crops centering on rice and upland crops and in related research fields covering plant pathology, entomology and plant physiology.
6. At present, it is planned that CRIA will be reorganized into a Research Institute for Food Crops by absorbing Horticultural Research Institute. It is also envisaged under its future development plan that its representative offices at Malang (East Java) and Banjarmasin (Kalimantan) will be reorganized into new branches adding to the existing three at Sukamandi (West Java), Maros (Sulawesi) and Padan (Sumatra), and that a total of 26 sub-stations will be established in different places in the country. Furthermore, 4 Sub-stations have been started in Sumatra from April of this year by the foreign aid. Sub-stations are staffed with research workers and their activities are limited to tests and experiments interested by ARIA's head office.

The following table shows the past production of main crops selected for accelerated food production in Indonesia.

	(In thousand tons)			
	<u>1970</u>	<u>1973</u>	<u>1975</u>	<u>1976</u>
Paddy	23,148	25,901	27,573	28,282
Upland paddy	2,120	2,189	1,930	1,930
Maize	2,825	3,689	2,638	2,512
Cassava	10,478	11,185	12,322	12,468
Sweet potato	2,175	2,386	2,477	2,418
Groundnuts	281	290	329	411
Soybean	497	541	562	482

As for the production tendency of these crops, paddy is on the increase but all others have remained on the same level or pursued a downward trend over the past years. This is ascribed to the inadequacy of varieties, lack of cultural technology, and decline of market price. CRIA is planning to amplify its research activities for augmented production of the above main crops by appropriating 50% of its budget for rice and the other 50% for secondary crops including, among others, soybean for which Japanese research cooperation is specially desired.

7. The following are the aids currently offered to CRIA by third countries and international organizations.
 - a. Grant from USAID
 - Assistance in rice breeding through IRRI
 - b. Loan from the World Bank
 - Development of Sukamandi Branch of CRIA
 - c. Grant and Loan from USAID
 - Development of Sumatra
 - d. Dutch grant
 - Climatology in CRIA and Development of Maros Branch of CRIA
 - e. Japanese grant
 - Assistance in CRIA's researches (plant pathology, plant physiology, etc.)

f. Canadian grant

Assistance in cropping system through IRRI

8. In view of the high evaluations given to the Joint Research Program and the growing national demand for accelerated food production in Indonesia, the team considers that Japan should comply in a positive manner with the request for the New Project specifically for the following reasons.
 - a. The Indonesian government is hoping for wholesale cooperation of Japan as she is now the only country providing project-based cooperation for CRIA.
 - b. The Joint Research Program has played a role of a pioneer in international research cooperation in Indonesia as can be readily seen from the outstanding achievements recorded in its 7-year implementation period and the high evaluations given thereto.
 - c. The present program covers research fields related only to plant protection. It is desirable that the New Project be started as a comprehensive agronomical research program not only covering plant protection but also aiming at basic studies and application researches in a greater diversity of fields such as water management, breeding method of leguminous crops, weed control, soil and fertilization management, plant physiology, nematology, rodent control, toxicology and so forth.
 - d. Implementation of the New Project at CRIA, Bogor, will make it possible to provide basic data required in the planning and execution of other Japanese agricultural cooperation projects in Indonesia and at the same time promise to heighten the joint research achievements gained in the last seven years.
9. For reasons enumerated above, it is proposed that the following fundamental policy be adopted for the New Project.
 - a. Objective
 - 1) Cultural researches of main food crops including paddy and leguminous crops.
 - 2) Researches in plant physiology and plant protection of the main crops mentioned above.

- b. Place of implementation
Central Research Institute for Agriculture (CRIA), Bogor, or its branches or sub-stations if need arises.
- c. Period
Five years starting on October 23, 1978.
- d. Number and specialized fields of Japanese experts
As per Table 3.

III. Times Schedule up to Commencement of New Project

January	1978	Receipt of the official request from the Indonesian government regarding the New Project.
February	"	Consultations of the pertinent Japanese authorities (Ministry of Foreign Affairs, Ministry of Agriculture and Forestry, and Japan International Cooperation Agency) concerning the New Project.
April	"	Completion of the Japanese draft of the master plan of the New Project.
May	"	Consent of the said Japanese authorities to the said draft of master plan after examination.
June	"	Registration of the Indonesian proposals for the New Project with IGGI Card of BAPPENAS (Official communication from the Japanese Embassy in Jakarta).
July	"	Evaluation survey of the present Joint Research Program; Presentation of the Japanese draft of R/D on the New Project to the Indonesian government and CRIA.
"	"	Review of the Japanese draft of R/D on the New Project (Indonesian side).
Aug. (Middle)	"	Sending the Indonesian draft of R/D to JICA, Tokyo.

Aug. (End)	1978	Review of the Indonesian draft of R/D on the New Project (Japanese side).
"	"	Presentation of the final Japanese draft of R/D on the New Project
Sept.	"	Coming Japanese R/D Mission to Indonesia. Conclusion of R/D on the New Project.
Oct.	"	Expilation of the present agreement and enforcement of the new R/D on October 23.
"	"	Dispatch of a new team of cooperating experts.

IV. Japanese Master Plan of the New Project

Taking advantage of its visit to Indonesia in July 1978, the Evaluation Team for the Joint Research Project presented the Japanese draft of the master plan of the New Project to Mr. Sadikin Sumintawikarta, Head of the Agency for Agricultural Research and Development and Dr. Marah Rusli Hakim, Director of the Central Research Institute for Agriculture (CRIA).

Details of the master plan, shown in the attached Annex, were explained not only to the directors of the above two organizations but also to the CRIA's staffs. The Indonesian government officials was requested to convey its desires and opinions to the Japanese government through the normal diplomatic channel regarding the master plan. The main desires and opinions expressed by the relevant Indonesian officials and research staffs during the team's stay in Indonesia were as enumerated below.

- 1) The title of the Japanese R/D draft should be change the following.
"Strengthening of Legume and Cereal Research Project"
- 2) Regarding the place of implementation of the New Project, applied experiment will make it possible to providing on the any places in Indonesian country if need arises.
- 3) Improvement of participating expenses of the symposium and International research conferences which held in Japan.
- 4) Difficulty on the medical sevices and accommodations to the Japanese experts and their families owing to the basis of the Indonesian own expenses.
- 5) As tests and experiments on fertilizer practice are undertaken by

Agronomy Division at CRIA, it is hoped that an additional Japanese plant physiologist will be dispatched to Agronomy Division on a long-term assignment.

- 6) Short-term dispatch of nematologist, toxicologist, rodent control scientist and weed control scientist is desirable.
- 7) Water management research is not to be construed in the restricted sense of the term meaning only water management for paddy culture, but should be interpreted in a broader sense applied to the irrigation system of all types of farmland including paddy fields and various upland fields.
- 8) A considerably large amount of fund will be appropriated for the supply of various facilities and equipment under the New Project, but it is empirically known to be impossible to complete the purchase of equipment worth this amount in a single fiscal year. In addition, there are no buildings for storing large-type machinery and equipment. It is therefore hoped that suitable budgetary measures will be taken for supply of buildings and warehouses, either to be constructed or prefabricated for assembly at site.
- 9) Supply of back numbers of main overseas research reports and periodicals in each fields is desirable.

V. Conclusions

The findings of the evaluation survey and the opinions and desires of the relevant Indonesian officials and research staffs regarding the New Project will be subjected to further reviewal after the team's return to Japan, and maximum effort will be expended for realization of such desires.

Besides making a comprehensive evaluation of the Joint Research Program now in progress, the team is hoping for smooth implementation of the New Project and determined to serve as its promoter.

In concluding this brief evaluation report, the team wishes to express its deep gratitude to the competent Indonesian Authorities and the Japanese experts stationed in Indonesia for the helpful assistance rendered throughout the survey period.

Shigetada Matsumi
Leader.
Japanese Evaluation Team for Japan-
Indonesia Joint Food Crop Research
Program

July 1978

Table 1. Plan of Operation of Present Project for 1978 (Draft)

Japanese Experts		(1978)												Affiliation
L: Long-term S: Short-term		Apr	May	Jun	Jul	Aug	Sep	Oct.	Nov	Dec				
L	Leader								→	Oct.22			JPPA	
L	Agronomist								→	"			Chugoku AES	
L	Entomologist								→	"			Hokuriki AES	
S	Entomologist		May 23										NIAS	
S	Rodent control scientist		"										Yamagata Pref.	
S	Plant pathologist		Jun.5				Aug.20						NIAS	
S	Plant virologist		"				Sep.4						NIPV	
S	Plant physiologist		Jun.16				Aug.15						CAES	
S	Chemist (pesticide)				Jul.20			Sep.30					NIAS	
S	Entomologist				Jul.6			Sep.19					NIAS	
S	Equipment installation												Dhimano Co.	
S	"												(2 weeks) Gaschromatograph	
S	"												(2 weeks) Atomic absorption spectro photometer	
S	"												(") Amino acid analyzer	
Indonesian Visiting Scientists														
M: Medium-term														
S	Plant Physiology Div., S CRIA												Sunyatna Effendi	
M	Agronomist												(10 days)	
M	Plant pathologist													
M	Plant physiologist													
M	Entomologist													

Table 2. Research Plan for New Project (1978 ~ 1983)

Research Theme	Content of Research	Division in Charge
A. Study on Upland Crops, especially Legume Crops		(Training in Japan)
a) Study on Breeding Technique on Soybean	i. Breeding Technique etc.	Agronomy
b) Study on Cultivation Practice of Soybean	i. Cultivation Methods of Soybean ii. Application Methods of Fertilizer iii. Improvement of Seed Germination etc.	Agronomy
c) Study on Upland Weed Control	i. Development and Ecology of Upland Weed ii. Physical, Chemical and Integrated Control of Weed in Upland fields etc.	Physiology
d) Study on Plant Physiology of Upland Crops	i. Physiological Disorders ii. Soil Microorganisms etc.	Pathology Entomology
e) Study on Plant Protection	i. Ecology and Control of Diseases on Upland Crops ii. Ecology and Control of Insect Pests on Upland Crops etc.	Agronomy
B. Study on Rice Production		
a) Study on Rice Cultivation	i. Water Requirement and Water Management ii. Drought Injury etc.	Agronomy
b) Study on Practical Methods of Fertilizer Application, Conservation and Improvement of Soil Productivity	i. Effective Utilization of Fertilizer ii. Application Methods of Fertilizer under various agro-climatic condition iii. Conservation and Improvement of Soil Productivity etc.	Agronomy
c) Study on Weed Control	i. Development and Ecology of Weed ii. Effect of Herbicide etc.	Physiology
d) Study on Plant Physiology	i. Requirement of Nutrients (Using ¹⁵ N, etc.) ii. Physiological Disorders etc.	Pathology Entomology Entomology
e) Study on Plant Protection	i. Ecology and Control of Rice Diseases ii. Ecology and Control of Rice Insect Pests iii. Insect Identification and Taxonomy iv. Rats etc.	

Table 3. Expert Dispatch Plan for New Project (1978 ~ 1983)

Field	Long term or Short term	1st year	2nd year	3rd year	4th year	5th year	Remarks
Team Leader	Long term			*			
Upland Crops Cultivation	Long term			*			including Soybean Cultivation. Breeding Technique, General Upland Crops Cultivation, Weed, Control, and Conservation and Improvement of Soil Productivity
	Short term	↔	↔	↔	↔	↔	
Rice Cultivation	Long term			*			including Water Management, Weed Control, Application Methods, and Conservation and Improvement of Soil Productivity
	Short term	↔	↔	↔	↔	↔	
Plant Physiology	Long term			*			including Plant Nutrition, Physiological Disorders and Soil Microorganisms
	Short term	↔	↔	↔	↔	↔	
Plant Pathology	Long term			*			including Plant Pathology on Upland Crops, Plant Pathology on Rice and Nematology
	Short term	↔	↔	↔	↔	↔	
Entomology	Long term			*			including Entomology on Upland Crops, Entomology on Rice, Insect Identification & Taxonomy, Rats and Toxicology
	Short term	↔	↔	↔	↔	↔	
Coordinator	Long term			*			

Note: The short term experts may be dispatched in the fields of above table and other field including the installation and/or maintenance of equipments when necessity arise.

Table 4. Plan of Training and Study tour of Indonesian Researchers in Japan (1978 ~ 1983)

Field	1st year	2nd year	3rd year	4th year	5th year	Total Number
I. Training for Counterpart Researchers						
1. Upland Crop Cultivation	—	—	—	—	—	5
2. Soybean Breeding	—	—	—	—	—	3
3. Soil and Fertilizers	—	—	—	—	—	3
4. Rice Cultivation	—	—	—	—	—	4
5. Entomology	—	—	—	—	—	3
6. Plant Pathology	—	—	—	—	—	2
7. Plant Physiology	—	—	—	—	—	3
II. Study tour of Research Administrators						
	—	—	—	—	—	4
Total Number	7	6	6	6	2	27

Note: 1. Training period of counterpart researchers in Japan shall be about 6 months.

2. Study tour period of Research Administrators in Japan shall be about 3 weeks.

資料 7 Annex List of research results of Indonesia-Japan Joint Food Crop Research Program (1970 ~ 1978)

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>A. PLANT PATHOLOGICAL AND VIROLOGICAL RESEARCHES</p> <p>1. Diseases survey on food crops in Indonesia</p> <p>a. Disease survey on food crops</p> <p>Nishizawa, T., et al. (1972) List of diseases of food crops</p> <p>Iwata, Y. (1972). Plant disease forecasting in Japan (mimeograph)</p> <p>2. Studies on diseases of rice</p> <p>a. Sheath blight, stem rot and sheath blight of rice</p> <p>Nishizawa, T., M. Mahmud, Mukelar A. and Otjim Sumantri (1973). Studies on sheath blight and stem rot of rice (March 1971 ~ March 1973)</p> <p>Kajiwara, T. and Kosim Kardin (1975). A method of seedling inoculation for the screening of resistant variety to rice sheath blight</p> <p>Kosim Kardin, M., T. Kajiwara and M. Muchsin (1975). Weed species infected by <u>Rhizoctonia solani</u> Kuhn (mimeograph)</p>	<p>Rept. J.R.P., 16 - 17, '77</p> <p>Pl. Path. Rept., '73 Rept. J.R.P., 18-20, 28-34, '77</p> <p>Rept. J.R.P., 20 - 22, '77</p> <p>Rept. J.R.P. 22 - 28, '77</p>	<p>S.E. Asia Region. Symp. on Pl. Dis. in Trop., Jogjakarta, '72</p> <p>3rd. Indon. Phytopath. Soc., Feb. '75</p> <p>3rd. Indon. Phytopath. Soc., Feb. '75</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p>			

Notes: Rept. J.R.P.: Report of Japan-Indonesia Joint Food Crop Research Program (October 1970 ~ October 1975)

* : Short term consultant **: Trainee in Japan

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>Kosim Kardin, M.**, M. Oniki, A. Ogoshi & R. Sakai (1976). Anastomosis grouping of some isolates of <u>Rhizoctonia solani</u> Kuhn isolated from various plants in Indonesia (mimeograph)</p> <p>Kosim Kardin, M. (1972). Penyakit "sheath rot (<u>Acroclindrium oryzae</u> Sawada) pada tanaman padi di Indonesia (mimeograph)</p> <p>Nishizawa, T., M. Machmud & Mukelar Amir (1975). Tests on the chemicals for controlling sheath blight in Indonesia</p> <p>b. Rice blast</p> <p>Mukelar A.** & T. Yamaguchi (1976). Race identification of <u>Pyricularia oryzae</u> Cav. in Indonesia (mimeograph)</p> <p>Kobayashi, T., Mukelar A. and Otjim Sumantri (1976). Preliminary study on the pathogenicity of rice blast fungus (<u>Pyricularia oryzae</u> Cav.) in Indonesia (mimeograph)</p> <p>c. Udbatta disease</p> <p>Kobayashi, T. (1977). Occurrence of a rice disease similar to Udbatta disease (<u>Ephelis oryzae</u>) in Indonesia (mimeograph)</p> <p>d. Bacterial leaf blight of rice</p> <p>1) Varietal resistance to bacterial leaf blight</p> <p>Nishizawa, T., T. Yamamoto, M. Machmud, Mukelar A., Hartini Ramlan H., M. Hanafiah A., Imam Purjadi and Otjim Sumantri (1973).</p>	<p>CRIA Progress Report, Pests and Diseases series No. 9</p> <p>Ann. Phytopath. Soc. Japan 41 (3), 301, '75</p>	<p>4th Indon. Phytopath. Soc., Jul. '76</p> <p>CRIA Plant Pathology Div. Seminar, Feb. '78</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>			

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>Studies on bacterial leaf blight of rice (mimeograph)</p> <p>Machmud, M., T. Nishizawa, Hartini Ramlan H., T. Yamamoto, Nunung H. A., and I. N. Oka (1973). Hasil Penelitian beberapa penyakit penting padi pada tahun percobaan 1971 - 1972 (mimeograph)</p> <p>Hartini R. H. & O. Horino* (1975). Quantitative resistance (field resistance) of Commercial rice varieties in Indonesia to bacterial leaf blight (mimeograph)</p> <p>2) Variation in pathogenicity of <u>Xanthomonas oryzae</u></p> <p>Hartini, R. H., K. Nishiyama & A. Ezuka (1975). Bacteriological characteristics of <u>Xanthomonas oryzae</u> different in their pathogenicity and locality</p> <p>Yamamoto, T., Hartini R.H., M. Machmud, T. Nishizawa & D. M. Tantera (1975). Variation in pathogenicity of <u>Xanthomonas oryzae</u> (Uyeda et Ishiyama) Dowson and resistance of rice varieties to the pathogen</p> <p>Hartini R.H., O. Horino* & Eddy Sutawo (1976). Grouping of Indonesian isolates of <u>Xanthomonas oryzae</u> based on their virulence to differential rice varieties with special reference to a new bacterial group (mimeograph)</p> <p>3) Bacteriophage of <u>Xanthomonas oryzae</u></p> <p>Machmud, M. & W. Wakman (1975).</p>	<p>CRIA Contr., No. 16, '75 Rept. J.R.P., 62 - 67, '77</p> <p>CRIA Contr., No. 28, '77 Rept. J.R.P., 42 - 62, '77</p>	<p>CRIA Staff Meet., Bogor, '73</p> <p>4th Indon. Phytopath. Soc., Jul. '76</p> <p>3rd Indon. Phytopath. Soc., Feb. '75</p> <p>4th Indon. Phytopath. Soc., Jul. '76</p>	<p>a</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p>			

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>Preliminary study on forecasting bacterial leaf blight of rice by using its bacteriophage (mimeograph)</p> <p>4) Chemical control of bacterial leaf blight of rice</p> <p>Eddy Sutarwo, Hartini R. H., O. Horino*, P. Soetjipto & D.M. Tantera (1975). Effect of application of nitrogen on the incidence of bacterial leaf blight (mimeograph)</p> <p>Nishizawa, T. et al. (1973). Tests on the chemicals for controlling bacterial leaf blight</p> <p>e. Bacterial leaf streak of rice</p> <p>Nunung H. Achamad (1973). Klasifikasi beberapa isolat bakteri penyakit daun bergaris Xanthomonas translucens f. sp. oryzicola (Fang et al) Bradbury berdasarkan reaksinya terhadap beberapa varietas padi Indonesia (mimeograph)</p> <p>f. Virus/mycoplasma diseases of rice</p> <p>Oka, I. N. (1976). Virus diseases on food crops in Indonesia and their control</p> <p>1) Yellow dwarf</p> <p>Tantera, D. M. (1973). Studies on rice virus/mycoplasma diseases in 1972 (mimeograph)</p>	<p>Rept. J.R.P. 67 - 76, '77</p> <p>Rept. J.R.P., 76-82, '77 Pl. Path. Rept. '73</p> <p>CRIA Progress Report Pests & Diseases Series No. 9</p> <p>Trop. Agr. Res. Inst. Symp. Series No. 10, '77, TARC, Nov. '76</p>	<p>3rd Indon. Phytopath. Soc., Feb. '75</p> <p>4th Indon. Phytopath. Soc., Jul. '76</p> <p>Internat. Symp. TARC Nov. '76</p> <p>CRIA Staff Meet., Bogor, Jul. '73</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>			

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
Tantera, D.M. & H. Satomi (1972). Laporan hasil-hasil peninjauan penyakit padi di daerah Sulawesi Selatan tanggal 11 - 19 December 1972 : 6 pp. (mimeograph)			o			o		
Satomi, H. (1972). Yellow dwarf disease of rice in Indonesia (abstract)		S.E. Asia Reg. Symp. on Pl. Dis. in Trop., Jogjakarta, Sept. '72	o			o		
Satomi, H., M. Roechan, M. Iwaki & Y. Saito (1978). Occurrence of rice yellow dwarf in Indonesia	CRIA Contr., No. 40, '78		o			o		
2) Grassy stunt								
Tantera, D. M., H. Satomi & Roechan (1973). Grassy stunt disease of rice in Indonesia	CRIA Contr. No.2, '73 Rept. J.R.P., 87 - 91, '77		o			o		
3) Penyakit habang (Tungro-like) disease								
Tantera, D. M. (1975). Field screening for tungro and grassy stunt in Indonesia, 1972 - 1975 (mimeograph)		3rd Indon. Phytopath. Soc., Feb. '75		o		o		o
Tantera, D.M. Roechan & Rachmadi (1975). Virus-vector relationship on Penyakit habang of rice (mimeograph)	CRIA Progress Report Pests & Diseases Series No. 8		o			o		
Saito, Y., M. Roechan, D. M. Tantera & M. Iwaki (1975). Small Bacilliform particles associated with Penyakit habang (Tungro-like) disease of rice in Indonesia	Phytopathology, 65(7): 793 - 796		o			o		o
Hibino, H., H. Roechan & Suyoko Sudarisman (1978). Association of two types of virus	Phytopathology (in press)		o			o		o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>particles with Penyakit habang (Tungro-like disease) of rice in Indonesia</p> <p>Hibino, H. et al. (1977). Independent multiplication of two kinds of virus in tungro-infected rice (mimeograph)</p> <p>Hibino, H., H. Jumanto & Suyoko Sudarisman (1977). Properties and purification of isometric particles isolated from tungro-infected rice (mimeograph)</p> <p>Hibino, H. et al. (1977). Transmission of two kinds of viruses from tungro-infected rice by insect vectors (mimeograph)</p> <p>4) Rice kerdil hampa virus (Ragged stunt virus)</p> <p>Hibino, H., M. Roechan, Suyoko Sudarisman & D. M. Tantera (1977). A virus disease of rice (kerdil hampa) transmitted by brown planthopper (<u>Nilaparvata lugens</u> Stal) in Indonesia</p> <p>Hibino, H., Nasir Saleh & M. Roechan (1977). Rice regged stunt virus in the infected rice and insect vector cells and in negative stain</p> <p>Hibino, H., M. Roechan, H. Warsidi & M. Muchsin (1977). Techniques of screening resistant varieties of rice to ragged stunt and grassy stunt diseases in the laboratory (mimeograph)</p> <p>Hibino, H., Nasir Saleh & M. Roechan (1978). Negative transmission of ragged stung virus</p>	<p>CRIA Contr. No. 35, '77</p> <p>Virology (in press)</p>	<p>CRIA GEU Meet., Feb. '78</p> <p>- do -</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>		

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
through rice seeds and brown planthopper eggs (mimeograph)								
Hibino, H. Nasir Saleh & M. Roechan (1978) Multiplication of rice ragged stunt virus in viruliferous insects, <u>Nilaparvata lugens</u>	Phytopathology (in press)		o				o	
Roechan, M., H. Hibino, H. Warsidi & M. Muchsin (1978). Varietal resistance of rice to kerdil hampa (mimeograph)		CRIA Pl. Path. Div. Semi., May '78		o			o	
Hibino, H., Nasir Saleh, J. Harjosudarmo, S. Suyoko, & M. Roechan (1978). Two kinds of virus particles in diseased tissues effected by tungro virus disease of rice	Ann. Phytopath. Soc. Japan, 44(2), 207, '78		o				o	
5) Stripe disease								
Roechan, M., T. Morinaka, M. Hori & T. Nishizawa (1973). Varietal resistance of Indonesian rice varieties to stripe disease	Rept. J.R.P., 96 - 99, '77		o				o	
3. Studies on the diseases of corn								
a. Downy mildew of corn								
Mikoshiha, H. & M. Sudjadi (1974). Field observation on natural infection of <u>Sclerospora maydis</u>	Rept. J.R.P., 100, '77		o				o	
Mikoshiha, H. & M. Sudjadi (1974). Field study on conidial dissemination under natural condition	Rept. J.R.P., 100-102, '77		o				o	
Mikoshiha, H. & M. Sudjadi (1974). Field observation on downy mildew infection of corn in Java	Rept. J.R.P., 102-104, '77		o				o	

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
Subjadi, M., K. Mikoshiha & D. M. Tantera (1973). Studies on downy mildew disease of maize during the year 1972/73 (mimeograph)		CRIA Staff Meet., Bogor, Jul. '73	o					o
Tantera, D. M. (1974). Cultural practice to decrease losses due to corn downy mildew disease	Proc. Intn. Symp. on Downy Mildew of Maize, Tokyo, '74			o				o
Kajiwara, T. (1974). Some experiments on downy mildew of maize	-- do --		o					o
Kajiwara, T., M. Sudjadi & S. Otjim (1975). Greenhouse test of some chemicals for controlling downy mildew of corn (<u>Sclerospora maydis</u>) (mimeograph)		3rd Indon. Phytopath. Soc., cibogo, Bogor, Feb. '75	o					o
M. Sudjadi **, T. Inaba & T. Kajiwara (1978). Histopathological studies on corn downy mildew caused by <u>Sclerospora maydis</u>	Ann. Phytopath. Soc. Japan '78 (in press)	-- do --	o					o
T. Kobayashi & M. Sudjadi (1976). Pansoil fungicide test for controlling downy mildew of corn (<u>Sclerospora maydis</u>) (mimeograph)		4th Indon. Phytopath. Soc., Jul. '76	o					o
M. Sudjadi (1976). Incidence of corn downy mildew caused by <u>Sclerospora maydis</u> in relation to planting data, meteorological factors and spore density 1 (mimeograph)	CRIA Progress Report Pests & Diseases Series No. 9		o					o
M. Sudjadi, Bambang M. & D.M. Tantera (1976). Histopathological studies on seed-borne infection of corn caused by <u>Sclerospora maydis</u> (mimeograph)	-- do --		o					o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
M. Sudjadi, Punarto Slamet & D. M. Tantera (1976). Some experiments on spore trapping of <i>Sclerospora maydis</i> in the field (mimeograph)	CRIA Progress Report Pests & Diseases Series No. 9		o					o
b. Maize dwarf mosaic	Rept. J.R.P., 114 - 117, '77		o					o
Iwaki, M. et al. (1974). Host range, symptoms and aphid transmission of maize dwarf disease								
4. Studies on the diseases of legume plants								
a. Scab of mung bean								
Kajiwara, T. & A. Mukelar (1975). Mung bean scab caused by <i>Elsinoe</i> in Indonesia	CRIA Contr. No. 23, '76	3rd Indon. Phytopath. Soc., Cibogo, Bogor, Feb. '75	o					o
Mukelar, A., M. Sudjadi & T. Kajiwara (1975). Chemical control for mungbean scab	Rept. J.R.P., 117 - 122, '77	1st Internat. Symp. on Mungbean, Aug., '77						
b. Virus diseases of mungbean								
Iwaki, M., M. Roechan, Nasir Saleh & D. M. Tantera (1974). Virus diseases of mungbean (Mungbean mosaic virus, Bean yellow mosaic virus)	CRIA Contr. No. 24, '78	3rd Indon. Phytopath. Soc., Cibogo, Bogor, Feb. '75	o					o
Auzai Hamid, M. Iwaki, Rusmilah H. Suseno & D.M. Tantera (1976). Virus diseases of legume plants in Indonesia; Mungbean mosaic virus (mimeograph)	Rept. J.R.P., 123 - 124, '77	1st Internat. Symp. on Mungbean, Aug. '77						
	Rept. J.R.P., 152 - 160, '77	4th Indon. Phytopath. Soc., Jul., '76	o					o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
Iwaki, M. (1977). Virus diseases of mungbean in Indonesia		1st Internat. Symp. on Mungbean, Aug. '77		o				o
Hibino, H. & M. Roechan (1977). Cytological studies of leaf cells infected with several legume viruses (mimeograph)		1st Internat. Sump. on Mungbean, Aug. '77		o				o
c. Witche's broom of legume plants								
Iwaki, M., M. Roechan, Nasir Saleh, M. Sugiura & Hibino, H. (1978). Identify of mycoplasma-like agents of legume witches' brooms in Indonesia	CRIA Contr. No. 41, '78			o				o
Nasir Saleh, H. Hibino, M. Roechan & D. M. Tantera (1977). Rice and secondary crop diseases associated with mycoplasma-like organisms in Indonesia		ASPAC Seminar, Nov.-Dec. '77 CRIA Pl. Path. Div. Seminar, Jan. '78		o				o
d. Iwaki, M., M. Roechan & D.M. Tantera (1975). Virus diseases of soybean (Soybean stunt virus, Bean yellow mosaic virus, Soybean dwarf virus, Soybean yellow mosaic virus)	Rept. J.R.P., 131 - 152, '77			o				o
Iwaki, M., M. Roechan & D. M. Tantera (1975). Virus diseases of soybean in Indonesia (mimeograph)		3rd Indon. Phytopath. Soc., Feb. '75		o				o
Roechan, M., M. Iwaki & D. M. Tantera (1975). Virus diseases of legume plants in Indonesia	CRIA Contr. No. 15, '75			o			o	o
Roechan, M., M. Iwaki & H. Hibino (1976). Yellow mosaic disease of soybean in Indonesia		4th Indon. Phytopath. Soc., Jul. '76		o				o
e. Iwaki, M., M. Roechan & D. M. Tantera (1975). Virus diseases of peanut (Peanut mottle virus,	Rept. J.R.P., 161 - 167, '77			o				o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>Peanut mosaic virus, Peanut crinkle leaf virus)</p> <p>Iwaki, M. et al. (1975). Tests on chemical control of peanut mottle virus disease by insecticide</p> <p>f. Virus diseases of cowpea</p> <p>Iwaki, M., M. Roechan & D. M. Tantera (1975). Virus diseases of cowpea (Cowpea aphid-borne mosaic virus, Cowpea stunt disease)</p> <p>Iwaki, M., M. Roechan & D. M. Tantera (1975). Virus diseases of legume plants in Indonesia</p> <p>1. Cowpea aphid-borne mosaic virus</p> <p>g. Iwaki, M. (1975). Summarization of research results on the virus/mycoplasma diseases of legume plants</p> <p>5. Studies on the diseases of cassava and sweet potato</p> <p>a. Tominaga, T., Nunung H. Achamad**, K. Nishiyama & A. Ezuka (1978). <u>Xanthomonas manihottis</u> (Arthand-Berthed) and Bondar) Starr., the cause of cassava bacterial blight in Indonesia</p> <p>b. Studies on the sweet potato diseases</p> <p>Sudjadi, M., Wargiono H. & D. M. Tantera (1976.) Reactions of sweet potato clones to scab (<u>E. batatas</u>) and brown leaf spot (<u>C. batatae</u>) (mimeograph)</p>	<p>Rept. J.R.P. 161 - 167, '77</p> <p>Rept. J.R.P. 174 - 176, '77</p> <p>Rept. J.R.P. 168 - 172, '77</p> <p>CRIA Contr. No. 13, '75</p> <p>Rept. J.R.P. 172 - 174, '77</p> <p>CRIA Contr. No. 38, '78</p> <p>CRIA Progress Report Pests & Diseases Series No. 9</p>	<p>CRIA Pl. Path. Div. Seminar, Apr. '78</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>	<p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p> <p>o</p>			

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
B. PLANT PHYSIOLOGICAL RESEARCHES								
1. Survey and studies on physiological disorders of rice plants								
a. F. Yazawa, L. N. Hakim & M. Higuchi (1971/72). Surveys on the occurrence and distribution of physiological disorders of rice	Rept. J.R.P., 178, '77	Seminar Sci. Soil Manure Japan '75		o				o
b. Ismunadji, M., L. N. Hakim, I. Zulkarnaini & F. Yazawa (1971). Physiological disease of rice in Cihea	CRIA Contr. No.4 1-10, '73	Sci. Soil Manure Japan, '73		o				o
c. M. Miyake, I. Zulkarnaini & L. N. Hakim (1973/75). Experiment's on the physiological disorders of lowland rice	Rept. J.R.P. 178-184, '77	Sci. Soil Manure Japan, '76-'77		o				o
d. Ismunadji, M. (1973). Penyakit fisiologis tanaman padi di Indonesia		CRIA Staff Meeting, '73		o				o
2. Nitrogen nutrition and rice yield								
a. Ismunadji, M., I. Zulkarnaini & F. Yazawa (1972). Nitrogen requirement of lowland rice on major Java oils	CRIA Contr. No.7, 1-17, '73 Rept. J.R.P. 238 - 242, '77			o				o
b. Ismunadji, M., Sisdiyati, Sutantyo & F. Yazawa (1973). The effect of fertilization on growth, nitrogen nutrition and the occurrence of Helminthosporium leaf spot on lowland rice	CRIA Contr. No.5, 1-12 Rept. J.R.P., 243 - 245, '77			o				o
c. Kosuge, N. & I. Zulkarnaini (1977). Recovery of fertilizer ¹⁵ N applied in the paddy field (Nitrogen-15 in soil-plant studies)		Regional Seminar, '77		o				o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
d. Kosuge, N. & R. Sismiyati (1978). Effect of ball fertilizer and soil dressing in lowland rice (mimeograph)								
e. Ismunadji, M. & R. Sismiyati (1976). Studies of fertilizer nitrogen efficiency in lowland rice on an acid latosol of Indonesia (mimeograph)		IRRI Annual Conf., '76	o				o	
f. Ismunadji, M. & R. Sismiyati (1977). Studies on fertilizer nitrogen efficiency in two major lowland rice soils in Indonesia (mimeograph)		IRRI Annual Conf., '77	o				o	
g. Makarim, A. K., M. Ismunadji & I. Zulkarnaini (1978). Diagnosis hara N tanaman dalam hubungan dengan pertumbuhan dan hasil tanaman padi		CRIA Seminar, '78		o			o	
3. Effect of phosphatic fertilizer on lowland rice								
a. Sismiyati (1975). The effect of phosphatic fertilizers on lowland rice in two different locations	Rept. J.R.P., 203 - 209, '77	CRIA Seminar, '75 Sci. Soil Manure Japan, '75		o			o	
b. M. Miyake, M. Ismunadji & I. Zulkarnaini. Effect of phosphatic fertilizer on lowland rice in some soils	Rept. J.R.P., 210 - 238, '77	Sci. Soil Manure Japan, '76		o			o	
c. M. Miyake, M. Ismunadji & I. Zulkarnaini (1976). Effect of phosphatic fertilizer on lowland rice in Muara (mimeograph)	Rept. J.R.P., 210 - 225, '77	Sci. Soil Manure Japan, '77		o			o	
d. Sismiyati, R. & O. Sudarman (1977). Perubahan status hara N, P, dan K. tanaman dan tanah sawah pod zolik merah kuning setelah beberapa musim pemupukan fosfat (mimeograph)		CRIA Seminar, '77		o			o	

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
4. Potassium nutrition and rice yield								
a. Sisdiyati, R. & F. Yazawa (1977). Effect of potassium application on rice growth under increasing manganese supply	CRIA Contr. No. 26, '77 Rept. J.R.P., 253 - 257, '77	Sci. Soil Manure Japan, '77	o				o	
b. Kosuge, N. (1978). Potassium efficiency of rice plants (mimeograph)			o				o	
c. Ismunadji, M. (1976). Rice diseases and physiological disorders related to potassium deficiency	Pro. 12th Colloquium Internat. Potash Inst.		o				o	
d. Ismunadji, M., S. Partohardjono & Satijati (1977). Peranan kalium dalam peningkatan produksi tanaman pangan (Kalium dan tanaman pangan)	CRIA, EDISI KHUSUS No. 2		o				o	
e. Ismunadji, M. S. Partohardjono, A. K. Makarim & G. Soepardi (1977). The role of potassium in rice production (Indonesian mimeograph)		Workshop on the Establishment of Potassium Fertilizer Use in Lowland Rice, Tugu, Dec. 8-9, '77	o				o	
f. Ismunadji, M. and H. R. von Uexkull (1976). Comparative values of chemical fertilizer for paddy rice		Seminar on "The fertility of paddy soils" (222 - 248) ASPAC, Taipei, Taiwan, Jul. 26-31, '76	o				o	
g. Ismunadji, M. & H.R. von Uexkull (1977). Potassium requirements of some paddy soils in Java (mimeograph)		Conference on Classification and Management of Tropical soils, Kuala Lumpur, Aug. 15-20, '77	o				o	

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>5. Nutrition of other elements in lowland rice</p> <p>a. Hayami, K. (1974). Studies on the possibility for the occurrence of sulphur deficiency</p> <p>b. Ismunadji, M., I. Zulkarnaini & M. Miyake (1975). Sulphur deficiency in lowland rice in Java</p> <p>c. Ismunadji, M. & K. M. Makarim (1977). Peranan belerang dalam peningkatan produksi padi (mimeograph)</p> <p>d. Ismunadji, M. (1977) Magnesium deficiency in lowland rice in South Sumatra</p> <p>e. Ismunadji, M. & I. Zulkarnaini (1977). Sulphur deficiency in lowland rice in Indonesia</p>	<p>Rept. J.R.P., 190 - 194, '77</p> <p>Rept. J.R.P., 194 - 202, '77 CRIA Contr. No. 14, '74</p> <p>SEFMA 647 - 652, '77 (Internat'l Seminar on Soil Environment and Fertility Management in Intensive Agriculture)</p> <p>CRIA Contr. No.8, 1 - 19, '73 Rept. J.R.P., 246 - 251, '77</p>	<p>Kongres Nasional Ilmu Tanah II, Aug. 1-4, Jogjakarta</p> <p>IRRI Annual Con., '77</p>	o	o	o	o	o	o
<p>6. Utilization of organic matters in lowland rice</p> <p>a. Ismunadji, M., I. Zulkarnaini & F. Yazawa (1973). The effect of straw incorporation on growth and nutrient status of lowland rice, I. The effect of straw incorporation on 13 rice varieties</p> <p>b. Kosuge, N. & I. Zulkarnaini (1978). Effect of rice straw application in the paddy field (mimeograph)</p>			o	o	o	o	o	o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
c. Ismunadji, M. (1974). Utilization of cereal crop residues and its agricultural significance in Indonesia	CRIA Contr. No. 37, '78	ASPAC Seminar, Tokyo, '74		o				o
7. Nutritional studies on upland crops								
a. Higuchi, M., A. Hidayat, M. Ismunadji & F. Yazawa (1973). The effect of N,P,K, lime and stable manure application on nutrient uptake, growth and yield of soybean	Rept. J.R.P., 260 - 266, '77			o				o
b. Fatchurochim, M. (1975). Hubungan pemupukan dengan absorpsi hara dan produksi kedele (mimeograph)		CRIA Seminar, '75		o				o
8. Physiological examination of rice plant								
a. Hasan, R., M. Nasir, M. Ismunadji & F. Yazawa (1972). Preliminary experiment on the study of root activity of 12 rice varieties	Rept. J.R.P., 252 - 253, '77	CRIA Staff Meeting, '72		o				o
b. Yazawa, F. & R. Sisdiyati (1972). Toxic action on biuret in urea on the growth of rice seedling	Rept. J.R.P., 257, '77			o				o
c. M. Miyake & I. Zukarnaini (1974). Cold water resistance of lowland rice	Rept. J.R.P., 258 - 260, '77			o				o
d. Kato, T* (1976). Relationship between potassium and accumulation of organic compounds in rice plant (mimeograph)				o				o
e. Ismunadji, M. & M. Miyake (1978). Sulphur and amino acid contents of brown rice	JARO, '78 (inpress)			o				o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers			
			A	B	C	X	Y	Z	
<p>9. Others</p> <p>a. Kosuge, N. (1978). Clay minerals of several paddy soils in Indonesia (mimeograph)</p> <p>b. Makarim, A.K. & O. Sudarman (1977). Research on the nutrient status of rice and soil of Palembang Rice Estate (Indonesian, mimeograph)</p> <p>c. Makarim, A. K. & M. Ismunadji (1977). Long term fertility trial in rice on a planosol in Jakenan, Central Java (mimeograph)</p> <p>d. Hidayat, A., O. Sudarman & M. Ismunadji (1978). The nutrient status of Sittung transmigration areas (mimeograph)</p>			o						
<p>C. ENTOMOLOGICAL RESEARCHES</p> <p>1. Leafhoppers and planthoppers of rice</p> <p>Satomi, H., Tantera, D.M. & M. Koechan (1973). Rept. J.R.P., 93 - 96, '77</p> <p>Seasonal prevalence of leafhoppers and Planthoppers in the rice field</p> <p>2. Rice stem borer</p> <p>Hattori, I.* (1978). Identification and classification of rice stem borers in Indonesia (mimeograph)</p> <p>Sri Suharni Siwi & I. Hattori* (1978). Inventory of rice stem borers in Indonesia (mimeograph)</p>			o						

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers		
			A	B	C	X	Y	Z
<p>3. Insecticides</p> <p>Orita, S. & Djatnika Kilin (1978). Resistance of agricultural pests to insecticides</p> <p>i) Estimation of LD50 of <u>Nilaparvata lugens</u> to insecticides at several regions</p> <p>ii) Resistance of <u>Nilaparvata lugens</u> to insecticides</p> <p>Orita, S. & Djatnika Kilin (1978). Influence of insecticides on agricultural beneficial insects</p> <p>i) Field survey of parasites and predators of <u>Nilaparvata lugens</u></p> <p>ii) Influence of insecticides on the egg parasite of <u>Nilaparvata lugens</u></p>			o					o
<p>D. RAT</p> <p>Rochman, S. Ontsu & Suwalan (1978). Experiment on food preference of rat, <u>Ratus argentiventer</u> (mimeograph)</p>		CRIA Entomol. Div. Seminar, May '78	o					o
<p>E. AGRONOMICAL RESEARCHES</p> <p>I. Research on rice production</p> <p>1. Water-plant relationship in rice culture</p> <p>a. Measurement of water requirement</p> <p>Boy Sarwono, Aris Munandar & M. Susaki (1978).</p>								o

Research Subjects	Publications	Seminars or Meetings	Research Progress			Res. & Tech. Transfers			
			A	B	C	X	Y	Z	
Varietal difference of water requirement on lowland rice				o					o
Boy Sarwono, M. Susaki & Syamsir Djalib (1978). Effect of cultural practice on water requirement of lowland rice				o					o
b. Effect of water management									
Soetjipto Partohardjono, M. Susaki & Djak Rahman (1978). Effect of midseason drainage on the growth and yield of lowland rice				o					o
Soetjipto Partohardjono & M. Susaki (1978). Effect of water depth on the growth and yield of lowland rice				o					o
c. Drought injury in lowland rice									
Soetjipto Partohardjono, Aris Munandar & M. Susaki (1978). Effect of drought injury on the growth and yield of lowland rice				o					o
2. Method of fertilization application									
a. Method of nitrogen application									
Soetjipto Partohardjono & M. Susaki (1978). Effect of nitrogen application at different stages of lowland rice on its growth and yield (mimeograph)		CRIA Agronomy Div. Seminar, Oct. '77		o					o
Soetjipto Partohardjono, Aris Munandar & M. Susaki (1978). Effect of nitrogen application on the growth and yield of lowland rice				o					o