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NOTE OF UNDERSTANDING AND RECOMMENDATION  
OF  
THE JOINT EVALUATION  
ON THE STRENGTHENING OF LEGUMES  
IN RELATION TO  
CROPPING SYSTEM RESEARCH PROJECT

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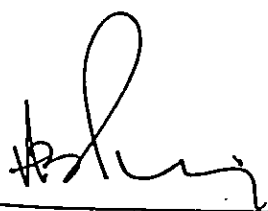
The Record of Discussion between the Japanese  
Project Formulation Team and the Authorities  
Concerned of the Republic of Indonesia on the  
Technical Cooperation for the Strengthening of  
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NOTE OF UNDERSTANDING AND RECOMMENDATION  
OF  
THE JOINT EVALUATION ON  
THE STRENGTHENING OF LEGUMES IN RELATION TO  
CROPPING SYSTEM RESEARCH PROJECT

Leaving three more months till the termination of cooperation period on October 22, 1983 as stated in the Record of Discussions, the Japanese Evaluation Team organized by Japan International Cooperation Agency and headed by Mr. Hirotaka MAEDA visited the Republic of Indonesia from August 2 to August 19, 1983, to carry out overall review and evaluation of project performances together with the Indonesian organizations concerned, and hereby recommends the measures to be taken by respective Governments in the near future, as are given in the summary attached herewith.

Jakarta, Indonesia

August 16, 1983



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Director

Central Research Institute for

Food Crops

Agency for Agricultural Research

and Development

is Leader of the Indonesian Evaluation Team



Hirotaka MAEDA

Leader

The Japanese Evaluation Team

NOTE OF EVALUATION AND RECOMMENDATION  
OF THE JOINT EVALUATION ON STRENGTHENING OF LEGUMES IN RELATION  
TO CROPPING SYSTEM RESEARCH PROJECT

1. INTRODUCTION

With a view to developing package on food crops production suitable for agro-climatic condition in the Republic of Indonesia, this project was initiated with the period of five years, based on the Record of Discussion signed on October 12, 1978 (hereafter to as "R/D), for the purpose of strengthening research activities on legumes and other food crops (rice, corn, tuber crops) as components in cropping system at the Central Research Institute for Food Crops, Bogor (hereafter to as "CRIFC", changed name of the Central Research Institute for Agriculture/CRIA as referred in the R/D, with reorganization on April 1, 1981).

Activities of this project include the transfer of technology through the dispatch of Japanese experts, training of Indonesian researchers and supplying of equipments.

2. OBJECTIVES OF EVALUATION

- 2.1 Prior to the termination of R/D period on October 22, 1983, to make overall review of the results of this cooperation project so far since the beginning of the project.
- 2.2 To discuss about the future measure to be taken after the termination of the R/D period and accordingly make recommendation to the concerned agencies of both governments.

3. METHODOLOGY OF EVALUATION

3.1 Evaluation works were done taking August 1, 1983 as a base date.

3.2 Concerning organization for this evaluation are as follows :

Organization in charge of the project;

Central Research Institute for Food Crops (CRIFC)

Organization for conducting the activities;

Bogor Research Institute for Food Crops (BORIF).

- 3.3 Evaluation was conducted based on the "Master Plan" of the R/D.
- 3.3.1 Concerning projects activities, evaluation was carried out on the results of the transfer of technology and the results of experiment for the respective research subject (8 subjects) for legumes and the other food crops as components in cropping system.
- 3.3.2 Concerning the dispatch of Japanese experts, training of Indonesia researchers in Japan and supply of equipments and machinery, evaluation was carried out on the actual performance.
- 3.3.3 Concerning countermeasure in Indonesia side as proposed by the previous Joint Committee meetings, reviews were carried out on the actual performances.
- 3.3.4 Concerning the measures to be taken after the termination of the R/D period, discussion was carried out on the research subjects to be continued.

#### 4. RESULTS OF EVALUATION

The Joint evaluation team recognized that the research activities based on the master plan for the R/D have satisfactorily progressed, and research condition has been prepared in consequence of the effort of both Indonesian and Japanese Government.

Results on respective evaluation section are shown in Annex I, and the outlines are as follows :

##### 4.1 Evaluation of research activities.

##### 4.1.1 The research subjects which goals have been achieved

Subject 1. Plant breeding techniques on legumes and other upland crops

(1) Plant breeding techniques of soybean and other upland crops

Subject 2. Cultivation practices of legumes and other upland crops

(1) Cultivation practices of soybean

1) Cultivation method of soybean planted after lowland rice

2) Plant production and its increase in soybean

(2) Cultivation practices of tuberous root crops

Subject 3. Irrigation water controll

(1) Effective use of irrigation water



Subject 4. Application practices of fertilizer, conservation and improvement of soil fertility

- (1) Application practices of fertilizer on low land rice in cropping system
- (2) Application practices of fertilizer on low land rice after soybean cultivation

Subject 5. Weed Control

- (1) Weed control on upland field

Subject 6. Plant Physiology

- (1) Increase of protein yield in soybean
  - 1) Nutrient absorption properties in cultivars
  - 2) Movement of nitrogen in soil
  - 3) Improvement of fertilizer application for soybean
  - 4) Relationship between nutritive value and cultivation practices
  - 5) Increase of viability of soybean seed
  - 6) Estimation of nitrogen fixation by root nodule
- (2) Physiological disorder of upland crops
  - 1) Physiological disorder type and its distribution
  - 2) Moisture deficiency in upland crops

Subject 7. Plant Pathology

- (1) Legume diseases
  - 1) Survey of disease occurrence in soybean and mungbean
  - 2) Seasonal changed of occurrence and variety test of resistance for rust disease in soybean
  - 3) Relation between culture practices and disease occurrences in soybean
  - 4) Confirmation and control of seed infective fungal and bacterial disease in legumes
  - 5) Scab disease and cercospora leaf spot of mungbean
- (2) Rhizoctonia disease of several crops
- (3) Fungal, bacterial diseases and nematodes of legumes and other upland crops

Subject 8. Entomology

- (1) Bionomics and control of main soybean insect pests
  - 1) Ascertainment of insect pests and extraction of key pests
  - 2) Seasonal prevalence of key pests
  - 3) Classification and identification of stem and pod borers and seed pests
  - 4) Identification of pod borers
  - 5) Seasonal fluctuation, biology and control method of pod borers
  - 6) Chemical control of key pests
  - 7) Utilization of pheromon trap for forecasting of occurrence of spodoptera litura in soybean area
- (2) Development of artificial diet and mass rearing for insect pest
- (3) Control of lepidopterous pests by utilization of micro organisms
- (4) Analysis of pest problems in the high yielding areas of soybean
- (5) Analysis of the cause of pest resurgence in soybean field

4.1.2 The subjects to be continued

Subject 1. Plant breeding techniques on legumes and other upland crops

- (1) Plant breeding techniques of soybean and other upland crops
  - 1) Plant breeding techniques for adaptable varieties to the environmental conditions
  - 2) Collection and preservation of breeding materials, and examination of their characteristics

Subject 2. Cultivation practices of legumes and other upland crops

- (1) Cultivation practices of soybean
  - 1) Enhancement of soybean productivity based on the growth habit and yield component factors
  - 2) Techniques of liming for soybean production in acid soil

Subject 3. Plant Physiology

- (1) Chemical composition of soybean seed in relation to its viability
- (2) Physiological disorder of soybean

Subject 4. Plant Pathology

- (1) Studies on the bionomics and control of legume diseases
  - 1) Bionomics and control of main diseases affecting production of grain legumes

Subject 5. Entomology

- (1) Studies on the bionomics and control of main insect pests
  - 1) Bionomics and control of main insect pests affecting production of grain legumes
- 4.2 Concerning the dispatch of Japanese experts, 12 researchers have been sent on long-term assignment, while 16 researchers have been sent on short-term assignment. It is recognized that the experts have been sent adequately as planned, and have contributed much to the performances of the project. In addition, 14 Japanese short-term experts were sent for designing, setting up and repairing of equipments and machinery.
- 4.3 Concerning the training programme, 5 counterparts for study tour and 22 counterparts for individual training have been sent to Japan. It is recognized counterparts have been sent for training to Japan adequately as planned. As the results, counterparts received deeper knowledge to carry out the research independently under their technical leaderships. In particular, as the results of training, 1 counterpart took a doctorate and another counterpart is studying in Japan for preparation of a doctoral dissertation.

4.4 Concerning the supply of equipments and machinery, irrigation system, green house, equipments for research, vehicles etc. valued at about 405,161 thousand yen ( including 1983 fiscal year budget ) have been provided.

It is recognized that the facilities are utilized and carefully maintained.

4.5 Indonesian side has assigned counterparts to Japanese experts, and provided offices, laboratories and experimental field in accordance with the master plan of the R/D. Consequently, activity of Japanese experts progressed smoothly.

4.6 Many of the research result has been published. However, effort should be done to promote other publication by both side.

4.7 The Joint Committee meetings were held 3 times, and Joint meetings between Japanese experts and Indonesian counterparts were held as occasion demanded. Discussions have been made about the research plan, results of research, training of counterparts, research equipments, requirement of experts etc. Consequently, this project has been harmoniously implemented.

#### 5. RECOMMENDATION

This project is to terminate on October 22, 1983. However, in consideration of the objectives and background described in the master plan of the R/D and in order to attain the aim of remaining research subjects, additional cooperation as listed in Annex II is necessary.

In view of this circumstance, it is recommended to concerned agencies of Japanese and Indonesian Government that the technical cooperation period should be extended for another two years after termination of the present cooperation period stated in the R/D.

Annex I

1. Results of research activity and research subjects to be intensified in future
2. Results of Japanese Experts
3. Results of Training and Study tour of Indonesian Researchers
4. List of Equipments and Machinery .

1. Results of research activity and research subjects to be intensified in future

1978 - 1980

1981 - 1983

1984 - 1985

Research subjects and results

Research subjects and results

Research subjects to be intensified

Subject 1. Plant breeding techniques on legumes and other upland crops

(1) Plant breeding techniques of soybean

(1) Plant breeding techniques of soybean and other upland crops

(1) Plant breeding techniques of soybean and other upland crops

(Results)

1) Selection of AI tolerant varieties, and selection of mother plants with superior character for high yield soybean variety were carried out.

1) Plant breeding techniques for adaptable varieties to the environmental conditions

2) "Standard of soybean survey" which is essential for soybean breeding was issued.

2) Collection and preservation of breeding materials, and examination of their characteristics.

Subject 2. Cultivation practices of legumes and other upland crops

(1) Cultivation practices of soybean

(1) Cultivation practices of soybean

(1) Cultivation practices of soybean

(Results)

1) Actual circumstances of soybean cultivation in the principal production area was surveyed.

1) Characteristics related to the productivity, and growth habit of soybean were explicated to help improving cultural practices and breeding.

1) Enhancement of soybean productivity based on the growth habit and yield component factors

2) On the basis of this results, experiments for high and stable soybean yield were carried out. As a result, significance of non-tillage cultivation, efficiency of chemical fertilizer, and control effect

2) Planting density of soybean was studied and optimal density for high production was obtained.

2) Techniques of liming for soybean production on acid soil

1978 - 1980

Research subjects and results

of pod borers were explicated.

(2) Cultivation practices of other upland crops.

1981 - 1983

Research subjects and results

3) Actual circumstances of soybean cultivation in the principal production area in Java island was surveyed and improving schem of cultural practices was proposed.

(2) Cultivation practices of tuberous root crops

1) Crop production and its increment in sweet potato and cassava

(Results)

1) Characteristics and growth habit in sweet potato and cassava were studied, and the specific characteristics for high productive potential were detected.

1984 - 1985

Research subjects to be intensified

Subject 3. Irrigation water control

(1) Effective use of irrigation water

(Results)

1) The effects of sowing date on seedling characteristics of rice were studied. From the experiments it was found that there were differences in dry matter production between dry season and wet season, affected by the amount of solar radiation.

2) The effects of transplanting time on rice yield and yield components were studied. The fact that the amount of solar radiation during the ripening period, was found.

(1) Effective use of irrigation water

1) Effects of surface drainage in ripening stage to rice yield

(Results)

1) Growth disorder caused by extremely low soil moisture brought decrease of rice yield, and varietal difference were found in the factors for decreasing yield. But there was no difference in yield regardless of the time of removing water when soil moisture was kept from arising growth disorder. From these results,

1978 - 1980	1981 - 1984	1985 - 1988
Research subjects and results	Research subjects and results	Research subjects to be intensified
	possibility for early removing water in paddy field was suggested	

Subject 4. Application practices of fertilizer conservation and improvement of soil fertility

(1) Application practices of fertilizer on low land rice in cropping system

(Results)  
 1) Influence of the preceding soybean cropping on rice yield was studied. Increase of rice yield was found when soybean was planted precedingly and nitrogen fertilizer was applied. The increase of yield was owing to increasing numbers of spikelets and dry matter production during the ripening period in the cultural conditions mentioned above.

(1) Application practices of fertilizer on low land rice after soybean cultivation

(Results)  
 1) Growth habit of rice was studied in different conditions of variety, altitude, and cropping season. As a result, it was suggested that varietal differences should be considered when a standard of fertilization is prepared.  
 2) The influence of preceding soybean cropping on rice yield was not necessarily distinct. But fertilization had remarkable influence on rice yield. Variety IR-36 showed stable yield for different local conditions.



1978 - 1980

Research subjects and results

1981 - 1983

Research subjects and results

1984 - 1985

Research subjects to be intensified

Subjects 5. Weed control

(1) Weed control on upland field

(Results)

- 1) Weeds increased remarkably by application of tillage, fertilizer and irrigation in soybean field after low land rice. From these results, it was suggested that thoroughgoing preparation for weed control must be made when intensive cultural practices were applied.
- 2) Survey for distribution of weeds in Indonesia was carried out, and the list of weeds was prepared.
- 3) Higher sensitivity in indica varieties to 2,4-D and less inhibition of growth in high temperature condition were found.

Subject 6. Plant Physiology

1. Increase of protein yield in soybean

(1) The effects of nitrogen on the growth, yield and nutrient uptake of soybean

(Results)

The effect of urea application on the growth, yield and nitrogen uptake of soybean using urea labelled

1. Increase of protein yield in soybean

(1) Improvement of fertilizer application

(Results)

The aim is to clarify the response of soybean to fertilizers on Latosol; this field experiment was conducted at K.P Muara.

1. Chemical composition of soybean seed in relation to its viability

with 15 N were studied.

From the experiments, it is concluded that urea should be applied as basic dressing only and top dressing is not profitable.

- (2) Varietal differences in plant growth and nutrient uptake of soybeans.

(Results)

Five soybean varieties were grown in the field, and various differences in plant growth and nutrient uptake were investigated. The growth characteristics of recommended varieties (Orba No. 945) showed shorter growing period with higher CGR ( $g/m^2/day$ ) in the early growth stage. Increase in the nutrient uptake (N.P.K) by fertilizer application was higher in recommended varieties.

- (3) An estimation of nitrogen fixation by root nodule.

(Results)

In soybean cultivation the fixed nitrogen by root nodule played a very important role as a nitrogen source. Attempt was made to evaluate the amount of nitrogen fixed by root nodule using nodulate and nonnodulate isolines of soybean.

The effect of fertilizers on the yield of soybean was: positive response to nitrogen, calcium and magnesium; for phosphorus and potassium there were no clear response.

The response of soybean to fertilizers at K.P Muara was low. The soil at K.P Muara was used as paddy field for a long years. Very likely nutrients, especially phosphorus is accumulated in soil.

- (2) Relationship between nutritive value and cultivation practices.

(Results)

Soybean samples were sent to Japan National Food Research Institute. Protein and amino acid analysis will be determined.

- (3) Increase of viability of seed.

(Results)

The effect of site of production, condition of storage on viability of soybean seed and the effect of sowing method on germination rate of seed were investigated.

Results obtained were as follows: Orba soybean seed viability could be maintained over 10 months. Decreasing moisture content of seed was very effective to prolong its viability. But the seed that had been stored in low moisture content under 7.4% (Relative humidity 40%)

The results indicated that the amount of fixed nitrogen accounted for 43% of the total nitrogen uptake in Muara soil

(4) Studies on the germination of soybean seed.

(Results)

Changes of seed viability as affected by the place of production and storage were investigated with the seeds stored in 3 substations of BORIF.

The high temperature and humidity environments caused the rapid loss of seed longevity. The seed longevity was influenced by the place of storage and varietal difference. For practical use, the time limit of seed storage was investigated. The placement of fertilizer to avoid salt injury was clarified.

2. Behavior of nitrogen in the soil

(Results)

Behavior of nitrogen in the soil under upland yield condition was investigated.

(1) The applied nitrogen disappeared quickly from the soil surface layer which was considered to be due to the leaching loss.

showed hibernation.

The hibernation should be broken before sowing.

There were large differences in germination rate among sowing methods. The scattering straw mulch method showed very low germination rate compared with other methods. Fungicide coating of seed before sowing was effective.

2. Physiological disorder of upland crops

(1) Physiological disorder. Type and its distribution.

(Results)

The study about nutritional diagnosis of soybean and peanut was conducted to study physiological disorders. Abnormal soybean growth was found in grumusol that has badaeration. Grumusol is found in central and East Java and have many problems in soil physical properties.

(2) Moisture deficiency in upland crops.

(Results)

Effect of soil moisture on the germination of soybean seed was investigated. Effect depends on the sowing method. According to the survey, Irrigation was needed to have stable soybean yield in the dry season.

2. Physiological disorders of soybeans.

1978 - 1980 Research subjects and results	1981 - 1983 Research subjects and results	1984 - 1985 Research subjects to be intensified
<p>During the wet season, the applied nitrogen disappears within one month.</p> <p>(2) The nitrification speed of urea and ammonium chloride was investigated.</p> <p>The nitrification initiated one week after application. The nitrification of urea completed between two and four weeks. The nitrification speed of ammonium chloride was slower than urea.</p> <p>(3) The mineralization of soil nitrogen under aerobic incubation was estimated. The amount of inorganic nitrogen released from the soil ranged between 2.1 and 13.9 mg N/100g.</p>	<p>3. Cadmium (Cd) analysis Pollution in agriculture is rapidly increasing in Indonesia. Training in Cadmium analysis is given to Indonesian research related with the method of sampling, treatment of samples, analysis and interpretation of data.</p> <p>Manual of Cd analysis in English and Indonesian are both in print.</p>	

1978 - 1980

Research subjects and results

1981 - 1983

Research subjects and results

1984 - 1985

Research subjects to be intensified

Subject 7. Plant Pathology

1. Survey of disease occurrence in upland crops.
- (Results)  
Many kinds of diseases already reported were found on soybean and mungbean fields.
2. Diseases of soybean (Results)  
Soybean rust and mungbean scab developments were influenced by the sowing times.
1. Studies on the bionomics and control of legume diseases.
- (1) Relation between cultural practices and disease occurrences in soybean.  
(Results)  
Cultural practices did not influence on rust development and Agromyza attack in soybean plants.
- (2) Varietal test of rust disease occurrence in soybean.  
(Results)  
All varieties tested were susceptible or moderately susceptible.
2. Confirmation and control of seed infective fungal and bacterial diseases (Results)  
Seed dressing with topsin-M was effective to prevent seed infection of Cercospora leaf spot of mungbean and peanut
3. Scab disease and Cercospora leaf spot of mungbean.  
(Results)  
Studies on the scab disease have been carried out in Japan. Epidemiological studies on Cercospora leaf spot were carried out

3. Rizoctonia disease of several crops.  
(Results)

Isolates of causal fungus from several crops were classified into several groups.

Rhizoctonia rot was found on mungbean leaves and stems.

4. Causal agents of cassava bacterial wilt.  
(Short-term expert)

4. Guidance on ecology of nematode.  
(Short-term expert)

(Results)

(Results)

Two distinct diseases were included. Bacterial wilt in the narrow sense was caused by Pseudomonas solanacearum and bacterial die back was caused by Xanthomonas campestris pv. manihotis.

Many species of pathogenic nematode were detected from several upland crops.

5. Distribution of physiological races of Pyricularia oryzae.  
(Short-term expert)

(Results)

(Results)

Many race groups belonging to from IA to II are confirmed, and the distribution of races may differ with location.

1978 - 1980

Research subjects and results

1981 - 1983

Research subjects and results

1984 - 1985

Research subjects to be intensified

Subject 8. Entomology

1. Studies on the bionomics and control of main insect pests.

(1) Classification and identification of stem and podborers and seed pests.

(2) Ascertainment of insect pests and extraction of key pests.

(Results)  
Several important pests of soybean and corn were recognized.

(3) Seasonal prevalence, damage and control of beanfly as a pest of soybean.

(Results)

Seasonal fluctuation of some important insect pests were recognized.

1. Studies on the bionomics and control of main soybean insect pests.

(1) Identification of podborers

(Results)

A new podborrer Etiella hobsoni was found out in this country. Comparative morphology of the two species E. zinckenella and E. hobsoni has studied.

(2) Seasonal fluctuation and biology of two species of podborer.

1) Seasonal fluctuation

(Results)

Population fluctuation in the fields of Muara and Ci keumeuh has been investigated from 1981 continuously.

2) Comparative biology and ecology of the two species of podborer.

(Results)

Damage aspects, geographical distribution, larval behavior, larval competition, host plants and reproduction isolation were carried out.

1978 - 1980

Research subjects and results

1981 - 1983

Research subjects and results

1984 - 1985

Research subjects to be intensified

(4) Chemical control of key pests.

(Results)

Several effective chemicals against Ophiomya phaseoli and Atherigona exigua were selected by screening tests.

(5) Developing of artificial diet and mass rearing for insect pests.

(Results)

Two kinds of artificial diet were developed.

(6) Control of lepidopterous pests by utilization of microorganisms.

(Results)

Leucania separata nuclear polyhedrosis virus was effective to the insect pest.

(3) Control methods of the podborers.

1) Varietal resistance of soybean to the podborers.

(Results)

Field and laboratory tests were conducted. From the results, soybean variety No. 29 was resistant compared with Orba.

2) Chemical control of the podborers

(Results)

Experiment on the timing of application of insecticide. From the field experiments, it was clarified that the effective time was during one or two weeks after flowering (Orba).

2. Investigation of the pest problems in high yielding areas of soybean in Java.

(Results)

From the experiment, it was proved that the most insecticides had a stimulative effect on the fecundity of Spodoptera litura.

3. Utilization of pheromone trap for forecasting of occurrence of Spodoptera litura in soybean area.

(Results)

Investigation has been conducted in Bogor, Brebes and Jombang areas.



1978 - 1980  
Research subjects and results

1981 - 1983  
Research subjects and results

1984 - 1985  
Research subjects to be intensified

2. Studies on the ricefield  
rat. (Short-term expert)

(Results)  
Some experiments on the  
population dynamic of the  
rat carried out.

4. Aphid fauna of leguminous crops.  
(Short-term expert)

(Results)  
Aphid fauna of some crops was  
surveyed, only Aphis glycines  
on soybean was observed.

2. Results of Japanese experts

	1978	1979	1980	1981	1982	1983	
Major fields	10.23						10.22
1. Leader	2.22	11.30	4.1				10.22
	S. MATSUMI		S. TODA				
2 Plant Breeding and Cultivation of Upland Crops	2.15		5.14	6.24		6.23	
	K. NAKAYAMA		Y. HOJO				
	(Soybean cultivation)		(Soybean breeding)				
	7.18 --- 8.28		1.12 ---- 4.11				
	H. TAKAGI		S. NAKAMURA				
			(Soybean cultivation)				
			7.5 --- 10.4				
			Y. IZUMIYAMA				
3. Cultivation of Rice	2.15		2.14	3.4		3.3	
	N. ISHIKURA		H. KOBAYASHI				
			(Weed control)				
			3.6 --- 5.14				
			Z. HARADA				
4 Plant Physiology	3.28		3.27	4.8		10.22	
	T. FUJIMOTO		M. NAKASHIMADA				
	(Soybean physiology)		(Cadmium)				
	10.4 --- 11.28		10.20 --- 12.20				
	N. KUWAHARA		Y. YUITA				
			(Plant physiology)				
			12.1 --- 2.28				
			M. IMANISHI				

Major fields	1978	1979	1980	1981	1982	1983
	10.23					10.22
5 Plant Pathology	2.22		8.21			
		T. YAMAGUCHI		7.22		10.22
					S. NARISAWA	
					(Bacterial disease) (Blast)	
			2.27	5.26	2.25	5.24
			K. NISHIYAMA	M. YOSHINO		
6 Entomology	3.28		3.27	7.3		10.22
		M. OKADA			S. NAITO	
					(Tropical rat) (Insect clas.)	
			12.8	3.7	3.19	5.30
			T. SHIRAISHI	M. MIYAZAKI		
				(Nematoda)	4.7	6.6
					T. NISHIZAWA	
7 Coordinator	5.14		5.13			
		M. HABU				10.22
			5.1			
					Y. NIHEI	

Major Fields	1978	1979	1980	1981	1982	1983
	10.23					10.22
8 Doctor Course			3.6 --- 3.15 H. FUJII 3.6 --- 3.15 T. BABA			2.28 --- 3.9 T. KAJIWARA
9 Other Experts			(Planning of irrigation preparation) 4.28 --- 6.27 M. MIZUNOE		3.6 --- 6.3 S. MORI (Installing Irrigation)	
			(Planning of irrigation preparation) 4.28 --- 6.27 N. MORI			
			(Green house construction) 2.27 --- 3.17 G. SAKURAI		(Green house construction) 3.20 --- 4.23 9.30 --- 10.9 10.21 -- 11.13 K. MURAKAMI M. NISHIKAWA (Scanning electron microscope equipment)	
			(Green house construction) 2.27 --- 3.17 A. OGAWA		3.20 -- 4.23 10.21 -- 11.13 K. SAITO (Green house construction)	
			(Equipment repairing) 2.12 --- 2.22 4.23 --- 6.7 4.24 --- 5.8 M. MAEJIMA S.KAWAKUBO M. MAEJIMA (Equipment repairing) (Repairing of agricultural machinery) 4.23 --- 6.7 Y. SAKATA			
			(Repairing of Agricultural machinery)			9.30 --- 10.9 M. MASAKI (Equipment repairing)

### 3. Results of training and study tour of Indonesian researches

Major Fields	1978	1979	1980	1981	1982	1983
	10.23					10.22
1 Plant Breeding Cultivation of Upland Crops			(Sorghum) 3.13 -- 9.12 SUTORO (Peanut) 5.8 -- 11.7 SUTARTO	(Soy. Breed.) 6.5 --- 12.4 TATENG		(Sweet Potato) 3.30 ----- 9.20 MELINA
2 Cultivation of Rice				(Rice) 6.5 ----- 12.4 RUCHIAT		(Irrigation) 3.30 ----- 9.20 TRIP
3 Plant Physiology	(Rice) 5.1 --- 12.20 SOEKIRNO			(Rice) 8.3 --- 2.2 IRWAN		(Soil) 7.1 --- 6.30 WARMA
				(Chemical Analysis) 4.24 --- 10.23 NANANG	(Peanut) 3.17 --- 9.14 MURTADO	
4 Plant Pathology	(Nematoda) 5.1 --- 10.31 HERMAN					(Virus Diseases) 5.20 --- 11.19 NASIR
			(Corn Diseases) 5.1 --- 10.30 MASDIAR			
5 Entomology	(Agrochemic) 5.1 --- 10.31 KILIN			(Insect Ecol.) 6.5 --- 12.4 AGUS		(Insect) 3.17 --- 9.20 HARNOTO
					(Chemical Control) 6.24 --- 12.23 SUTRISNO	

	1978	1979	1980	1981	1982	1983
Major fields	10.23					10.22
C Study Tour	5.20 --- 6.10 PARANSIH	6.10 DJAM'AN	7.31 --- 8.20 SOEHARDJAN			6.1 --- 5.18 SOEGIJANTO
	5.20 --- 6.10 DJAM'AN	6.10 DJAM'AN	5.14 --- 6.3 BAMBANG			
7 Sector Course	6.27 --- 9.26 SUNDARU	9.9 MUKELAR	6.1 --- 11.30 --- SUNDARU	3.20 Acquisition of Title		3.17 --- '84 3.20 MUKELAR

#### 4. List of Equipments and Machinery

Fisical, Year	Item	Total Price (thousand yen)
1978	<ul style="list-style-type: none"> <li>- Laboratory instruments (Ultra centrifuge, Auto-steamer, Flame photometer, Incubator, Deep freezer, Seed storage box Grain drying oven, Thermo-drying oven, Leaf area meter, Analitical balance, Freezer etc.).</li> <li>- Field experimental instruments (Small tractor, Soil crusher, Weeding tiller, ect.).</li> <li>- Facilities (Green house, Air conditioner, Voltage regulator etc.).</li> <li>- Vehicles (Station wagon 1, Small truck 1).</li> <li>- Office equipment (Overhead projector, Copy machine etc).</li> <li>- Others (Chemicals, Books etc.).</li> </ul>	106.084
1979	<ul style="list-style-type: none"> <li>- Lab. instruments (Analitical balance, Microscope, Stereoscopic microscope, Rotary evaporator, Atomic absoption, Spectro photo meter, Gas purifer, Diamond knife, Centrifuge, Homogenizer etc.).</li> <li>- Field exp. instruments (Weeding tiller, Small tractor, Power tiller etc.).</li> <li>- Facilities (Experimental table, Air Conditioner etc.).</li> <li>- Vehicles (Microbus 2 )</li> <li>- Office equip. (Type writer, Copy machine, Camera etc.).</li> <li>- Others (Chemicals, Books etc.).</li> </ul>	61.426
1980	<ul style="list-style-type: none"> <li>- Lab. instruments (Microscope, Analitical balance, Portable area meter, Area meter, Spectro photo meter, Stereoscopic microscope, Microscope, Soybean dryer etc.)</li> <li>- Field exp. instruments (Power tiller etc.)</li> <li>- Facilities (Green house, Irrigation system-Generator, Electric control panel, Pump, Vinyl pipe etc.).</li> <li>- Vehicles (Microbus 1, Station wagon 1, Motorcycles 6).</li> <li>- Office equip (Copy machine, Type writer etc.).</li> <li>- Others (Chemicals, Books etc.).</li> </ul>	108.414

Fisical. Year	Items	Total price (thousand yen)
1981	<ul style="list-style-type: none"> <li>- Lab. Instruments (Spectrometer, Area meter, Clean bench, Balance, Drying oven with mechanical convection system, Electric conductivity meter, Incubator etc.).</li> <li>- Field exp. instruments (power tiller, Rice huller, Rice' thresher).</li> <li>- Facilities (green house etc.).</li> <li>- Office equip. (Printer, Calculator, Slide projector, copy machine, Type writer etc.).</li> <li>- Others (Chemicals, Books etc.).</li> </ul>	66.493
1982	<ul style="list-style-type: none"> <li>- Lab. Instruments (Low-temp. incubator, Super porometer, Integrating quantum radiometer photometer, Microscope, Thermal recorder, Deep freezer, Electronic balance, Flame photometer, Draft chamber etc.).</li> <li>- Field exp. instruments (Gasoline tiller etc.).</li> <li>- Facilities (Controller for prefabricated control room etc.).</li> <li>- Vehicles (Truck 1)</li> <li>- Others (Chemicals, Books etc.).</li> </ul>	42.744
1983	- Under dicussion	20.000,-
Grand total		405.161



Annex II

Research subject to be continued

Research subject	Contents
1. Plant breeding techniques on legumes and other upland crops	Plant breeding techniques for adaptable soybean variety to the environmental conditions will be studied. And as the basis of the breeding, collection and preservation of breeding materials, and examination of their characteristics will be carried out.
2. Cultivation practices of legumes and other upland crops	Researches for enhancement of soybean productivity based on the growth habit and yield component factors will be carried out. And, techniques of liming for soybean production on acid soil will be studied.
3. Plant physiology	Relationship between chemical composition and viability of soybean seed will be studied. And, physiological disorders of soybean grown on different soil will be studied.
4. Plant pathology	Bionomics and control of main diseases affecting production of grain legumes : In this subject, the main diseases affecting qualitative and quantitative losses of grain legumes will be studied.
5. Entomology	Bionomics and control of main insect pests affecting production of grain legumes : In this subject, the insect pests affecting qualitative and quantitative losses of grain legumes will be studied.

The Record of Discussions between the Japanese Project Formulation Team  
and the Authorities Concerned of the Republic of Indonesia on the Technical  
Cooperation for the Strengthening of Legumes in Relation to Cropping System  
Research Project (ATA-218)

THE RECORD OF DISCUSSIONS  
BETWEEN THE JAPANESE PROJECT FORMULATION TEAM  
AND THE AUTHORITIES CONCERNED OF THE REPUBLIC OF INDONESIA  
ON THE TECHNICAL COOPERATION FOR THE STRENGTHENING OF LEGUMES  
IN RELATION TO CROPPING SYSTEM RESEARCH PROJECT (ATA - 218)

The Japanese Project Formulation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as JICA) and headed by Mr. Shigeo KITANO visited the Republic of Indonesia from October 5 to October 12, 1978 for the purpose of working out the details of the technical cooperation program concerning the Strengthening of Legumes in Relation to Cropping System Research Project in the Republic of Indonesia.

During its stay in the Republic of Indonesia, the Team exchanged views and had a series of discussions with the Indonesian authorities concerned in respect of the desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, the Team and the Indonesian authorities concerned considered that Japan-Indonesia Joint Food Crop Research Program under the Agreement between the Government of Japan and the Government of the Republic of Indonesia signed at Jakarta on October 23, 1970 has achieved its expected results and accordingly agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Jakarta, October 12, 1978



Shigeo KITANO  
Leader  
The Japanese Project  
Formulation Team



Rusli Hakim  
Director  
Central Research Institute  
for Agriculture

## THE ATTACHED DOCUMENT

### I. COOPERATION BETWEEN THE GOVERNMENT OF JAPAN AND THE GOVERNMENT OF THE REPUBLIC OF INDONESIA FOR THE STRENGTHENING OF LEGUMES IN RELATION TO CROPPING SYSTEM RESEARCH PROJECT.

1. The Government of Japan and the Government of the Republic of Indonesia will cooperate with each other in implementing the Strengthening of Legumes in Relation to Cropping System Research Project (hereinafter referred to as "the Project") for the purpose of strengthening research activities on legumes and other food crops (rice, corn, tuber crops) as components in cropping system.
2. The Project will be implemented with the Master Plan which is given in Annex I.
3. The Project will be managed by the Joint Committee referred to in VI-2, in accordance with the annual work plan to be formulated in line with the Master Plan referred to in 2. above.

### II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense services of the Japanese experts as listed in Annex II through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
2. The Japanese experts referred to in 1. above and their families will be granted in the Republic of Indonesia the privileges, exemptions and benefits no less favourable than those accorded to experts of third countries working in the Republic of Indonesia under the Colombo Plan Technical Cooperation Scheme, and will include the following:
  - (1) Exemption from income tax and charges of any kind imposed on or in connection with the living allowances remitted from abroad;
  - (2) Exemption from import and export duties and any other charges imposed in respect of personal and household effects which may

be brought into from abroad or taken out of the Republic of Indonesia;

- (3) Exemption from import tax, import sales tax, sales tax, and other taxes and charges of any kind imposed on or in connection with the purchase in the Republic of Indonesia by the Japanese Experts of one motor vehicle per each expert; and
- (4) Free local medical services and facilities to the Japanese Experts and their families.

### III. PROVISION OF MACHINERY AND EQUIPMENT

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense such machinery, equipment and other materials necessary for the implementation of the Project as listed in Annex III, through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
2. The articles referred to in 1. above will become the property of the Government of the Republic of Indonesia upon being delivered c.i.f. to the Indonesian authorities concerned at the ports and/or airports of disembarkation, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese Team Leader referred to in Annex II.

### IV. TRAINING OF THE INDONESIAN PERSONNEL IN JAPAN

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to receive its own expense the Indonesian personnel connected with the Project for technical training or observation tour in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
2. The Government of the Republic of Indonesia will take necessary measures to ensure that the knowledge and experience acquired by the Indonesian personnel from technical training in Japan will be utilized effectively for the implementation of the Project.

V. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

1. In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take necessary measures to provide at its own expense:
  - (1) Services of the Indonesian counterpart personnel and administrative personnel as listed in Annex IV;
  - (2) Land, buildings and facilities as well as incidental facilities thereto for the Project as listed in Annex V;
  - (3) Supply or replacement of machinery, equipment, instrument, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided through JICA under III above;
  - (4) Transportation facilities and travel allowance for the Japanese experts for the official travel within the Republic of Indonesia;
  - (5) Existing suitably furnished accommodations for the Japanese experts and their families.

In addition, all equipment and machinery available at the Central Research Institute for Agriculture as well as those provided through JICA may be used for implementing the Project.

2. In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take necessary measures to meet:
  - (1) Expenses necessary for the transportation within the Republic of Indonesia of the articles referred to in III above as well as for the installation, operation and maintenance thereof;
  - (2) Customs duties, internal taxes and any other charges imposed in the Republic of Indonesia on the articles referred to in III above;
  - (3) All running expenses necessary for the implementation of the Project.

## VI. ADMINISTRATION OF THE PROJECT

1. The Director of the Central Research Institute for Agriculture of the Agency for Agricultural Research and Development will be responsible for the administration and implementation of the Project, and the Japanese experts will provide necessary technical guidance and advice for the implementation of the Project.
2. For the effective implementation of the Project, a Joint Committee consisting of the members as listed in Annex VI, will be established and meet at least once a year. The Committee will formulate the details of the Master Plan referred to in paragraph I and the annual operation work plan of the Project. The details of the Master Plan and of the annual operation work plan will be submitted to the authorities concerned of the two Governments for the approval.
3. The Project will be implemented with close cooperation extended by the related agencies and institutions concerned of the Republic of Indonesia.

## VII. CLAIMS AGAINST JAPANESE EXPERTS

The Government of the Republic of Indonesia undertakes to bear claims, if any arises, against the Japanese experts engaged in the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Indonesia except for those claims arising from the willful misconduct or gross negligence of the Japanese experts.

## VIII. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document.

## IX. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be five (5) years from October 23, 1978.

## ANNEX I MASTER PLAN

1. With a view to developing package of technology on food crops production suitable for agro-climatic condition in the Republic of Indonesia, the Project will be carried out for strengthening research activities on legumes and other food crops (rice, corn, tuber crops) as components in cropping system at the Central Research Institute for Agriculture, Bogor (hereinafter referred to as "CRIA").
2. The Project will consist of the following activities;
  - (1) Research work on the component technology of cropping system through interdisciplinary approach on the following themes:
    - (a) Breeding Technique on Legumes and Other Secondary Crops
    - (b) Cultivation Practice on Legumes and Other Secondary Crops
    - (c) Water Management
    - (d) Application Methods of Fertilizer, Conservation and Improvement of Soil Productivity
    - (e) Weed Control
    - (f) Plant Physiology
    - (g) Plant Protection
  - (2) Exchange of information, samples, materials and research reports
  - (3) Development of research capabilities of the Indonesian researchers in the field as mentioned in (1) above
  - (4) Other activities to be agreed upon between the authorities concerned of the two Governments
3. The activities mentioned in 2. above will also be conducted at appropriate experimental stations of CRIA and farmers' field.

## ANNEX II JAPANESE EXPERTS

1. Leader
2. Researchers covering the following fields;
  - (1) Upland/Secondary Crops Cultivation
  - (2) Rice Agronomy/Cultivation
  - (3) Plant Physiology
  - (4) Plant Pathology



(5) Entomology

3. Coordinator/Liaison Officer

NOTE: Some additional short-term experts in the fields noted in 2. above and other fields when necessities arise.

ANNEX III LIST OF THE ARTICLES TO BE PROVIDED BY THE GOVERNMENT OF JAPAN

1. Equipment, machinery, instruments, tools, spare parts and other materials for laboratory work
2. Equipment, machinery, instruments, tools, spare parts and other materials for field work
3. Fertilizers, pesticides and materials for chemical control
4. Audio-visual aids and articles
5. Vehicles
6. Books and other necessary printed matters
7. Other necessary minor equipment and materials.

ANNEX IV LIST OF INDONESIAN STAFF

1. Project Leader
2. Counterpart researchers to the Japanese researchers
3. Laboratory assistant
4. Field workers
5. Clerical and service personnel including typists, clerks, drivers, etc.

ANNEX V LIST OF LAND, BUILDINGS AND OTHER INCIDENTAL FACILITIES

1. Plant protection research building
2. Offices for Japanese experts
3. Laboratories
4. Glass houses and green houses
5. Experimental farm land
6. Garages
7. Facilities for storing equipment, machinery and other materials for the implementation of the Project.

ANNEX VI COMPOSITION OF THE JOINT COMMITTEE

1. Chairman: Director of the Central Research Institute for Agriculture of the Agency for Agricultural Research and Development
2. Indonesian Side:
  - (1) Project Leader
  - (2) Head of Divisions of CRIA related to the Project
  - (3) Other personnel appointed by the Chairman
3. Japanese Side:
  - (1) Team Leader
  - (2) Experts designated by Team Leader
  - (3) Coordinator/Liaison Officer
  - (4) Representatives of Japan International Cooperation Agency

NOTE: Officials of the Embassy of Japan may attend the Joint Committee as observers.