インドネシア農業研究協力の概要

（昭和46年3月～昭和47年8月）

(THE INDONESIA-JAPAN JOINT CROP RESERCH PROGRAM)

昭和47年10月

海外技術協力事業団
農業協力部

Contents

I. OUTLINE OF THE PROJECT

1. Name — The Indonesia-Japan Joint Food Crop Research Program

2. Location — c/o Central Research Institute for Agriculture
Djl. Merdeka, Bogor, West Java

3. Date of the Agreement
Oct. 23, 1970

4. Aims — This Program has for its object to carry out the joint research on plant protection of food crops in the field of plant pathology, virus vector and physoilogical disorders.

5. Experts

Name	Research Field	Term of Duty
Y. Iwata	Plant Pathology	March 1971-Febrary 1974
T. Nishizawa	Plant Pathology	March 1971-Febrary 1973
F. Yazawa	Plant Physiology	March 1971-Febrary 1973
H. Satomi	Plant Virology	May 1971-May 1973

6. Counter-Parts

Name	Research Field
Dahro	Research Administration
I.N. Oka	Plant Pathology
I.D.M. Tantera	Plant Virology
Mukelar A.	Plant Pathology
Machmud	Plant Pathology
Rocchan	Plant Vixology
Sudjadi	Plant Pathology
Nunung H.A.	Plant Pathology
Harini R.S.	Plant Pathology
S. Paransih I.	Plant Physiology
M. Ismunadji	Plant Physiology

Iskandar Zulkaxnaini	Plant Physiology
Lukman Nel Hakim	Chemical Analysis
Sismiati	Plant Physiology
RatnaRasan	Plant Physiology
Fatchurochim	Plant Physiology
Siti Insijah	Chemical Analysis

7. Equipments and Machineries Provided by the Government of Japan

(1) Items

(a) Plant Pathology and Virology

(1970-1971)

Thermostatic hot air steriliser	2	Insect light trap	2
Shaker	1	Insect specimen cabinet	2
Wide range incubator	3	Spore Trap	1
Autoclave	3	Copyer	1
Arnold sterilizer	1	Electronic computer	1
Portable high speed centrifuge	1	Hand computer	2
Centrifuge	1	Typewritor	2
Glass electrode PH meter	1	Transformor	8
Vacuum pump	1	Compressor	1
Freezer	2	Air conditioner	4
Deep Freezer	2	Jeep	1
Refregerator	1	Direct reading balance	1
Camera	2	Thermostatic water bath	1
Microscope	4	Seed bed warmer set	2
Microphotographic unit	1	Stereoscopic microscope	2
Slide duplicator	1	Photographic stand	1
Rotary Microtome	1	Sliding microtome	1
		Diesel genorator	1

(1971-1972)

Green house	4	Soil sterilizer	1
Jeep	1		

(b) Plant Physiology

(1970-1971)

Constant temperature oven	1	Electric Water bath	1
Pulverizer	1	Electronic computer	1
Ball mill	1	Handling computer	1
Shaker	1	Type writer	1

Homogenizer	1	Muffle furnace	1
Rotary vacuum evaporator	1	Auto still for distilled water	1
Direct analytical balance	1	Jeep	1
PH meter	2	Air Cleaner for microclement laboratory	1
Thin layer chromatography apparatus	1	Leaf area meter	1
Nitrogen semimicro-determination apparatus	1	D.O. meter	1
Garbohydrate determination apparetus	1	Camera	1
Refrigerator	2	Enlarger	1
Deep freezer	1	Flame photometrer	1
Spectrophotometer	1	Transformer	6
		Diesel generator	1

(1971-1972)

Low constant temperature water bath	1	Auto balance type temperature recorder	1
Draft chamber	1	Auto solar radiation recorder	1
Universal projector	1	Constant temperature oven	1
Microscope	1	Cation exhangeable capacity measuring apparatus	1
Photo system for microscope	1	Atomic absorption photometer	1
Water test set	1	Double beam grating spectrophotometer	1
Microtome	1		
Fat collecting set	1		
Top pan direct reading balance	1		

(2) Sum

	Plant Pathology & Virology	Plant Physiology	Shipping freight, Insurance	Total
1970-1971	¥17,281,450	¥13,260,210	¥2,650,793	¥33,192,453
1971-1972	¥15,060,434	¥12,798,434	¥3,089,726	¥30,948,407
(1972-1973	¥17,705,000	¥10,705,000	¥3,702,000	¥32,183,000)

II. RESEARCH ACTIVITIES

This research cooperation team arrived at Bogor on March 1971, and received the equipments and consumables based on the budget for 1970-1971 on June 1972.

However, at that time basic conditions of laboratory, such as electricities, water supplies, gas etc. were not satisfactory, to operate the equipments and machines for laboratory works.

The team members have made every effort to improve the laboratory conditions. At the same time, we have carried out the experiments in laboratory and green-house as far as we can under such conditions.

Survey and tests in the field were also tried according to the research scheduel.

Construction of four green-houses for the researches in plant pathology and virology was completed in the middle of April 1972, and other equipments and consumables based on the budget for 1971-1972 arrived on May 1972.

Although the arrangement of laboratory should be continued, condition for research works is being improve step in cooperation with Indonesian research administrators and researchers concerned.

1. Plant pathological and Virological Research

Preliminary experiments in the laboratory and the green-house were carried out in 1971. In the rainy season 1971-1972, in addition to these experiments, field tests were planned and conducted in the Muara experimental station. These test include the screening of resistant varieties and chemicals for the control of bacterial leaf blight and sheath blight of rice.

Ecology to insect vectors of virus diseases and resistance of several rice varieties to virus diseases have also been investigated.

(1) Survey on the distribution of food crop diseases

To study the present conditions of the occurrence and distribution of food crop diseases in Indonesia, surveys have been done on several localities in Djawa, South Sulawesi and South Kalimantan.

The following diseases have been observed during these survsys.

Rice: Yellow dwarf, Grassy stunt, Bacterial leaf blight, Bacterial leaf streek, Blast, Sheath blight, *Stem rot (Leptoshaeria salvinii)*, Helminthesporium leaf spot, False smut, C Cercosporaleaf spot.

Corn: *Downy mildew, Rust, Leaf spot, Sheath blight.*

Pulses: Peanuts-Wiches' broom, Sclerotial blight, Leaf spot, Bacterial wilt.

Soy bean-Virus diseases, Sclerotial blight, Katjang hidjau-Virus diseases, Witches' broom, Sclerotial blight, Damping-off.

Sweet potato: Witches' broom, Leaf spot

These surveys should be continued.

(2) Studies on bacterial leaf blight of rice

(a) Screening test of resistant varietes

In the dry season 1971, preliminary tests were carried out on 10 varieties by inoculating the bacteria on seedlings and rice plants at maximum number of tillers stage. As a result, no resistant varieties were found in these tests.

In the rainy season 1971-72, screening tests were done on 35 varieties in green house, and 266 varieties and lines in the Muara experimental station. Examination and arrangement of the experimental data are in progress.

(b) Screening test of the chemicals for the control

Several chemicals were found to be offective for the control of bacterial leaf blight in the tests on seedling inoculated with causal bacteria. These chemicals were applied to field tests in the Muara experimental station, and the results are now being arranged.

(c) Forecast by phage method

Forecast of bacterial leaf blight by use of bacteriophage of causal bacteria, Xanthomonas oryzae, "phage method" is practiced in Japan.

Bacteriophage has been successfully detected in the irrigation water and the surface water on paddy field in the Muara experimental station.

Investigation on the relationship between the bacteriophage in the surface water of paddy field and the disease occurrence are mow under way to explere the possibility of forecast of bacterial leaf blight by phage method in Indonesia.

(3) Studies on sheath blight

(a) Screening test of resistant varieties

Screening test of resistant varieties by inoculating the pathogen (Pellicularia sasakii) has been carried out in green-house (35 varieties) and in the experimental station at Muara (266 varieties and lines).

The results are now being arranged.

(b) Screening test of chemicals for the control

The results of preliminary screening test showed that some chemicals are effective for the control of sheath blight. These chemicals were then applied to pot test, and to field tests at Muara. As the result, Valide, Polyoxine Z and Neoasezin were proved to be effective for the control of sheath blight.

(4) Studies on rice blast

Screening test of resistant varieties to rice blast (Piricularia oryzae) have been carried out in the fields at Sukabumi where rice blast occurrs endemically.

Investigation on physiologic races, test on varietal resistance and also basic study for chemical control are now under consideration.

(5) Studies on bacterial leaf streak

Causal bacteria (Xanthomonas translucens var. oryzicola) have been isolated from the diseased leaves collected from various places and investigated in physiogical characters.

Screening test of resistant varieties has been done on the seedlings by inoculating the bacteria, and also on rice plants in the naturally infected fields of the Muara experimental station.

(6) Studies on virus diseases

(a) Identification of virus disease

Through the transmission experiments by insect vectors, Nephotettix nigropictus and Nilaparvata lugens, presence of yellow dwarf and grassy stunt in Indonesia has been proved respectively.

(b) Investigation on the ecology of insect vectors and varietal resistance of rice in the field.

Investigation on the occurrence of insect vectors (leaf hopper and plant hopper) related to virus diseases, and also on the resistance of several varieties to virus diseases has been carried out in the Muara experimental station.

Insect light traps have been set in Muara and Tjiandjur for the investigation on the occurrence of insect vectors.

(7) Studies on the major diseases of corn

Inoculation methods for testing varietal resistance of corn to downy mildew have been studied and also epidemiology of downy mildew in the fields in CRIA has been investigated.

Survey on the occurrence of major diseases of corn in Indonesia and screening test of resistant varieties in 1972-1973 were planned.

References:

(a) Progress report of Indonesia-Japan Joint Food Crop

Research Program No.1 Studies on bactorial leaf blight of Rice (1), July 1, 1971

(b) Ditto No. 2 Studies on virus diseases of rice

(1) Identification of virus diseases April 1, 1972

1. Plant Physiological Research

To study the general aspects of physiological disorders of food crops in Indonesia, surveys have been done on various locatilities.

In the dry season 1971, some pot and field tests were done to confirm the cause of "Mentek" disease observed in the experimental farm in Tjihea. In the rainy season 1971-72, field tests in the experimental stations at Muara.

Tjihea and Ngale, and experimental farm at Jogjakarta, and also four kinds of pot tests at CRIA in Bogor were carried out to examine the cause of physiological disorders and to explore the counter-measures.

(1) Survey on the physiological disorders of food crop

Surveys on various localities in Jawa, South Sulawessi and Soth Kalimantan have revealed the disorders of rice apparently caused by phospher deficiency, iron toxicity or toxic gas originated from strong reduction of soil.

Physiological disorders caused by magnesium deficiency were observed on corn and peanuts in South Sulawesi. Soil and plant samples from thses disordered fields are being analized chemically.

These surveys should be continued.

(2) Studies on the relation between yield and nitrogen requirement of rice on physiological disordered fields

Several tests have been made on the relation between yield and nutrient in rice plant, and nitrogen requirement of rice grown on various kinds of soil.

(a) In the dry season 1971, in pot tests using Mgale soil (grumusol), application of physiological acid fertilizer revealed the effectiveness for yield increase, suggesting that the soil is not defecient in sulfur.

(b) In the dry season 1971, in the field test at Tjihea, remarkable decrease in rice yield on "Mentek" field and apparent disorders by iron toxicity were observed.

(c) In the dry season 1971, tests on nitrogen requirement of rice were carried out on the farms treated with different nitrogen level, in the experimental stations of Muara, Pusakanegara, Ngale, Genteng, and

Modjosari.
The results showed that according to different type of soils of the stations, nitrogen requirement to produce 100kg grain varied between 1.27-2.20kg, and this value increasing nitrogen application.
Nitrogen utilization ratio fertilyzer used, was also variable, and it was low in Muara soil.
Increase of this value for better rice production in Muara will be possible by improvement of cultural practices.

(d) In the rainy season 1971-72, investigations on leaf area index, and dry matter production, and starch tests were carried out on four rice varieties with different growth type in the Muara experimental station.
Samples are now under chemical analysis.

(3) Studies on growth and root activity of rice grown on different type of soils

In the dry season 1971, pot tests were conducted, using the soils of experimental stations in Muara, Ngale, Pusakanegara and Singamerta.

The results indicated that rice plants on Ngale soil showed extreme phospher deficiency, and rice growth in Muara soil was inferior at vegetative stage, but recovered at later stage of growth. Chemical analysis is being carried out.

Root development of rice was studied in glass pots, using five different type of soils (Muara, Ngale, Patjet, Pusakanegara and Singamerta). Root rot was observed in Patjet soil.

Symptom of white and slender roots, restricted in distribution was observed in Ngale soil at early stage of growth.

Arrangement of experimental data is now under way.

In the rainy season 1971-72,12 rice varieties were grown in untrient solution in pots and their root activities were measured by alpha-naphthylamine method which is based on the oxidizing activity of roots. The results showed that there are differences in dry weight and activity of root system among the rice varieties.

(4) Studies on resistance of rice varicties to high nitrogen application and to soil reduction.

31 rice varieties in the dry season 1971 and 18 varieties in rainy season 1971-72 have been subjected to pot tests.

The results are now being arranged.

(5) Studies on the countermeasures on fields of "Akiochi" and "Mentek"

In the rainy season 1971-1972, it was shown from the tests on "Akiochi" farm in Jogjakarta that the application of ball fertilizer is effective to increase rice yield, showing the necessity of nutrient supply at later stage of growth.

On the experimental farm in Tjihea where severe "Mentek" disease was observed, application of potassium fertilizer was effective to prevent "Mentek"

(6) Studies on physiological disorders of soy bean

Field tests are planned in the Muare experimental station in the rainy season 1972-1973.

References:

(a) Nitrogen requirement of lowland rice on major Jaxa soil presented at the staff meeting in Cria. May 20-30, 1972

(b) Preliminary experiment on the study of root activity of 12 rice varieties ditto

3. Training of the Counterpart in Japan

Based on the agreement between the Government of Republic of Indonesia and Japan, Mr. Lukman (CRIA) stayed in the National Institute of Agricultural Sciences in Tokyo for 6 months from January 1970 to study the modern methods of chemical analysis.

In 1972-73, four scientists are expected to visit Japan for training in the Research Institutes in Japan.

III. PROGRESS REPORT

Departmen Pertanian JIJRP-1

Lembaga Pusat Penelitian Pertanian

Hama & Penjakit

July 1, 1971

Progress Report on Japan-Indonesia Joint
Food Crop Research Program No.1

Studies on Bacterial Leaf Blight of Rice. (1)

Bacterial leaf blight is one of the most important rice diseases in Indonesia. This disease always causes severe damage to susceptible varieties, and it is most difficult to control. Therefore, Japanese plant pathologist of Japan-Indonesia Food Crop Research Program team and staff of Plant Pathology Division of LP3 are carrying out jointly the research works in laboratory on bacterial leaf blight since March 1971.

Pathogenic bacteria and their bacteriophages were already isolated and laboratory screening tests by inoculation method in green house are now under way.

Some results obtained are shown in following photographs.

(写真省略)

JIJRP-2

April, 1972

Progress Report on

JAPAN-INDONESIA JOINT FOOD CROP RESEARCH PROGRAM

No. 2

Studies on Virus Diseases of Rice (1)

-Identification of virus diseases-

Several kinds of virus diseases of rice (Tungro, Penyakit merah, Yellow-orange leaf, Transitory yellowing, Orange leaf, Yellow dwarf, Grassy stunt) have been reported in Southeast Asian countries, and their damage to rice production is a serious problem.

In Indonesia, Rivera et al. (1968) have recently verified the presence of tungro virus in the diseased rice plants from West Djawa and South Sumatera, and suggested that tungro may probably be involved in the epidemiology of Mentek. They also reported that yellow dwarf and grassy stunt have been observed in West Djawa and South Sumatera, but they did not confirm the fact experimentally.

In our research works, we are trying to identify the virus diseases in Indonesia, because identification is quite important as an initial step to the development of research on virus diseases of rice.

Diseased samples have been collected from various districts and identified through the transmission experiment. As the result, we have so far confirmed the presence of yellow dwarf and grassy stunt in Indonesia.

Some data of the experiments are described below:

1. Yellow dwarf

Source of the disease agent: A diseased plant from South Sulawesi (variety IR 22,Fig. 1)

Vector species used: <u>Nephotettix nigropictus</u> (Fig. 4, middle)

Symptom of inoculated plants: Fig. 2 (variety PB 8)

Percentage of infective leafhoppers: 95.1% (39/41)

Incubation period of the disease agent in insects:
within 20 days 53.8% of the insects became infective

2. Grassy stunt

Source of the disease agent:
(a) A diseased plant from Muara (variety Pelita 1/1)
(b) A diseased plant from Tegal

Vector species used: Nilaparvata lugens (Fig. 4, right)

Percentage of infective planthoppers:
(a) 40.0% (10/25), (b) 25.0% (10/40)

Incubation period of the disease agent in insects:
within 12 days 60.0% 9a0 and 50.0% (b) ot the insects became infective respectively

Lately yellow dwarf has been found in South Kalimantan and West Djawa. Grassy stunt has been found in South Kalimantan, South Sulawesi, and many places in Central and West Djawa.

(写真省略)

IV. SOME REPORTS OF THIS PROGRAM

MINISTRY OF AGRICUITUPE
CENTRAL RECEARCH INSTITUTE FOR AGRICULTURE
BOGOR, INDONESIA

STAFF MEETING, MAY 29-30, 1972.

(1) NITROGEN REQUIREMENT OF LOWIAND RICE ON MAJOR JAVA SOILS

M. Ismunadji, I. Zulkarnaini and F. Yazawa

INTRODUCTION

The study of plant nuttrition is one of the main effort to improve quality and increase yield of food crops per unit area of land surface. The application of fertilizer is a supplement to the nutrient supply that is originally present in the soil to increase the nutrient level in the rooting medium. However non efficient use of fertilizer resulting in economic less or even reduce yislds and quality of the product. The lack of fertilizer usually not because fertilizer is not required, but because of economic factors. During the growing period, nutrient ions continuesly removed from the medium and accumulated in the plant organs. The total supply of nutrients from the soil is limited and only a small part is in immediate contact with the plant root. Continues uptake of nutrients and removal of plant products therefore require supplemental addition of these nutrients. The amount of nutrient actually lost from the soil system due to plants is that is removed by the harvested portion of the crop.
The quantity of N removal in various crops vary with the plant species. The amount of N absorded from no nitrogen plots shows N supply power of the soil. The actual removal of nutrients depends not only on the content of the elements of the plant material harvested, but also on the total weight of dry matter

removed.

The N utilization ratio varies greatly according to the type and amount of clay, ranging from 40-60% in soils montmorillonite clay minerals and 10-30% in soils with kaolin and allophane. The ratio of N in grain to that in straw is higher in high yielding than in low yielding varieties. Amount of indigenous N of soil absorbed by plant ranged from 50-80 kg/ha and about 60-80% of N absorded by the rice plant is attributed to indigenous N in soils (YANAGISAWA and TAKAHASHI, 1964). Many factors are responsible for N recovery in the rice plant, including variety, soil and environmental factors. Beside the occurence of plant disease and pest and weather condition, cultural practices is of importance to eliminate leaching, denitrification, volatilization of nitrogen and consumption of nutrients by weed.

Field experiment for the measurement of plant nutrient supply are more troublesome and less precice than laboratory measurement, because of the inability to control the variable. However it is capable of reflecting the actual soil plant relationship in the farmers field.

MATERIAL AND METHOD

The experimental data was collected from the experiments (split plot with 3 replications) conducted by the Agronomy Division of the CRIA to study the response of rice varieties to different levels of N in the form of urea (0-60-60, 45-60-60, 90-60-60, 135-60-60, 180-60-60) in different experimental farms, located in East, Central and West Java with an elevation from 5m to 270m above sea level. For the present experiment only the varieties PB5, Pelita I/1 and Pelita I/2 from Genteng (alluvial), Modjosari (regosol), Ngale (grumusol), Pusakanegara (alluvial) and Muara (latosol) were taken into consideration due to limited labour facilities. Two representative hills from each plot were sampled for chemical analysis. For easy calculation, the determination of straw dry weight was based on the grain yield divided by the grain straw ratio of the samples taken.

The samples obtained were dried in a drying oven, divided into grain and straw, powdered and further used for chemical N analysis following the method of YOSHIDA, FORNO and COCK (1971). The evaluation of fertilizer utilization is possible direct by means of isotope technique, but in this experiment the quantity of N derived from the fertilizer is determined by the conventional method from the different in plant nutrient yield between the N treated and the non N treated plot.

RESULT AND DISCUSSIDN

Nitrogen is an essential element for the growing plant and is often a limiting factor for crop production. It is removed in large quantities with the harvested crop. The removal of N in comparison with other macroelements by grain crops is shown in Table 1 (FRIED and BROFSHART, 1967). The aim of the experiment is to have an idea of N uptake and N efficiency of fertilizer used on lowland rice located in different patrs of Java, which is of importance for rice production.

The dry matter yield and N content of straw and grain and N uptake of shoot at harvest are presented in Table 2. The N content of straw as well as grain increase with increasing N aplication, for straw between 0.3-0.6% and for grain between 0.8-1.3%. It means that increasing N supply increases grain yield and also improving grain quality due to higher protein content. The N uptake follows the same trend and increase consistently by increasing N supply and by the highest N application the N absorption increase about two to nearly three times the zero N plot.

Of the elements N, P and K, the natural supply of nitrogen is the smallest among these three nutrients. According to MATSUBAYASHI et al. (1963) rice production in non phosphorus and non potash plot reaches about 95% of the rice yield, while in non nitrogen plot this value is about 80%. In the present experiment by the highest N application about 40-70% is attributed to indigenous N in the soil (Table 2).

The N utilization ratio of fertilizer, the translocation ratio of N to the grains, N requirement to produce 100 kg grain yield and yield return per kg N are shown in Table 3. The data obtained of the N utilization ratio in this experiment vary between 12-60% and this is in agreement with the findings of YANAGISAWA and TAKAHASHI (1964) ranging from 10-60%. It is known that plant species, soil and weather condition play an important role in nutrient absorption. The occurence of disease and pest often causes yield failure and inefficient use of fertilizer, reflecting in low N recovery. It is also worthy to stress that good cultural practices to eliminate N loss are responsible for maximum N utilization ratio of the fertilizer used.

The translocation ratio of N to the grains shows no wide variation ranging between 62-79%. It means that the great part of N in the rooting medium is accumulated in the grains ard only a small portion is distributed to the other plant parts. The N requirement to produce 100 kg grain vary between 1.27-2.20 kg and this value increase with increasing N application. In normal condition this magnitude is about 1.7 kg and high values is often due to growth disorders. The low figure is indicative of efficciency of fertilizer use by the growing plant due to limited amount of nutrients available in the rooting medium. These values are of importance for fertilizer application and production planning. Yield return perkg N applied is calculated by yield increase divided by the quantity of fertilizer used and by the highest N application these values are relatively still high ranging from 9-28 kg.

From the result obtained it was shown that different areas showed variables in N utilization ratio of fertilizer used, In areas with low fertilizer utilization ratio like Muara, it is possible to increase this value for better crop production by improving cultural practices and it is valuable to conduct experiments to study the cultural practices in relation with efficient use of fertilizer for maximam crop yield.

TABLE 1. THE REMOVAL OF N IN COMPARISON WITH OTHER MACROELEMENTS BY GRAIN CROPS FOR N-1

(FRIED AND BROESHART, 1967)

Crop	N	P	S	K	Ca	Mg
Barley	1	0.22	0.16	0.87	0.19	0.13
Buckwheat	1	0.20	-	1.1	0.28	-
Oats	1	0.18	0.29	1.0	0.19	0.26
Rice	1	0.22	-	1.2	0.24	0.13
Wheat	1	0.18	0.17	0.56	0.13	0.12
Corn	1	0.18	0.15	0.71	0.71	0.19

TABLE 2. YIELD ON AIR DRY BASIS OF STRAW AND GRAIN, N CONTENT AND N UPTAKE OF 3 RICE VARIETIES.
S: STRAW, G1: GRAIN, IECL. EMPTY GRAINS, G2: GGRAIN, EXCL. EMPTY GRAINS

Treatment	Variety	Yield (kg/ha)				% N		N up-take (kg/ha)
		S	G1	G2	Total (S+G1)	S	G1	
GENTENG								
0−60−60	PB5	3764	3592	3343	7356	0.49	0.94	52
	Pelita I/1	2944	3592	3058	6536	0.39	0.96	46
45−60−60	PB5	5651	5157	4552	10808	0.51	0.95	78
	Pelita I/1	4784	4888	3770	9672	0.37	0.97	64
90−60−60	PB5	7447	6330	5512	13777	0.55	1.13	113
	Pelita I/1	5127	5904	5121	11031	0.42	1.03	82
135−60−60	PB5	6697	5761	6010	12458	0.49	1.09	95
	Pelita I/1	6155	5904	5086	12059	0.47	1.14	96
180−60−60	PB5	8490	6614	6046	15105	0.54	1.32	134
	Pelita I/1	8430	6473	5691	14930	0.53	1.13	121
MODJOSARI								
0−60−60	PB5	3438	3635	3478	7073	0.38	0.93	47
	Pelita I/1	3263	4022	3855	7285	0.29	0.90	46
45−60−60	PB5	4418	5129	4918	9547	0.36	0.94	64
	Pelita I/1	5150	5356	5129	10506	0.37	0.92	69
90−60−60	PB5	6035	6313	6103	12348	0.40	1.02	88
	Pelita I/1	6295	6580	6323	12875	0.40	1.03	93
135−60−60	PB5	6620	7156	6949	13776	0.40	1.10	105
	Pelita I/1	7120	7661	7340	14781	0.44	1.06	115
180−60−60	PB5	7864	8917	8511	16781	0.41	1.19	139
	Pelita I/1	7419	8451	8180	15870	0.46	1.15	133
NGALE								
0−60−60	PB5	4098	3967	3433	8065	0.34	0.82	46
	Pelita I/1	4448	4367	3633	8815	0.34	0.83	52
45−60−60	PB5	5457	4633	4067	10290	0.42	0.86	65
	Pelita I/1	5992	5300	4833	11292	0.37	0.86	68
90−60−60	PB5	6588	5767	5033	12355	0.38	0.94	80
	Pelita I/1	7161	6533	5700	13694	0.37	0.82	80
135−60−60	PB5	8436	7200	6400	15636	0.39	1.05	108
	Pelita I/1	6930	6833	5800	13763	0.36	0.94	89
180−60−60	PB5	9176	7200	6433	16378	0.46	1.09	120
	Pelita I/1	6620	8533	7367	15153	0.44	1.05	132
PUSAKANEGARA								
0−60−60	PB5	3958	4504	4142	8462	0.38	0.94	58
	Pelita I/1	4806	5370	4886	10176	0.40	0.99	72
45−60−60	PB5	5231	5617	5206	10848	0.42	1.00	78
	Pelita I/1	6291	6409	5753	12700	0.40	0.91	83
90−60−60	PB5	6451	6775	6253	13226	0.41	1.09	100
	Pelita I/1	7930	7152	6450	15082	0.41	1.04	107
135−60−60	PB5	7115	7319	6719	14434	0.51	1.25	128
	Pelita I/1	8689	7811	6969	16500	0.47	1.06	124
180−60−60	PB5	7516	7741	7546	15257	0.57	1.33	150
	Pelita I/1	6445	7914	7002	14359	0.58	1.16	147
M U A R A								
0−60−60	PB5	3615	3903	3730	7518	0.42	0.91	51
	Pelita I/1	3101	3497	3146	6598	0.38	0.87	42
45−60−60	PB5	3733	4507	4248	8240	0.38	0.93	56
	Pelita I/1	4238	4863	4480	9101	0.41	0.83	57
90−60−60	PB5	4480	5026	4784	9506	0.44	0.98	69
	Pelita I/1	4519	5607	5009	10126	0.43	0.97	74
135−60−60	PB5	4974	5965	5604	10939	0.40	1.09	85
	Pelita I/1	5238	6422	5691	11660	0.59	1.09	100
180−60−60	PB5	5073	6071	5411	11144	0.61	1.13	101
	Pelita I/1	5035	6002	5320	11037	0.65	1.11	100

TABLE 3. N UTILIZATION RATIO, TRANSLOCATION RATIO OF N TO THE GRAINS, N REQUIRMENT FOR 100 KG GRAIN AND GRAIN YIEED RETURN PER 1. KG FERTILIZER N OF 3 RICE VARIETIES

Treatment	varoety	N utilization ratio	Translocation ratio of N in grain (%)	N requirement for 100 Kg grain (Kg)	Grain yield return per 1 Kg fertilizer N (Kg)
1	2	3	4	5	6
GENTENG					
0-60-60	PB5	-	65	1.57	-
	Pelita I/1	-	75	1.51	-
45-60-60	PB5	56	63	1.71	27
	Pelita I/1	40	74	1.70	16
90-60-60	PB5	67	63	2.05	24
	Pelita I/1	40	74	1.60	23
135-60-60	PB5	32	66	1.58	20
	Palita I/1	37	70	1.89	15
180-60-60	PB5	45	65	2.20	15
	Pelita I/1	41	62	2.12	15
MODJOSARI					
0-60-60	PB5	-	72	1.35	-
	Pelita I/1	-	79	1.19	-
45-60-60	PB5	38	75	1.31	32
	Pelita I/1	50	72	1.33	28
90-60-60	PB5	46	73	1.45	29
	Pelita I/1	53	73	1.48	27
135-60-60	PB5	43	75	1.51	26
	Pelita I/1	51	71	1.56	26
180-60-60	PB5	51	77	1.63	28
	Pelita I/1	48	73	1.62	24
NGALE					
0-60-60	PB5	-	70	1.35	-
	Pelita I/1	-	70	1.42	-
45-60-60	PB5	42	65	1.61	14
	Pelita I/1	36	67	1.40	27

1	2	3	4	5	6
90-60-60	PB5	37	69	1.59	18
	Pelita I/1	31	67	1.40	22
135-60-60	PB5	46	70	1.70	22
	Pelita I/1	28	72	1.54	16
180-60-60	PB5	41	65	1.87	17
	Pelita I/1	45	68	1.79	21
PUSAKANEGARA					
0-60-60	PB5	-	75	1.39	-
	Pelita I/2	-	73	1.48	-
45-60-60	PB5	45	72	1.49	24
	Pelita I/2	25	69	1.45	19
90-60-60	PB5	47	74	1.60	23
	Pelita I/2	39	69	1.66	17
135-60-60	PB5	52	71	1.91	19
	Pelita I/2	38	67	1.78	15
180-60-60	PB5	51	72	1.99	19
	Pelita I/2	42	62	2.10	12
MUARA					
0-60-60	PB5	-	70	1.36	-
	Pelita I/2	-	72	1.34	-
45-60-60	PB5	12	75	1.32	11
	Felita I/a	33	71	1.27	30
90-60-60	PB5	20	71	1.44	12
	Pelita I/2	36	74	1.48	21
135-60-60	PB5	25	76	1.51	14
	Pelita I/2	43	69	1.79	19
180-60-60	PB5	28	70	1.86	9
	Pelita I/2	32	67	1.88	12

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MINISTRY OF AGRICULTURS
CENTRAL RESEARCH INSTITUTE FOR AGRICULTURS
BOGOR. INDONESIA

STAFF MEETING, MAY 29-30, 1972.

(2) PRELIMINARY EXPERIMENT ON THE STUDY OF ROOT ACTIVITY OF 12 RICE VARIETIES

R. Hasan, M. Nasir, M. Ismunadji
and F. Yazawa

INTRODUCTION

To determine the optimum level of fertilizer, many fertilizer experiments were carried out under different soil condition in Indonesia. The results suggested that low productivity of rice yield was among others mostly due to low nutrient uptake. This seems to be connected not only with shortage of nutrient elements in the soil, but also with other factors affecting the uptake of nutrients by the rice plant. Physiological functions such as the uptake of nutrients and the respiration of root may relatively estimated by taking into due consideration the development of root and the rate of root tip elongation. On the other hand there are relationship between photosynthetic activity and physiological function of root.

Root activity is one of the essential probloms in the study of rice cultivation, since root activity has an important role on the growing plant to obtain maximum yield. This opinion is based on the fact that root activity directly influences nutrient absorption from the soil (YAMADA and OTA, 1958). He also reported that nitrogen absorption by roots coincided well with the respiration in root at the respective plant growth stage.

The activity of the root is related with respiration rate and the main function of root activity is supplying energy for nutrient absorption, which is formed from the respiration of the roots. Thus root activity can be measured by its respiration rate by using Warburg's manometer apparatus. However a simple method can be used by measuring its oxydizing or reducing activity of the root using alpha-naphty lamine, esculin or tri-tetrasolium chloride method. The oxydizing activity of the roots can be determined by measuring the oxydation of the alpha-naphtylamine by the roots. When the oxydizing activity of the root is very low, generally nutrient absorption will by inhibited (OTA, 1970).

The activity of the root is closely related with root age and it means that its activity has a corelation with the growth stage of the growing plant. MITSUI (1960) found that the roots of rice seedling are oxydative and occasiohally it turned to reductive in the later stage of development. Physiological activity of the roots increase with the growth of the plant up to around heading time, including the number of roots per plant, the fresh and dry weight, root length, respiration rate and nutrient absorption. Then it dccreases until the ripening stage, except root length (INADA, 1967).

MATERIAL AND METHOD.

The experiment was conductod in a glasshouse in Sindangbarang, using plastic cylindrical containers of 3.5 L capacity. Twelve rice varieties were included in this experiment as shwn in table 1. Water culture method was chosen for this experiment to avoid the risk of root damage and losses during harvest by using soil as the rooting medium. During the experimental period tapwater was used for watering. The experimental pots were supplied with complete nutrient solution, renewed once a week until one month after transplanting and then renewed twice a week. The pH of the nutrient solution was kept between 5.3-5.5 by adding sulphuric acid.

The seedlings were transplanted 21 days after sowing, one healthy seedling per pot. Each variety consisted of 6 pots and placed in rows. Root activity measurement was done at seedling, primordia and heading stage (15 days after heading), using alpha-naphtylamine method (OTA, 1970), This method is based on the oxydizing activity of the roots by measuring the oxydation of the alpha-naphtylamine by the roots.

RESULT AND DISCUSSION

As shown in table 1, the root activity per unit root dry weight of the rice varieties are relatively high at seedling and primordia stage and decreases at heading time. Tha value at seedling stage vary between 1.46-2.28 ppm primerdia stage 1.72-2.15 ppm and heading time 1.02-1.38 ppm alpha-naphtylamine per mg root dry weight. It means that the root activity from seedling to heading time decreases about 60%. The low value of root activity at heading time is probably mainly due to detioration of the root system, which was observable during the experimental poriod, Among the varieties PB5, Dewi Ratih, Pelita I/1, Pelita I/2 and Sukamandi are varieties with relatively high root activity of around 2 ppm alpha-naphtylamine per mg root dry weight.

The total root activity depends not only on the activity per unit root dry weight, but also on the total root dry weight per pot. The total root dry weight increases substantially from seedling to primordia stage about 30 to 45 times and then increases slightly until heading time. For the varieties PB5, C4-63, Dewi Ratih, Bengawan, PB8 and Sigadis the total root dry per pot decreases from primordia to heading stage due to starvation of part of the root system. The value of total root activity per pot at seedling stage vary between 0.75-1.29 ppm, primordia stage 8.8-14.2 ppm and heading stage 5.04-10.2 ppm alpha-naphtylamine per root dry weight per pot.

From the results obtained, it is clear that there are differences in dry weight and activity of the root system between the varieties. It is valusble to conduct more intensive experiments to study the root system and root activity of the rice plant, and it is of importance for breeding work and increase rice production.

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TABLE. 1. ROOT DRY WEIGHT PER POT, ROOT ACTIVITY PER MG ROOT DRY WEIGHT AND TOTAL ROOT ACTIVITY PER POT OF 12 RICE VARIETIES.

Variety	ppm - NA/mg root dry weight			ppm -NA/pot			Root dry weight per pot (gr)		
	Seedling stage	Primordia stage	15 days after heading	Seedling stage	Primordia stage	15 days after heading	Seedling stage	Primordia stage	15 days after heading
11. PB.-5	2.14	2.07	1.6	1.08	11.0	5.78	0.16	5.32	4.97
2. C4-63	1.46	2.03	1.17	0.75	11.3	5.04	0.15	5.56	4.32
3. Syntha	1.63	1.92	1.13	1.02	12.4	7.13	0.20	6.44	6.34
4. Dewi Ratih	1.91	2.04	1.08	1.09	14.1	5.45	0.16	6.91	5.04
5. Bengawan	1.75	1.86	1.08	1.09	14.2	5.71	0.19	7.63	5.30
6. PB-8	1.86	1.87	1.22	0.87	11.5	5.52	0.14	6.16	4.52
7. Remadja	1.82	1.85	1.20	1.29	10.2	7.55	0.22	5.53	6.27
8. Sigadis	1.82	1.72	1.03	1.18	8.8	5.11	0.19	5.15	4.97
9. Pelita I/1	2.28	2.15	1.02	1.17	12.2	5.82	0.15	5.68	5.69
10. Pelita I/2	1.93	2.08	1.19	1.01	11.6	8.45	0.17	5.56	7.12
11. Gendjah Beton	1.87	1.82	1.21	1.08	11.0	8.51	0.19	6.03	7.03
12. Sukamandi	2.27	2.00	1.38	0.97	9.51	10.2	0.13	4.76	7.36

PAPER PRESSED AT THE SOUTH EAST ASIA REGIONAL
SYMPOSIUM ON PLANT DISEASES IN THE TROPICS, JOGJAKARTA
(INDONESIA) SEP. 11-15, 1972

(3) YELLOW DWARF DISEASE OF RICE IN INDONESIA

Hirowo SATOMI

Method and results of the transmission experiment are as follows.

Source of the disease agent: A diseased rice plant (variety IR 22) from Panggentungan in South Sulawesi

Vector species used: Nephotettix nigropictus

Percentage of infective leafhoppers: 95.1% (39/41)

Incubation period in insect: 50% of the insects became infective within about 20 days and 90% within about 23 days after acquisition feeding respectively.

Incubation period in plant: 50% of the infected test plants developed symptoms within about 3 days and 90% within about 43 days after inoculation feeding respectively.

Days after acquisition feeding

No.	16-17	18-19	20-21	22-23	24	25-26	27-28	29-30	31	32-33	34-35	36-37	38	39-40	41-42	43-44	45	46-47	48-49	50-51	52	53-54
1 f	○	○	×	⊙	⊙	×	⊙	⊙	×	⊙	×	×	×	×	×							
2 f	○	×	×	⊙	⊙	⊙	⊙	×	×	⊙												
3 f	×	○	⊙	×	⊙	⊙	⊙	×														
4 f	×	○	⊙	⊙	⊙	×	⊙	×														
5 f	○	○	⊙	○	⊙	⊙	⊙	⊙														
7 f	×	○	○	⊙	⊙	×	⊙	⊙	×	×	×	×	×	×	×	⊙	⊙	⊙				
8 m	×	○	⊙	×	⊙	⊙	×	⊙	×	⊙	×	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
14 m	●	⊙	⊙	×	⊙	⊙	⊙	×	⊙	⊙	×	×	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
15 f	●	⊙	⊙	⊙	⊙	×	⊙	⊙	⊙	⊙	⊙	⊙	×	×								
16 m	×	⊙	○																			
18 f	×	⊙	⊙	⊙	⊙	×	⊙	⊙	×	⊙	⊙	⊙	○	⊙	×	⊙	×	⊙	○			
19 f	○	○	×	⊙	⊙	×	⊙	⊙	×	×	⊙											
20 f	○	○	×	⊙	×	⊙	×	×	×	⊙	⊙	⊙	×									
21 f	○	○	○	⊙	×	⊙	⊙	⊙	○	⊙	×											
22 m	○	⊙	⊙	⊙	×	⊙	⊙	×	○	⊙	×	⊙										
23 m	○	○	○	×	×	⊙	×															
26 f	×	⊙	⊙	⊙	×	⊙	×	×	○	×	×	⊙	⊙	×	⊙							
27 f	○	○	⊙	⊙	⊙	×	⊙	⊙	×	⊙	×	×	⊙	×	×							
28 f	○	×	○																			
29 f	○	○	×	⊙	×	×	⊙	⊙	⊙	×	×	⊙										
:																						

⊙: infected, o: noninfected, x: dead or undeveloped
(test plant) f: female, m:male

PAPER PRESSED AT THE SOUTH EAST ASIA REGIONAL SYMPOSIUM ON PLANT DISEASES IN THE TROPICS, JOGJAKARTA (INDONESIA) SEP. 11-15,1972

(4) GRASSY STUNT DISEASE OF RICE IN INDONESIA [1)]

D.H. TANTERA, H. SATOMI AND ROECHAN [2)]

ABSTRACT

Grassy stunt disease of rice has been observed in the field in West Java since 1967. Succesful transmission of the disease was conducted in glass house experiments by using Nilaparvato lugens Stal as insect vector, From 15 to 37% of the insect population could transmitte the disease. The incubation periods of the causal agent in the insect appear to be from 7 to 15 days after the first day of acquisition feeding. The disease differ from other virus diseass of rice by its specific relationship with N. lugens and by its dymptoms.

INTRODUCTION

Symptoms of grassy stunt disease in the field was first noticed in 1967 at Muara Exp. Garden, Bogor (4).

At first it was considered as a disease of minor importance since only a few plants were infected in the field. However beginning early 1969 the disease was noted by workers of the Agricultural Extention Service in Tegal areas in Central Java (2). The disease reached an epidemic proportion in that area in 1969, 1970 and 1971. High population of rice brown planthopoers was also noted in the affected area. Over 8,000 ha of rice field were reported to be affected (2) and yield loss was estimated at 77.8% due to the grassy stunt disease as well as planthopper damage.

The first transmission experiment of the disease was succesfully conducted by using Nilaparvata lugens Stal last year (1). Infected plants were collected from Sukamandi (West Java). Since then, further transmission experiments have been carried out. The results are presented in this paper.

1). Contribution of the Central Research Institute for Agriculture, No. 2 (1972).

2). Plant Virologist, Entomologist and Assistant Plant Virologist respespectively, Division of Plant Pest and Disease, CRIA.

DISEASE SYMPTOMS

Grassy stunt infected plants are characterized by stunting, exeessive number of tiller, formation, narrow and stiff leaf blade and a more erect growth habit of the plants (grassy appearance). The leaves may be yellowish to light green depending on the variety affected, but on the older leaves one usually found numerous rusty spots. The disease differed with rice yellow dwarf only in a few respects: the absence of rusty spots, the more yellowish color of the leaves, and softer and wider leaf blade of the plant infected with the latter disease.

In the green house, experimentally inoculated plants began to show disease symptom at 21 days after inoculation. The symptoms which may be noticed were the erect growth habit, leaf discoloration and formation of few rusty spots on the older leaves. Plants may be positively identified as infected with grassy stunt disease at 30 days after inoculation.

DISEASE DISTRIBUTION

Diseased plants have been colloected from several locations in Indonesia and transmission experiments with N. lugens has confirmed the presence of the disease in the locations as presented in Table 1.

MATERIALS AND METHODS

Nilaparvata lugens Stal colony was first obtained from the Entomology Sub Division.

They were reared in 55 x 55 x 85 cm screened wooden cages in the greenhouse. They were maintained on healthy IR5 plants for several generations.

Acquisition feeding was done by confining nymphs with infected plant either in screened cages, pots covered with mosquito net or cylindrical cages made of mylar polyether film. The insects were confined for 48 hours with the diseased plant, then they were transferred each day to healthy plants untill they were used for inoculation.

Inoculation feeding was conducted in test tubes where one seedling of the test plant were confined with specified number of infective planthoppers as mentioned later. An aspirator was always used to transfer the insects.

Test plants of varieties Pelita I/1, Taichung Native 1 or IR8 were used in all transmission tests. Rice seeds were soaked for 2-3 days in water then it was planted in plastic pots or trays filled with soil fertilized at the rate of 2.0 g $(NH)_2SO4$, 0.8 g P_2O_5, and 0.8 g K_2O per kg of soil. After each inoculation feeding, test plants were removed from test tubes and planted in an insect free greenhouse. Test plants were sprayed weekly with 0.1 % Sumithion.

RESULTS AND DISCUSSIONS

Effects of number of insects for inoculation and disease transmission.

In this experiments field population of Nilaparvata lugens were used. A few infected plants were collected from Lebaksiu, Tegal (Central Java) where the disease outbreak occurred. Infected plants were confine in screened cages in the greenhouse. Nymphs obtained from these plants were collected at about 11 days following the first day it was noticed feeding on infected plants. Varying number of insects were then confine with one seedling of Pelita I/1 test plants for 24 hours. Results of the test are presented in Table 2.

The results indicate that the rate of infection in the test plants may be increased considerably by increasing the number of insects for inoculation feeding. However Rivera et al (3) indicated that only about 79.1% infection was obtained when 12 insects were used for inoculation. None of the control plants exposed to laboartory reared insects produced any symptom.

Incubation periods and retention period in insect.

Our test indicated that Nilaparvata lugens may becomes infective as early as 7 days following the first day of acquisition feeding and some insects remained infective untill they died. However the longest retention period obtained so far in our expermiments was 21 days after first day of acquisition feeding, the longest period used in serial transfer. These are ilustrated in Fig. 1 and Fig. 2.

Percentage of active transmitter.

In this test insects were fed individually on test plants after a 48 hrs of acquisition feeding on infected plants. At two days intervals each insect was given fresh healthy seedlings of variety IR8. The results of the test are presented in Fig. 2 and Fig. 3. Eighty percent of the transmitters were infective at 19 days after acquisition feeding (Fig. 2). The number of infective insects fluctualis between 15% to 24%.(Fig. 3).

These studies has added further informations on the grassy stunt disease of rice in Indonesia.

Such a disease have also been observed in several locations in Java (2) and South Kalimantan. Results obtained in this study regarding the disease relationships with the brown planthopper Nilaparvata lugens pointed out that it is similar if not indentical with grassy stunt disease in the Phillipnes (3).

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Table 1. Distribution of grassy stunt disease of rice in Indonesia.

Location	Province	Variety infected
Muara, Bogor	West Java	Pelita I/1
Sukamandi	West Java	Pelita I/1, Pelita I/2
Bongkok, Tegal	Central Java	Local Varieties, IR5, Dewi Ratih.
Lebaksiu, Slawi	Central Java	Syntha, C4-63, IR5
Kmb6, Bandjarmasin	South Kalimantan	

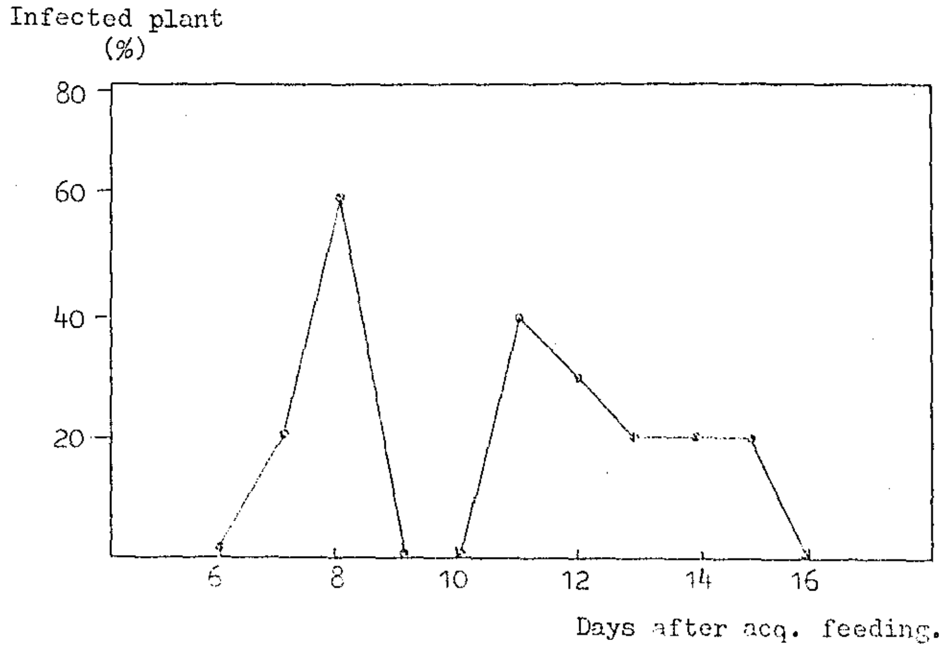

Figure 1. Incubation period and retention period of grassy stunt disease agent in N. lugens.* (3 insects/test plant).

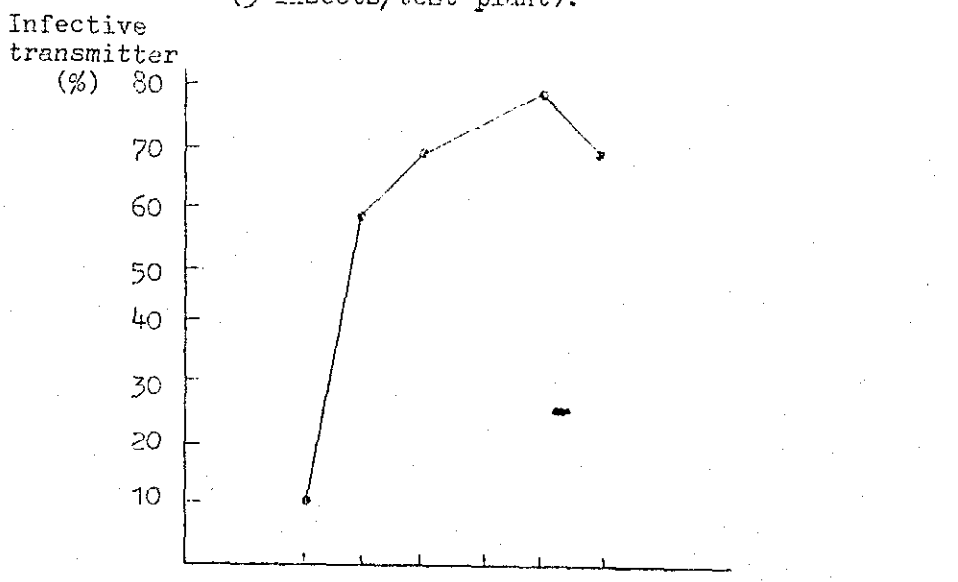

Figure 2. Percentage of infective transmitter among *N. lugens* after a 48 hrs acq. feeding on grassy stunt infected plant.

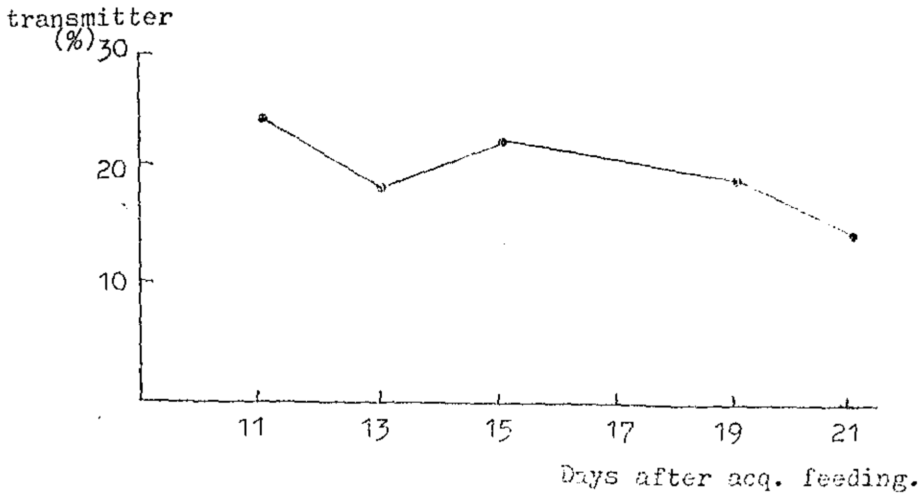

Figure 3. Percentage of transmitter among *N. lugens* after a 48 hrs acq. feeding on grassy stunt infected plant.

V　業務情況報告書

NO.1　（１９７１年３月～５月）

1.　着　　任

岩田（団長，植物病理），西沢（植物病理），矢沢（植物生理）の３名は３月２日着任し，赴任のおくれていた里見（Virology）も５月１４日着任し，チーム全員が揃つたので，これまでに経験した，また感じたことを記して業務報告とします。

2.　タイ国研究機関の視察

赴任の途次，タイ国バンコック市バンケンにあるRice DepartmentおよびDepartment of Agricultureの研究所を訪問し，研究施設，研究状況について視察し，またタイ国研究者および日本人研究者（FAO，CP，熱研関係）と意見の交換を行なった。

その結果，タイ国における研究が日本人研究者の協力により，研究施設，研究内容ともにかなり充実しており，それに比べインドネシアの現況は著しく劣っていることを痛感し，わがチームの任務の重大なことをあらためて認識した。

なお，東南アジア諸国における協力研究のうち，共通的な問題については，今後情報の交換を密にし，研究の進展をはかる必要があると考えられる。

3.　ボゴールの中央農研の現況

GO所長がIRRIに行っているため（１年間の予定ときいている）現在は園芸試験所長のDahro氏が所長を兼務している。また総務部長のSoebijant氏はThe National Fertilizer Study of Indonesia(Consultants to The Gov, of Indonesia)に兼務していて８月まで不在である。その他（部長クラス）については従来と変りがない。

研究施設については，昨年実施調査団が来イしたときとほとんど変りないが，ただ病虫部においては図書室を別棟に移し昆虫関係の研究室に改装している。

4.　本研究協力計画に対するイ国側の対応

本研究協力計画に対するインドネシア側の対応は積極的であると感じられる。

研究者については病理部門においては，専門家のassistantとして大学卒４名を新たに入れている。しかし，生理部においては，対応がまだ十分でないように思われ，今後改善の余地があると考えられる。

供与研究機材の運用のための電力事情の改善などについても中央農研（病虫部，生理部とも）として努力している。本年度，病理部で建設予定の網室については，その基盤工事，準備室の設置などにつき予算確保に努力するといっている。

5. 中央農研における外国の研究協力の現況

中央農研では，現在生理部にDr. Keuleman（オランダ）がいるが，近く帰国の予定。病虫部には昆虫関係にオランダのMr. Leeuwanghが1968年10月より駐在しており，（本年帰国予定を2年延長したときいている），また昨年よりMr. van Vheden（オランダ）も研究に従事している。

また，オランダは昆虫関係の網室（10m×20m）2棟を建設予定ときいており，病虫部の研究協力については病理と昆虫をNationalityにより分ける意向と考えられる。

なお，イ国側の強い要望もあり，病害関係の網室建設を本年度に実現したい。

6. 会　議

(1) IRRIチームとのMeeting

3月初めから，IRRIチームがジャワ島を視察していたが3月20日，中央農研においてその結果を各専門家別に報告があり，それに対して討議が行われた。

(2) 中央農研関係のStaff meeting

4月1〜2日，開催され，中央農研関係の研究者が全国から集合して，試験成績の発表および討議が行われた。合計21の発表が行われたが，内容的にはもの足りないものが多かった。

なお，Harahop氏が優良品種Pelita育成の功績により農林大臣賞を受賞された。

(3) National Rice Research Programの会議（第2回）このProgramはインドネシア政府がIRRIに要請し，Dr. Shastry (Project Coodinator, All India Co-odinated Rice Improuement Project, Constant to IRRI)が昨年6〜7月来イし，そのRecommendationによりできたものである。大学を含む全インドネシアの稲研究計画で，その第2回会議が4月3日，5日の2日間Tjiawi (Bogor) で開かれた。

出席者100名以上で，農林次官その他の挨拶の後，各部門に分れて討議が行われたが，発足後まだ日が浅いためか形式的で内容の充実したものとはいえないように感ぜられた。

7. 団員の生活および研究

岩田，西沢，矢沢の3名はボゴール到着以来，生活条件の整備に時日を費したが，最近ようやく安定することができ，現在団員協力して業務に励んでいる。

研究については，研究用資機材がまだ入手できないため，研究材料の蒐集や予備的な研究を

行なっている段階であるが，研究機材も近く引き取るとことができると思われるので，まずその整備を行ない，その上で本格的に研究を進める予定である。

8. 来 訪 者

(1) ランポン農業開発調査団 （3月12日）

児玉敏夫氏，大畠幸夫氏，西中啓二氏

(2) 林健一氏（FAOのRegional Rice Improuement Officer バンコック）

（3月19日）

(3) IRRIチーム （3月20日）

Dr. Beachel, Dr. Ou, Dr. Pathak, Dr. Khan, Dr. Yoshida

(4) 大戸元長氏，内山泰孝氏，三木好久氏

（5月11日）

No.2　（1971年6月〜9月）

1.　供与資機材の引き取り

5月末より6月初にかけて昭和45年度供与資機材がボゴール中央農研に搬入されたので，直ちにその開梱，点検を行ったが，研究用資機材はその性質上多種多様にわたるので，一応の点検を終えるのに約1ヵ月を要した。

この供与機材引取りに当って，輸送された梱包をトラックより降すのにすべて人力によるため，その作業は非能率的であるとともに，破損のないよう常に監督する必要があった。

破損についてはすでにOTCAに報告し，補償などその処理について検討されているが，総じていえることは梱包が不完全で，貴重な機材の破損が相当認められた。

今後は梱包について完全を期するよう配慮する必要のあることを痛感した。

また同一機械の本体と部品が別の梱包に収められている場合があって，点検に労力と時間を要した。今後は同一機械は本体部品とも同一梱包に収めるようすべきである。

2.　ボゴール中央農研の対応

供与機材を設置運用するための実験室の整備条件が十分でなかったため，中央農研は実験室内の塗装盗難除けのための窓鉄枠の設置，水供給のための水槽の設置，電気容量の増加など実験室条件の整備に努力している。

病理関係では網室設置について，イ国側は強く要望しており，すでにその基礎工事を進め，また付属建物（倉庫）1棟もほぼ完成し，日本よりの網室4棟の供与を待っている状態である。

カウンターパートについては前報告に述べたように病理関係では若い大学卒業者4名を入れているため，今後の指導の効果が期待できるが，これに反し生理部関係では優秀な若い研究者が得にくいという点もあって高校卒の助手がいる程度である。この点については今後も，若い将来性ある研究者を入れるよう中央農研に強く要望してゆくつもりである。

3.　研究実施の現況

上記のような実験室整備状況から，供与機材を十分に活用して本格的研究を行なう段階には到っていない。研究条件整備のための業務が多すぎるが，これは現段階ではやむを得ないことであろう。

当チームとしては実験室整備の促進をはかる，かたわら現在の状況でも行ない得る範囲の研究を進めている。

例えば病理関係では，イネ白葉枯病菌およびファージの分離，培養を行ない，その接種試験

による品種抵抗性の室内検定を行ない，成果はProgress Report No.1 としてすでに報告している。

生理部関係ではジャワ島の各種土壌を採集してポット試験により，生理的障害の栄養生理学的研究を進めるとともに，チヘア地区の生理病発生地において現地試験も実施している。

以上のように現地試験および実験室内試験を実施するかたわら，広くインドネシアの病害，生理的障害発生状況について把握するため，カリマンタン（里見団員）スラウェシ（西沢，矢沢団員）中部，東部ジャワ（岩田団長，西沢，矢沢団員）にも現地調査を行ない研究上の問題点の把握につとめている。

4. プロジェクト運営について

(1) インドネシアとの関係

インドネシアにおいてはイネに関する研究はNRRP (National Rice Research Program) によりCoordinateすることになっている。これは前報告にも述べたように大学関係も含む全インドネシアの稲研究計画であるが，主として中央農研（ボゴール）の部長が各部門の責任者となっている。

当プロジェクトとしては，このNRRPとの関係が大きいわけで，中央農研でテーマの検討，設定に当ってはこれに参画して協力指導を行なっている。

8月25～26日，中央農研においてSadikin農業総局長司会の下にNRRPの会議が開かれた。外国関係者9名を含む34名が参加し（岩田参加）1972～73年の研究テーマの検討が行われ，意見が交されたが，これに基づいて現在農林省で予算案が検討されている。

(2) 団員は各自，その専門分野について研究を進めているが，団員間の意志の疎通をはかり，また意見知識の交換を行なうため，原則として毎週1回（金曜日）チームの会議をもつことにしている。

この会議においては当プロジェクト運営上の問題につき討議するとともに，また研究進行状況，現地調査結果の報告などを行なっている。問題によっては中央農研所長または関係部長に申し入れを行なって，研究協力の推進をはかっている。

5. 主なる来訪者

6月　2日　OTCA坂本農業協力部長ほか

〃　15日　農林省田所普及部長ほか

7月　1日　OTCA木村業務課長，農技研富田室長ほか

7月29日　ADB　野島数馬氏，孫伯泉氏

8月24日　OTCA　吉原理事，　熱研　八田貞夫氏ほか

〃　26日　遺伝研　岡彦一博士

〃　27日　IRRI　吉田昌一氏

〃　30日　専売公社　船田敬美氏，山口洋一氏

9月　8日　農林省植物ウィルス研　小室康夫博士

〃　12日　FAO　松尾英俊博士，朴基丞氏

〃　17日　東北農試　城下　長，外務省技協課池田他人氏

No.3 （1971年10月～12月）

I 中央農業研究所の最近の状況

1. Dahro 所長の訪日

熱帯農業研究センターの招聘により，Dahro所長が11月10日より18日まで訪日され，農林省および民間関係研究機関を訪問されたが，この訪問は日本の熱帯農業研究協力に対する理解を深める上に極めて有益であったと考えられる。

Dahro所長は帰国後11月30日Mr．Oka（病虫部長）Mr．Sadikin（前中央農研次長）Mr．Soekendro（農林省）Mr．Puspo（同前）および吾がチームと会議を開き，Dahro所長より，中央農研に現在熱研より派遣されている御子柴技官のほか病理部門1名，生理部門1名，さらに後記Sukamandiに新設の中央農研 branchにPathologist 1名，Agronomist 1名を熱研から派遣するよう要望された。

また熱研との研究協力について，熱研山田登所長が早期に来イされ，Sadikin農業総局長と話し合ってほしいと強く要望された。

2. 中央農研の人事異動

中央農研の第2次長Mr．Sadikinは後記Sukamandiの中央農研 branchの長として転出した。

第1次長Mr．Siwi，総務部長Mr．Soebiant，訓練センター長Mr．Probowの3名はPh-Dをとるため，3年ないしそれ以上の長期にわたり，Ford財団の資金により米国に留学することになった。後任はまだ決っていない。

重要地位にある3名を同時に長期に外国に出すことは研究管理上理解に苦しむところであるが，開発途上国の研究者にとっては学位は極めて重要であり，学位をとるための米国の留学援助の機会が与えられたということで，このようなことになったものと思われる。

3. 中央農研 branchの設置

中央農研のbranchをSukamandi（西部ジャワ）に設置することになり，上記のように前次長のMr．Sadikinがその長として転出した。昭和47年8月発足を目途として現在圃場の整備が行われている。

このbranchには(1) crop improvement (2) agronomy (3) plant pathology (4) entomology (5) Economics (6) farm managment (7) statistics (8) secretariatの8部門がおかれる予定で，上記のようにplant pathologyとagronomyの部門に1名づつ

の熱研からの専門家の派遣が要望されている。

4. 熱研・御子柴技官の派遣

熱帯農業研究センターより御子柴術夫技官が10月26日派遣され，現在中央農研病虫部において，OTCA研究協力チームとともにCornのべと病について研究協力を行なっている。

5. イ国研究者の日本国内研修

当研究協力プログラムに関する協定に基いて，中央農研生理部研究員Mr. Lukmanの日本国内研修が実現することになり，昭和47年1月15日より6カ月間の予定で主として農業技術研究所で新しい分析技術の研修をうけることになった。

6. Sadikin総局長の視察

12月27日，Sadikin農業総局長が中央農研の研究活動を視察に来訪したので，当研究協力チームの活動について説明するとともに供与機材，網室基礎工事などの実情をみてもらった。吾々の研究協力の現況を知ってもらう上に有益であった。

II 外国からの農業研究協力

Ford財団がインドネシアのNational Rice Reserch Program(このことについては前業務報告に記述)によるイ国政府の要請に応じて，フィリッピンのIRRI(国際稲研究所)にFundを与え，インドネシアに研究adviserの派遣，trainingなどを行なうことになった。資金はFordが出し，FordとIRRIが運営にあたるものと考えられる。

具体的には昭和47年7月にIRRIのDr.Beachell(近く定年退職予定)を含む5名の米国研究協力チームがボゴールに来る予定ときいている。

このことはIRRIのDupty DirectorのDr. A. C. Mclungが11月ボゴールに来たときにも直接岩田に話があった。

吾々のOTCAチームの研究協力は食用作物の病害(生理病を含む)研究であり，また昆虫関係の研究は現在オランダが担当している。

インドネシアとしても外国との研究協力について調整をはかっているようであるが，病害，害虫関係の研究は主としてそれぞれ日本およびオランダにまかせるという考えのようである。上記アメリカの研究協力チームにも病理学者，昆虫学者は入れていない。

いずれにせよ，インドネシアでは農業研究協力においても今後国際的な複雑さを加えるものと考えられる。

III 研究協力実施の現況と要望

業務報告第2号で報告したように，実験室の整備はイ国側の予算の不足から思うように進捗

しないが，イ国側にその促進を求めつつ，現在行ない得る範囲内で研究を進めている。

実験室内試験は継続して実施するとともに，雨季に入ったので病理関係ではMuaraにおいて圃場試験（約1 ha）を開始した。また生理関係ではMuara，Tjihea，Djokjakarta Ngale（以上稲），Bondobili（南スラウェシ，トウモロコシ）において圃場試験を始めている。

2. 要　　望

(1) 供与機材の梱包について

昭和45年度供与機材については到着時に相当数の破損品があって，それらについては保険求償を行なった。しかし，保険求償の対象となっても，代りの機材が今だに到着せず研究実施上支障を来している。

破損の最も大きい原因は梱包にあると思われるので，今後は梱包を厳重にするよう配慮していただき度い。

昭和46年度供与機材は3月上旬発送予定ということであるが，これらの機材および昭和45年度保険対象機材の梱包については万全の措置をお願いたし度い。

(2) 電気関係機器専門家の派遣について

植物病理，植物生理の研究にはその性質上，多種多様の電気関係機器を必要とし，OTCAからの供与機器中にも，それらが含まれている。

これらの機器，とくに各種化学分析機器については，それを円滑に作動させるための settingは，それぞれの機器makerの電気専門家が行なっている。従ってそれらのmakerの専門家が来イしてsettingしてもらうことが望ましい。しかし機器の種類も多く，makerも異なるため，それはむづかしいと思われるので，研究所（例えば農業技術研究所）などの電気関係研究機器の全般について広い知識をもった専門家の派遣を要望し度い。

Ⅳ　主なる来訪者

昭和46年

10月　2日　福田秀夫氏（農林省植物防疫課長）
（FAO東南アジア太平洋地域植物防疫委員会出席）

10月　8日　米田公丸氏（アジ研）　吉岡雄一氏アジ研）
内野明氏（拓大教授）　斉藤優氏（中央助教授）
（アジア諸国の研究および科学技術開発調査団）

10月14日　早瀬達郎氏（農業技術研究所科学部肥料科長）

（熱研派遣）

10月26日　御子柴時夫氏（熱研主任研究官）

10月29日　梅原事務官　（外務省技術協力課）

10月　　　Dr. H. M. Beachell　（IRRI）

11月 3日　中西理事　（OTCA）

11月12日　Dr. A. C. McLung (Dupty Director, IRRI)

11月13日　永積昭氏　（東大助教授）

　　　　　新井郁男氏　（教育研）

　　　　　馬越徹氏　（文部省調査課）

12月 3日　中田正一氏ほか3名（海外農業開発財団）

12月 6日　筒本卓造氏　（林業試験場）

　　　　　樋渡幸男氏　（　同　上　）

　　　　　（熱研派遣）

No.4　（1972年1月〜3月）

I　研究協力

1.　年を過ぎて

昭和46年度の最後の業務報告を提出することとなったが，吾々が当プロジェクト実施のためボゴールに赴任したのが昨年の3月4日であるから，すでに1年余を経過したことになる。

1年をふり返ってみると，予期したとおり，または予期以上に困難なことが多かったといえよう。

しかし，OTCAのたえざるバックアップと団員相互の協力により，ともかく今日まで業務を遂行できたことは幸といわねばならない。

その上にインドネシア側が当プロジェクトに大きな期待をかけていることが次第にわかり，また貧しい国ながら，それなりの努力を示してくれていることは非常にありがたいことである。吾々の責任も重大といわねばならない。

当プロジェクトとしては一応基礎の基礎を築いたと考えているが，引きつづき今後の発展に努力を傾注したいと思っている。

II　アミ室の建設

当プロジェクトの病理部門においては，研究実施上極めて重要なアミ室の建設を要望していたが，幸に要望が受け入れられて，アルミ網室4棟（1棟5×12m）が建設できることになった。この網室建設にあたって機材の引き取り遅延，インドネシア労務者の非能率など，多くの困難に遭遇したが，アミ室建設のためOTCAより派遣されたシマノ工業KKの技術者3名の努力と滞在延長を認められたことにより，ようやく完成の見透しを得た。

このアミ室建設は当研究協力のなかで特記すべきものと考えており，アミ室機材費約11,000,000円（4棟）でアルミ合金で，特色ある構造をもつ美しいアミ室が建設されつつある。

これに対してはインドネシア側も大きな期待をかけており，その他の国も注目している。

しかし，アミ室はあくまでアミ室であり，今後これをいかに有効に利用して研究協力の成果をあげるかが，吾々に課せられた問題であると考えている。

III　カウンターパートの国内研修

当プロジェクトの協定にもとづくカウンターパートの日本国内研修については，昭和46年度は当中央農研生理部Mr．Lukmanが新しい化学分析技術研修のため，農林省農業技術研究所で研修に従事している（6カ月）が，Lukmanの研修状況について得た情報によると，極めて熱心で，研修の効果があがっていることをきき喜んでいる。

当プロジェクトの研究協力においては機材の供与と平行して研究者の育成が極めて重要であることを考え，努力しているところである。

昭和47年度は5名の国内研修を考えているが，その実現と成果を期待している。

要するに研究者の資質向上と機材の充実を車の両輪として研究協力の推進を図り度いと考えている。

Ⅳ 在なる来訪者

2月14日　伊吹義信氏　（フィリッピン大学）

2月16日　木村重隆氏　（OTCA）

〃　野島数馬氏　（OTCA）

2月29日　吉田昌一氏　（IRRI）

3月　2日　草野秀氏ほか4名　（東ジャワ・メンズ・プロジェクト巡回指導調査団）

3月　3日　長瀬清澄氏，小川昭治氏，藤本征夫氏（シマノ工業KK）

3月　5日　昆野昭晨氏　（農技研）

3月20日　松原良夫，田内幾氏　（OTCA）

〃　本岡武氏　（京大教授）

3月26日　大戸元長氏　（海外農業開発財団）

3月29日　鳥塚守氏　（農林省統計調査部）

〃　遠藤幸男氏　（〃　福島種畜牧場）

〃　鈴木たね子　（〃　水産庁東海区水研）

3月30日　安尾俊氏　（〃　普及部）

NO 5　（１９７２年４月〜６月）

1.　研究協力の現況

(1)　概　　況

業務報告No.4 で報告したように，本研究協力の発足以来１年を経過して，次第に軌道にのりつつあるといえる。

研究室の整備はインドネシア側予算の不足から，なかなか思うようには進捗しないが，とくに電気関係の整備がおくれることは研究機器の使用上障害となっているが，それぞれ次第に改善されつつある。

不満をいえば際限がないが，ほとんど何もなかった赴任当初を想起すると，ここまで来たことは感慨に堪えない。

１９７１〜７２年の雨期には病理関係，生理関係とも，研究室内研究のほかに，さらに圃場試験を展開し，その結果は現在とりまとめ中である。

昭和４６年度予算によるアルミ合金網室の建設が完了し，またその他の資機材も到着したので，今後はさらに研究の実績をあげ度いと考えている。

カウンターパートについても赴任当時にくらべて次第に充実し，とくにカウンターパートの不足した生理関係においても最近は充実をみるに到った。

研究者の能力においては日本と比すべくもないが，訓練の結果，次第に向上しつつあるといえよう。

(2)　網室の完成

病理研究用のアルミ合金網室４棟（１棟５×１２m）が４月中旬完成した。業務報告 No．４ で報告したように，これは本研究協力において特記すべきことであると考える。

今後は単なる備品，消耗品の供与のみでなく，このような性質のもの（建物など）の供与も考えてゆくべきであると痛感した。

網室内のポット置台その他はインドネシア側が整備することになっているが，この網室の活用が今後の研究推進上大いに期待される。

(3)　熱研在外研究員の派遣

４月１１日，熱帯農業研究センターより山元剛（病理），樋口太重（生理）の両氏が中央農研に派遣され，先に派遣されている御子柴附夫氏とともに研究協力に従事している。

熱研センター山田登所長が４月来イされ，農業総局長，中央農研所長その他関係者と対談されたことは有意義であったと考える。

なお，従来熱研センターより派遣された在外研究員と当研究プロジェクトとの協力関係については明確を欠いた点もあったが「OTCAインドネシア農業研究協力と熱研ベースとの協調について」の通達（5月27日付）があったことは今後の運営上有益であったと考える。

(4) 研究成果の報告等

上記のように，現在までに行った研究結果の多くは，資料を整理中であるが，一部は4月29〜30日に開かれた中央農研関係のstaff meetingにおいて発表した。

2. 巡回指導調査団の派遣について

本研究協力もすでに1年を経過したので，巡回指導調査団の派遣を要請すべく検討を行っている。

本チームとしては研究協力の性質から考えて，現在派遣されている専門家の専門分野とは異なるが関連の深い分野の研究者に来てもらって，今後研究を推進する上での諸問題につき討議を行ない示唆を得たいと考えている。

3. 中央農研の近況について

中央農研は現在，下記のような機構改革案を出して承認を求めている。研究者の陣容が極めて貧弱であるため，機構改革の意義があるのか，また改革しても実績を期待できるかどうか疑問に思われる。

		Division	Sub-Division		Branch
	1	Physiology	3		
	2	Agronomy	4	1	Sukamandi
	3	Breeding	5	2	Semarang
Director	4	Pests & Diseases	4	3	Malang
	5	Technology & Economics	3	4	Maros
	6	Planning, Information & Publication	4	5	Padang
	7	Administration	4		

業務報告No.3で報告したように中央農研のMr. Siwi（第1次長），Mr. Soebianto（総務部長，研究者），Mr. Prabowo（訓練センター長）の3名はUSAid,Ford,IRRIによるsenior researcherのpost-graduate studiesにアメリカに長期留学（3年ない

しそれ以上）したが，さらに病虫部長Mr．Okaも同様9月からアメリカに長期留学することになった。

この他にも中堅研究者でアメリカに長期留学の予定者が2〜3名あるときいている。

このように中央農研の幹部級が長期にしかもほとんど同時に海外に留学することは，中央農研の研究管理を考えるとき，まことに不可解なことであるが，開発途上国では余り不思議でないという考えもある。

若い研究者の訓練は外国チームにまかせるとの噂もきくがまことに釈然としないものがある。

開発途上国の研究者にとっては学位は単なる学問的な意味だけでなく，社会的地位にもつながるため，上記のようになるものと思われるが，それにつけても，わが国にかかる研究者の留学（学位をとるための）の受入体制がないということについては，今後十分検討するべきではなかろうか。

4. カウンターパートの国内研修

昭和46年度の国内研修には中央農研生理部の研究者Lukmanを6ヵ月農業技術研究所化学部において研修させているが，昭和47年度には4名の研究者の国内研修を申請している。

上記Lukmanについては指導者の話では研修の効果が上っているとのことで，今後も将来性ある研究者の国内研修を引き続き行わせたいと考えている。

5. 主なる来訪者

4月 8日 堀尾房造氏 （熱研在外研究員）
23日 山田登博士 （熱研所長）
5月 4日 松岡敏郎博士 （武田薬品KK）ほか2名
7日 中山素平氏 （OTCA会長）
17日 Prof. Dr. Harjono(Gadjamada Univ.)
6月 3日 鮫島晋助氏 （朝日新聞記者）
10日 田村美治氏 （東部メイズプロジェクト団長）
15日 左本正二氏 （国際開発KK），加田治氏 （P．T．Mitsugoro）
堀田三郎氏 （協同飼料KK）ほか2名
18日 柳健一氏 （外務省技術協力第一課長）
波多野参事官 （在ジャカルタ大使館）
20日 中田博士ほか16名 （海外農業開発財団，海外研修チーム）
25日 今西功氏 （OTCA西部ジャワ会議増産チーム）