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AGENCY FOR

AGRICULTURAL RESEARCH AND DEVELOPMENT

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SEVENTH QUARTERLY NARRATIVE REPORT

ON THE

APPLIED AGRICULTURAL RESEARCH PROJECT

FOR THE MONTHS

OF

OCTOBER, NOVEMBER, DECEMBER

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SEVENTH QUARTERLY NARRATIVE REPORT

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APPLIED AGRICULTURAL RESEARCH PROJECT

OCTOBER/DECEMBER 1983

TABLE OF CONTENTS

QUARTERLY NARRATIVE REPORT
APPLIED AGRICULTURAL RESEARCH PROJECT
OCTOBER - DECEMBER 1983

I. INTRODUCTION

Although delayed several times, the mid-term evaluation of the project took place during this Quarter. The team was made up of USAID staff from Washington D.C. and Jakarta, a consultant from the U.S., and a staff member of AARD. Preparing for this evaluation took a substantial amount of time, and the AARP/RMI staff were deeply involved in all phases of the preparation, conduct, and post-evaluation activities. In general it turned out to be a useful exercise that should help all of us involved in the AARP to make continuing contributions to the project.

The evaluation required the full time assistance of Dr. Collier, Mr. Harwood, and Mr. Fritz because of the emphasis on technical assistance, construction, procurement and training. The other AARP/RMI staff spent some time with the evaluation team, but primarily they continued in their efforts to assist the research and training program of AARD. This will be evident in their individual Quarterly Reports.

II. PERSONNEL

Thirteen long-term AARP/RMI experts continued in their assignments during this period, three with the Project Implementation Unit, one with the Central Research Institute for Food Crops, one with the Bogor Research Institute for Food Crops (BORIF), one with the Bogor Research Institute for Inland Fisheries, three at the Maros Research Institute for Food Crops (MORIF), three at the Banjarmasin Research Institute for Food Crops (BARIF) and one at the fisheries research substation, Gondol, Bali. George Manuelpillai, Soil Scientist, is scheduled to arrive January 1 for assignment to BARIF until the presently scheduled project termination date of September 30, 1985.

As of the end of the year 14 long term experts had served a total of 169 manmonths and seven short term experts had served a total of 3.9 manmonths.

III. OVERSEAS TRAINING

Only six AARP participants were in overseas training during this quarter. Messrs. Djajeng Sumangat of BORIF and Dudung Muhidin of the BORIF substation in Pasar Minggu completed a program in the Determination and Prevention of Post Harvest Food Losses conducted at the University of Idaho Institute for Perishables September 4 - October 14. Ms. Mahrita Willis Abidin of BARIF returned from the Integrated Pest Management Training Program conducted at IRRI Augusst 15 - Novmeber 25. Yanti Rina Darsani of BARIF and Maria T. Anitawati Kusuma of CAER returned from the program in Techniques and Methodologies of Agricultural Economics held at IRRI October 13 - December 9. On November 1 Mr. Farid N. Saleh of BARIF began a four month program of on-the-job training in dissemination of research information at IRRI.

Mr. P. Sukartana, Entomologist from the Central Research Institute for Forest Products, will depart January 1 for the University of Wisconsin where he will spend six months of on-the-job laboratory training on the bark beetle under the guidance of Dr. Dale Norris, Professor of Entomology and Forestry. Next July Prof. Norris expects to visit Bogor at which time he will check out Mr. Sukartana's application of his training in the Indonesia environment.

Mr. Haris Surahman and Entong Suratman, engineers from the Research Institute for Animal Production, will depart January 2 for a three month program in the Theory of Field Machinery at the Asian Institute of Technology, Bangkok. The AARP/RMI Administrative Specialist, Carl Fritz, interviewed a number of additional candidates and their supervisors at RIAP and the Research Institute for Animal Disease, and has initiated correspondence with RMI in Washington and a number of institutions in the US and other countries in a search for appropriate training possibilities. Oregon State University has agreed to conduct a three month program in Rabbit Research and Management for a team of five candidates from RIAP and RIAD beginning May 15, 1984.

Dr. Faisal Kasryno, Director of Center for Agricultural Economics Research, Dr. Chairil A. Kasahan, National Coordinator for the National Panel of Farmers Program (PATANAS) and Ir. Hermanto, East Java Regional Coordinator for PATANAS, will depart January 14 for a two-week training program in the structure and concepts of the USDA Economics Research Service and in handling the collection, processing and management of large scale data collection programs to be conducted by the USDA, the US Census Bureau and Michigan State University. They will be accompanied by their IADS advisor, Dr. Jeff Swenson.

Mr. Fritz also hopes to locate training for Ms. Darti Satyani of the Pasar Minggu Prawn Station in pond management for the fresh water prawn through correspondence initiated with the Consortium for International Fisheries and Aquaculture Development.

At the request of Ir. Sadikin Sumintawikarta, Director General of AARD, Mr. Fritz has been communicating with a number of international centers regarding the possibility of organizing one month programs for AARD teams to learn how those centers plan, conduct and review their research programs. CIMMYT, CIAT and ICRISAT have invited these teams for very short periods of only a few days. It is felt that the Government of Indonesia will not approve use of loan funds for such short periods. IRRI, however, will try to organize a one month program for a BARIF deep water rice team at IRRI and probably Thailand.

As of December 31, RMI had sent 58 participants abroad for short-term training. They had received a total of 113.14 manmonths of training. In addition, AARP had sent seven participants outside the RMI contract for a total of 6.2 manmonths. A complete listing of these participants is found at Appendix VI.

IV. Major conferences, Submissions, Decisions and Events

1. Project Reviews and Evaluation.

A midterm evaluation of the project had been scheduled earlier. Because of the unavailability of various proposed team leaders, it did not take place until December. Meanwhile, Ir. Sadikin, DG of AARD, decided to conduct his own comprehensive reviews. These began with a meeting with Ir. Sadikin, Mr. Abdullah, Dr. Farid Bahar, Dr. Hans Anwarhan, Dr. Collier, Messrs. Harwood and Fritz and other AARD staff in Bogor 4 November.

These discussions led to a four day (and night) meeting at the Hotel Gondangdia in the Puncak 8 - 11 November chaired by Pak Abdullah. The meeting included planning consultants as well as AARD and RMI officers. The purpose was to calculate the priority items which should and could be accomplished during the remaining duration of the project, i.e. up to September 30, 1985, including construction, equipment procurement, vehicle procurement, technical assistance and training. Messrs. Collier and Fritz prepared some of the papers for the review. A number of alternative construction programs were analyzed and discussed. One primary concern of participants was the short time period remaining, particularly for construction and procurement. This also adversely affected proposals for stationing TA personnel at several locations.

The project Evaluation Team was composed of Dr. Paul Stangel, Deputy Managing Director, International Fertilizer Development Center; Dr. Prabowo Tjitropranoto , Director, National Library for Agricultural Science ; Mr.Douglas Pickett, Agricultural Development Officer, Asia Bureau, AID/Washington; and Mr. Kevin Rushing, Project Officer/Agronomy, USAID/Jakarta. They conducted the evaluation December 5 - 23 in Jakarta, Bogor and visits to South Kalimantan and South Sulawesi.

The Team recognized that the project had been designed for seven years and approved for only five without reduction in scope. They also recognized the complexity of the project. They reviewed progress and found that more than three years into the five year project, only 10.22 of USAID loan funds and 34.71% of USAID grant funds had been expended. They made a total of 49 recommendations which include the following (paraphrased) :

- Scaling down the construction component and changing the GOI/USAID cost-sharing formula from 58.58%/ 43.42% to 35%/65%.

- Quickly resolving the problems associated with equipment procurement.

- Developing an annual work plan.

- A series of workshops to better identify research activities and manpower requirements of rice crop based and/or industrial crop based farming systems for specific agro-climatic zones.

- Strengthening the Data Base Unit within the AARD Secretariat.

6

2. Possible Project Extension.

As a result of the reviews and evaluation discussed above, project officers expect to prepare in the near future a document for submission to USAID which will include the following proposals :

- Extension of the project from September 30, 1985 to March 31, 1986.

- A revised construction program and change in the funding ratio.

- Some changes in TA plans, including the possibility of extending contracts for selected experts now on the job.

- Loan funding of in-country training and English language programs.

APPENDIX I

Quarterly Activity Feport for the AARP/RMI Specialist Team at Jakarta/Bogor

Dr. Collier and Messrs. Fritz and Harwood were heavily engaged in the reviews and evaluation described in section IV of the Quarterly Narrative Report, and prepared a number of documents for presentation. All members of the Jakarta/Bogor Team met with the Evaluation Team.

Quarterly Activity Reports of individual Team members are attached.

Appendix I.A.

Quarterly Activity Report

October, November, December 1983

William L. Collier

This period was an active time because of the preparations for and the conduct of the mid term evaluation. It required more than the usual amount of time because the evaluation was delayed several times. I assisted the Team Leader in all aspects of this preparation. The evaluation was in early December which was the main activity in the month because of the holidays slowing down the pace of work.

In October I was active in assisting the Secretariate in revising the SWAMPS II proposal for the World Bank. This Project will have a major impact on the research in the swampy lands of Indonesia. Since the AARP is putting major emphasis on the Banjarmasin/Banjarbaru Research Institute for Food Crops which has a swampy lands mandate, it was a logical part of my activities to assist in the preparations of this proposal.

Partly in preparation for the evaluation and partly to full-fill the requirement in the loan agreement, several draft detailed plans were prepared in this quarter. The final plan will be worked out once the various decisions for the future of the project have been made.

In November there was a meeting of the AARP held in Puncak. Information was gathered on construction, procurement, training and technical assistance and decisions were made on various aspects of the project. Some of the experts participated in this meeting.

In response to a clear need for computers, several AARD staff and myself visited IBM and other dealers to prepare an order for purchasing hardware and software. The computers will be placed at the institutes in Maros, Banjarmasin, Bogor, and Pasar Minggu.

Most of my time during this quarter was spent on assisting the planning of the construction, procurement, training, and technical assistance programs. A number of alternative plans were developed to assist in the decisions on the future program.

APPENDIX I.B.

QUARTERLY ACTIVITY REPORT: OCTOBER - DECEMBER 1983
by
Carl R. Fritz.

1. Participant Activity. Participant activity is mainly described under Training in the main body of the Narrative Report.

Further correspondence with the U.S. Forest Products Laboratory (FPC) in Madison, Wisconsin clarified the desire of Mr. Suparman Karnasudirdja of the Forest Products Research Institute (FPRI) to do research on the job at Madison, and he and the FPL agreed on a six-month program to begin April 1984.

We originally planned to send a total of four FPRI researchers to Madison. Two still require much improvement in English, and we have changed the program for Mr. Sukartana, FPRI entomologist, who is intensely interested in the bark beetle which is destructive to forest products in Indonesia. He has been in personal correspondence with Professor Dale Norris of the University of Wisconsin who has been doing research on this subject for some years. Prof. Norris visited Bogor during the quarter, and we worked out a practical six-month on the job training program for Mr. Sukartana in Prof. Norris' laboratory to begin in January. Prof. Norris will return to Indonesia next July at which time he would review Mr. Sukartana's application of his training in the Indonesian environment.

I am still attempting to locate a suitable short term program in refrigeration technology for four researchers and technicians of the Research Institute for Fish Technology. The Taiwan Fisheries Research Institute could not identify such a program in that country. The Consortium for International Fisheries and Agriculture Development (CIFAD) has asked me to supply more information which I shall do. I have also corresponded with CIFAD regarding a suitable freshwater prawn hatchery training program in Hawaii for a candidate participant.

I have interviewed a number of researchers and supporting staff of the Research Institute for Animal Production, Ciawi, and the Research Institute for Animal Disease, Bogor, to review their training requirements, and have corresponded with RMI in Washington, D.C. plus directly with institutions in the U.S. such as the Rabbit Center at Oregon State University and Winrock as well as institutions in Thailand for the purpose of arranging suitable programs. Many of these candi dates desire practical training on the job rather than regular courses. Arrangements were completed during the quarter for sending two engineers from RIAP to a 3-month program in the Theory of Field Machinery at the Asian Institute of Technology, Bangkok. They will leave January 2, 1984.

I also worked with Dr. Jeff Swenson, IADS Agricultural Economist, during the quarter to make arrangements for the Director of the Center for Agricultural Research, the National PATANAS Coordinator and the East Java Regional PATANAS (National Farmers Panel) Coordinator to get short training at USDA, the US Bureau of the Census and Michigan State University in the organization and management of large data systems. They will leave mid-January for about two weeks. I spent December 19 with Mr. B. Castro of AVRDC who also met with Mr. Abdullah, Mrs. Parunsih Isbagio, Dr. Siwi of CRIFC and participant candidates from BORIF. Several discussions were held with Dr. Mulyadi, Director of the Center for Soils Research, Dr. Paul Stangel of the International Fertilizer Development Center, Dr. Collier and Mr. Abdullah about the possibility of sending a large team of persons participating in the National Fertilizer Study to the IFDC sometime in 1984.

All of the above work on training was done in close collaboration with Mr. James Myers, RMI Training Coordinator.

Ibu Wuryani, AARP Training Assistant to Mr. Abdullah, Project Leader, was absent during November - December while attending a training course in Bogor. I missed her during this period. However, Mr. Utomo was assigned to take her place.

2. Project Reviews and Evaluation. I participated in most of the meetings which took place in November/December, along with Dr. Collier and Mr. Harwood. I prepared various papers having to do with participant training accomplishments and plans. The principal meeting I missed was one of the last ones in which RMI performance was discussed. On that day I picked up the quarterly installment of rupiah support funds for the RMI contract from the Government Cashier.

3. Administrative Matters. A number of AARP/RMI experts went on R & R during this period, and some university students came to visit their parents over the holidays. As usual, there was some confusion over procedures. This was complicated by a change in USAID rules.

Any person traveling internationally using AARP/RMI (USAID) funds is required to obtain approval of the AARP Project Leader. I can arrange for this . However Mr. Abdullah also needs to receive approval from the Director of the balai to which the expert is assigned.

During this quarter I obtained confirmation from the USAID Project Officer that USAID approval was not required for such travel including R & R travel for Third Country Nationals (non-US, non-Indonesian), because the USAID approved such travel when it approved the AARP/RMI contract. This clarification of a sometime hazy administrative area simplifies the procedure for us.

I have been told orally that TCNs will be allowed R & R only to their own countries. This has not yet been confirmed in writing.

The AARP/RMI contract provided that qualified family members staying with an expert at post were entitled to an R & R trip to Hongkong (or equivalent) between the sixth and eighth month of a two-year contract. Some of us have been strecteching these funds, augmenting them with our own, to purchase special excursion fares to the U.S.

USAID rules have now changed. They permit persons stationed in Jakarta to purchase excursion fares to Sidney, Australia, and those in 25% posts to purchase excursion fares to San Francisco or Los Angeles.

Persons flying with US Government funds should keep in mind that they must enter the US and depart from US on US carriers.

Dr. Chhorn Lim's effects spent a long time in storage in Jakarta until we finally succeeded in obtaining the original bill of lading from the person in the Philippines who arranged for their shipment.

4. Financial Matters. I supervised the monthly rupiah expenditure reports, preparation of a summary on rupiah expenditures for the July - September quarter, and submitted a request for rupiah funds for the current quarter. We received Rp 36,5 million from the GOI December 21, and repaid RMI Rp 11,2 million owed them.

I also approved bills for payment by RMI, reviewed and edited RMI contract claims for expenditures against the USAID loan and grant. As of December 31, these totaled $ 383,663 and $ 1,492,746, respectively.

5. The Future. According to the AARP/RMI contract, I am to be replaced by an Indonesian Administrative Specialist by the expiration of my current contract March 31, 1984, a date not too far away. The Project Leader, Mr. Abdullah, has requested USAID concurrence in my future assignment to the project as Training Specialist. I am amenable to such an assignment, assuming that it can be worked out.

APPENDIX I.C.

QUARTERLY REPORT

October - November - December

Roland E. Harwood

During October

Additional data was given to the engineers of USAID to explain the work done on the foundations of the auditorium in Cimanggu. The contractor was given a two month extension and hopefully will finish the building within this time.

Dr. Vanstone, from the Gondol fisheries program, explained the urgent need for electric power in Gondol. Calculations show that two 10 KVA gensets would make it possible to immediately begin some experimental work there. An attempt is being made to buy these gensets locally.

A three day trip to Banjarmasin allowed time to walk the entire boundry of the Banjarmasin Institute land. At the end of the dry season several hectares of the agricultural land are under thirty to sixty centimeters of water. The rivers that border the farm are of the same level as the flooded farm areas so a dike and pump dainage will be needed to control the water level. During the rainy season the water level reses about one meter above the dry season level. Several kilometers of drainage canals will be needed and soil from the canals can be used to construct the dikes and roads needed. The soil appears to be a clay loan suitable for dikes. This work can be done using the field equipment requested in our first P.S.A. order.

The contract for constructing the main laboratory and office building at Banjarbaru has been approved. The need to have deep water tanks at Banjarbaru with controlled water levels was discussed with Dr. Kevitt Brown. Plans are being made for this construction as soon as the field equipment arrives.

The Jeep agency in Banjarbaru has no spare partsso it was necessary to buy several parts in Jakarta and ships them to Banjarmasin to repair one of our Jeeps.

Three days November 8 - 9 - 10, were spent in meetings at __________ to determine the budget options for constructions, procurement, and training for our project.

During November four buildings, nine greenhouses with headhouse, and a drying floor were turned over to Litbang at Cimanggu. These constructions were from Phase I, Packet II of the construction program. A trip to Banjarmasin from November 28 to December 2 was made with Dr. Widadi to prepare for the beginning of construction of the laboratory building at Banjarbaru. A meeting was held with the contractor, public works, supervisor, and owners to explain the responsibilities of each and the system of control to be used during the construction program.

After clearing the building site and staking the area it was immediately evident that the topographical map was in error. Suggestions were made for changing the floor levels of the building plan to better fit the site.

16

One day was spent with a trip to Unit Tatas. Munch information was recorded and has since been discussed with the architects and engineers who will design the buildings planned for this station.

A visit was made to a factory in Banjarbaru that can build small tractors, pumps, and threshers using IRRI plans. If useful equipment can be procured locally it would aid local industry and assure a source of repair parts when needed. The factory has no production at present, but has produced some equipment in the past. Lack of demand is the reason given for not building more equipment, but tractors could be built at the rate of one per week if an order were received. The factory owner informed us that a new tractor and pump could be seen at Banjarbaru at the building of the National Headquarters for Industrial Promotion. On visiting this organization, we found one damaged tractor without any implements. It was not possible to find out how the machine had been damaged or to get any information except that this type of machine is not being used in the area. An axial flow water pump had been tested with good results, but none were being used in the area because the farmers who need them cannot afford to buy them according to the personnel we met at the headquarters.

Construction planning meetings were held every Tuesday at Pasar Minggu.

A field meeting was held every Thursday at Cimanggu to discuss construction progress and to resolve any problems with the construction program in Bogor.
An evaluation of our program was made during the two weeks of December 5 thru December 17. Several topics were discussed including constructions, procurement, and training.

A trip was made to Ujung Pandang from December 11 to December 13. A visit was made to Lanrang the newly purchased land for the building site for 83/84 constructions. This land has excellent drainage, is a heavy clay soil, plat, and clear and should present no problems for construction. Power (electric) lines run along one boundry of the land.

Discussion were held with station personnel who described their programs and problems and many suggestions for possible improvements were made.

Arrangements have been made to attend field demonstrations of the latest IRRI machinery made in Indonesia which will take plac next month near Bogor.

A two day trip was made to Banjarbaru (December 28 - 29) to check the construction just beginning there. A meeting is planned for January 3, 1984 with the contractor, personnel from Public Works, the supervisors, the architects, and the owners to define the exact level of the building foundations as present levels are in error.

As of December 31, 1983 the evaluation report has not been received.

Woody Harwood
January 5, 1984

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APPENDIX I.D.

TRIP REPORT

SOLAR DRYING WORKSHOP AND CASSAVA

PROCESSING IN

YOGYAKARTA

October 24 - 29, 1983

From October 24 - 29, 1983, I accompanied Ir. Soemadi and Ir. Sigit to Yogyakarta for the following purposes :

1. to attend a "National Workshop on Solar Drying" given by staff from UGM and BPTP - Karawang.
2. to meet food scientists working in the Faculty of Agricultural Technology at UGM.
3. to do a literature search of cassava-related research ongoing at UGM
4. to survey small-scale cassava processing techniques in nearby areas
5. to obtain data from Department of Agriculture offices.

1. Solar Drying Workshop (October 24 - 29, 1983)

Dr. M.S.A. Sastroamidjojo and Dr. Yohannes from UGM were the principal instructors at the workshop, although others speakers from Agricultural Technology, Animal Husbandry and Industrial Agriculture were also included. The workshop consisted of both seminars and practical training. The following were seminars presented at the workshop :

a. New sources of energy
b. Production of charcoal from agricultural waste products
c. Drying animal feed products.

d. Measurement of sun intensity

e. Drying rendeng

f. Large scale construction of sun-drying apparatus'

g. Drying Virginia tobacco

h. Drying fruit

i. Drying rice

Following completion of on-going experiments with a large-scale solar drier at UGM, the apparatus will be installed at Sub BPTP-Karawang, therefore it was important to learn the theory and practical application of solar drying.

A small-scale solar drier, which was used in drying gaplek, was also demonstrated. Gaplek dried faster with the solar drier and was of better quality than that dried with the traditional method of drying on bamboo mats.

2. Food Scientists at UGM

Ir. Soemardi and I met with the Dean of the Faculty of Agricultural Technology, Dr. Mohammed Rusti, M.S. and also the chair persons of the Departments of Agricultural Mechanization (Ir. Soemangat) and Food Technology (Ir. Murdijati). These two departments are under the Faculty of Agricultural Technology.

Ir. Soemangat gave us a tour of his facility, which is basically a workshop, and demonstrated the use of some small-scale processing equipment that they are currently working on. These included "ferrocement" and "bamboocement" silos, a drier powered by a bicycle, a rotary drier turned by hand and a solar drier.

Ir. Murdijati also gave us a tour of the food technology facilities, which included sensory labs, a workshop, a processing lab, a microbiology lab and a chemistry lab. Six staff members of the department are involved in tuber crop research. Some of the topics already studied include:

a. drying of cassava chips, cubes and gelondong
b. quality factors
c. insect and mold damage
d. forced-air drying
e. solar drying
f. cassava as a source of ethanol and fructose
g. processing of cassava starch.

Other lecturers from the Department of Food Technology met during this time were Dr. Slamet (food chemist, PhD from Michigan State University) and Dr. Tranggono (food scientist, PhD from Michigan State University).

3. Literature Search - UGM

Past thesis' from the Faculty of Agricultural Technology were reviewed and the pertinent ones were photocopied for the BPTP library. In addition, lecture notes/syllabi from various classes were photocopied for the BPTP library.

4. Cassava Processing Techniques

Cassava producers/processors in the Kabupatens of Gunung Kidul and Bantul, and in Kotamadya Yogyakarta were interviewed regarding typical cassava processing techniques. Production of the following cassava products was discussed :

a. gaplek	dried, sliced cassava
b. tiwul	steamed gaplek flour
c. gogik	dried tiwul
d. gatot	fermented, steamed cassava
e. tape gaplek	fermented gaplek
f. lemet	grated, steamed cassava with brown sugar and coconut
g. balok	fried, salted cassava
h. getuk	steamed, pounded cassava with sugar, flavorings and colorings.
i. growol	fermented, steamed, pressed cassava
j. gemblong	fermented, steamed, pounded cassava
k. kripiting	fried, salted cassava.

Usually, when a small-scale farmer harvests his cassava, he will sell the majority as fresh cassava, but will also consume a certain proportion fresh and dry a certain proportion (gaplek) to be stored for subsequent family consumption. The consumption of tiwul is widespread in the Yogyakarta area, most frequently as a 3 : 1 combination with rice.

Overall production of cassava products appeared inefficient and attention was rarely paid to quality factors. Drying of cassava(to gaplek) usually took place directly on the ground, without use of a mat. Gaplek was most often stored in bamboo, wood or clay boxes in the farmer's home. Insect infestation was common, however preventative measures were rarely taken. In addition, spoiled/fermented products such as gatot are likely to contain mycotoxins and other dangerous by-products.

Cassava postharvest treatments definitely require greater supervision and attention as fas as sanitation and efficiency are concerned. It is hoped that this brief survey will stimulate research efforts.

5. Department of Agriculture

Department of Agriculture offices in Yogyakarta (D.I.Y.) and Gunung Kidul were visited in order to obtain the following information :

a. production of cassava and other crops in D.I.Y. and the various kabupatens

b. price of cassava in the fresh, dried and starch forms in D.I.Y.

c. labor needs in cassava production and processing

d. cost per Ha to produce cassava, compared with income

e. cassava processing industries in D.I.Y.

In addition to obtaining the above information, Department of Agriculture personnel assisted in surveying farmers and processors in the area and offered information based on their own experiences.

DMB:is

APPENDIX I.E.1.

Quarterly Report

COOPERATIVE CRIFC - IRRI PROGRAM
THE INTERNATIONAL RICE RESEARCH INSTITUTE

CABLE ADDRESS :
IRRIAID BOGOR

MAIL ADDRESS
COOPERATIVE CRIFC - IRRI PROGRAM
IRRI - P.O. BOX NO. 107
BOGOR, INDONESIA

November 2, 1983

To : Mr. Walter C. Tappan
IRRI Liaison Scientist

From : Jerry L. McIntosh
Farming Systems Liaison Scientist

Subject : Monthly Report, October 1983

I. Principal Activities and Accomplishments.

A. Upland Agriculture and Conservation Project.

I have been requested by USAID and AARD to assist in the preparation of the agricultural research component of this comprehensive Upper River Watershed Project. A team of consultants has been organized by USAID to develop a proposal that covers research, expansion, credit and institutional aspects of the project which will cover the Jratunseluna and Brantas watersheds in Central and East Java. I have visited each watershed (8 days) with the overall team (10 scientists) and the 2-3 man team from AARD. Within AARD a working group of scientists from the respective Centers has been working with me to develop a research proposal. Three meetings were held by the working group at the Center for Soils Research. All component studies are to be completed by November 1, 1983.

B. Asian Farming Systems Working Group, Hangzhou and Beijing, China.

Dr. Suryatna Effendi and I participated in the meetings. Three days prior to the meetings were spent at IRRI, Los Banos to arrange visas for China and for consultation and preparation of research papers! One day was spent in Manila discussing the editing of the publication, Indonesian Farming Systems Research and Development.

Papers finalized were:

a. Progress Report on Farming Systems Research

b. Green Manuring and Biological Nitrogen Fization

c. Water Management for Upland Crops after Lowland Rice

C. Final discussions and editing of Crops/Livestock Project Proposal to be submitted to IDRC.

II. Miscellaneous Activities

Consultations

1. Dr. Heide - Soil Research Institute, Netherlands, stationed at IITA.

2. Mr. Joe Ona - PDP Consultant to NTT.

3. Usual

III. Constraints and Problem

No problems.

IV. Plans

A. Finish UACP project proposal by November 12.

B. Follow up on Crop/Livestock proposal to IDRC

C. Help develop plans and follow closely research underway in Cropping/Farming Systems.

25

APPENDIX I.E.2.

COOPERATIVE CRIFC - IRRI PROGRAM
THE INTERNATIONAL RICE RESEARCH INSTITUTE

CABLE ADDRESS :
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November 28, 1983

To : Mr. Walter C. Tappan
IRRI Liaison Scientist

From : Jerry L. McIntosh Jerry L. McIntosh
Farming Systems Liaison Scientist

Subject : Monthly Report, November 1983

I. Principal Activities and Accomplishments

A. The first draft of the project paper for the research component of the Upland Agriculture and Conservation Project was finished and submitted after two weeks of intensive discussion and writing. This has been a unique opportunity to bring together research staff in AARD from different centers and disciplines and collaboratively develop a project proposal for integrated systems research. Even though the project paper will require further revision and editing, the process that was carried out has enhanced research cooperation and understanding among scientists who have not previously worked together. They have developed a logical and sound research approach and are excited about the opportunity to carry out research that will directly meet the needs of these critical land areas and the people who live there.

B. Editing and revision

1. Budget figures for Crops/Livestock Project.

2. Papers to be published from Asian Farming Systems Working Group Meetings.

3. Illustrations and captions for Indonesian Farming Systems Research and Development publication.

4. Project paper for Evaluation of Urea Super Granules.

5. Paper for proceedings of Indonesian Farming Systems Working Group Meeting.

C. Inspect Farming Systems and Fertilizer Efficiency Research sites in Lampung and South Sumatra along with Messrs. Tappan, Palmer, Siregar, Soetjipto, Inu and IDRC guests.

D. Usual research discussions and consultations with colleagues.

II. Miscellaneous Activities

A. Attend Annual Field Day and discussion sessions for research in CRIFC.

B. Visitors and Consultations

- Dr. Hughes and colleagues - Hunting Associates and Public Works
- Dr. Paul Stangel - IFDC
- IDRC Regional program officers: Dr. H. Doggett, England
  Mr. A. McNaughton, Ottawa
  Dr. J. Kategile, Nairobi
  Dr. N. Mateo, Bogota
  Dr. G. Banta, Singapore

C. Review papers.

- Plant Breeding - Working Group Meeting as stable plant resistance.
- Background papers - Perennial Crops
  Crop water use
  Energy use

III. Constraints and Problems

A Problems from insufficient funds for travel have been alleviated somewhat by frequent requests for help from USAID, IRRI, etc., that permit me to visit the areas and meet the people I wish to see.

B. My tenure in Indonesia.

IV. Plans

A. Field visits to Farming Systems Research Sites.

B. Help develop strategy for Farming Systems Research in Upland Rainfed Areas (drought prone).

C. Follow-up on project proposals being developed.

JLM:fh

APPENDIX I.E.3.

COOPERATIVE CRIFC - IRRI PROGRAM
THE INTERNATIONAL RICE RESEARCH INSTITUTE

CABLE ADDRESS :
IRRIAID BOGOR

MAIL ADDRESS
COOPERATIVE CRIFC - IRRI PROGRAM
IRRI - P.O. BOX NO. 107
BOGOR, INDONESIA

December 29, 1983

To : Mr. Walter C. Tappan
IRRI Liaison Scientist

From : Jerry L. McIntosh
Farming Systems Liaison Scientist

Subject : Monthly Report - December 1983

I. Principal Achievements and Activities

A. Follow-up of field trip to Batu Raja and Way Abung.

Itinerary and observations are summarized in Appendix A. In general the IDRC officers were most impressed by the evidence of adoption of Farming Systems Technology developed in Indonesia. This may be summarized by the evidence that farmers:

1. Follow the basic cropping patterns and management guidelines.
2. Terrace the land to stabilize the soil.
3. Diversify production enterprises.
   - Interculture - Fruit species and vegetables.
   - Mixed farming - Production of small and large ruminants.

There are some suggestions:

1. We need to get the Crop/Livestock project approved and implemented as soon as possible. The methodology developed will be useful to other projects - particularly the Upper River Watershed projects.

2. Increase the numbers of Farming Systems Scientists in the Field.

3. Tackle weed problems.

B. Follow-up on Upland Agriculture and Conservation Project.

Budget figures need more complete breakdown and documentation. My responsibility in the project development process is finished at this point.

C. Participation in "Farming Systems for Upland Rainfed areas in the Tropical Rain Forests of East Kalimantan".

This workshop and the activities carried out are described in Appendix B. This was a very interesting and useful workshop. There are some points that should be reemphasized:

1. We need to improve coordination and information flow among Farming Systems projects in Indonesia. This is true for activities within AARD and with other institutions and agencies. For example, all provincial development projects funded by USAID have a Farming Systems Development (if not research) component. Other Rural Development Projects funded by World Bank (Yogya), FAO (Pematang Panggang), and West German TAD and ADP projects (E. Kalimantan and W. Sumatra) all have a Farming Systems Development Component.

2. Basic data for labor, costs, time to maturity or harvest, expected yields and ecological niche needs to be tabulated for Indonesian conditions. In many instances judicious use of these data, along with some on-site observations and monitoring, would minimize or perhaps preclude the need for:

   - Test Farms
   - Model Farms
   - Action Research

3. Long term trials, however, are needed to relate soil and climatic descriptions to crop performances. For example, the soil in Rimbayu, East Kalimantan gives test values of 8-10 m.e. of KCl extractable Al. Yet peanuts and soybean look better on these soils than on soils with less than 2 m.e. from other places.

II. Other Activities

A. Routine consultations and discussions with colleagues about on-going research.

B. Consultations

1. Department of Industry and UNDP - lime industry

2. Mr. George Manuelpillai - Final reports from Benchmark Soils Project.

3. Mr. Joe Ona - PDP, NTT

4. Dr. Ruben Villareal - AARD/IRRI Collaborative Palawija Crops Breeding for Cropping Systems. Plans were made for monitoring tour to be held in May in Indonesia.

C. GEU Meeting.

D. Discussion on Citanduy Research.

III. Problems and Constraints

A. Hopefully my stay permit will be extended beyond 31 January 1984.

B. Duplication of activities.

IV. Plans

A. Proceed with Crop/Livestock research as soon as project approved.

B. Visit Cropping Systems sites in Sumatra

- Fertilizer Efficiency
- Lime studies
- Variety trials

C. Further steps in development of Upland Agriculture and Conservation Project.

JLM:fh

COOPERATIVE CRIFC - IRRI PROGRAM
THE INTERNATIONAL RICE RESEARCH INSTITUTE

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IRRI - P.O. BOX NO. 107
BOGOR, INDONESIA

December 8, 1983

Trip Report

November 29 - December 1, 1983
J.L. McIntosh

Purpose : To take the opportunity to accompany IDRC Regional Program officers and AARD staff to visit Farming Systems Research sites in Batumarta, South Sumatra and inspect Fertilizer Efficiency Studies in Nakau, and Cropping Systems Research in Way Abung, Lampung.

Participants: IDRC Regional Program officers:

Dr. Gordon Banta, Singapore
Dr. Hugh Dogget, England
Dr. Gordon Potts, Egypt
Dr. Jackson Kategile, Kenya
Dr. N. Mateo, Columbia

IFDC:

Dr. Brian Palmer

AARD:

Dr. A.P. Siregar, CRIAS
Ir. Soetjipto Ph., BORIF
Mr. Inu G. Ismail, BORIF
Mr. Soebowo, BORIF

CRIFC/IRRI:

Mr. Walter C. Tappan
Dr.Jerry L. McIntosh

Background

IDRC Agricultural Program officers routinely hold meetings to review existing and future program activities. The most recent meeting was held in Manila. Subsequent to that meeting the participants wished to divide into groups and visit Farming Systems Research Sites in Thailand and Indonesia. The primary interest in Indonesia was to get a first hand understanding of the conditions and methodology for Farming Systems Research in this country. The kinds of research and the ensuing production programs that are common in Indonesia may not be feasible in other countries for biological, cultural and political reasons. It is necessary many times to have direct contacts among scientific and administrative personnel to understand why some approaches may or may not work. Fortunately, the active support for agricultural research and development at the highest levels of government and the diligent nature of Indonesian farmers, promotes the rapid development of research and production programs.

Drs. Banta and Siwi agreed that the group should visit Batumarta Transmigration area and see the impact of past research and the area proposed for an IDRC/AARD Crop/Livestock Research Program. Even though the IDRC guests had only one day for the field, the other members of the group wished to visit other research sites in the area - Nakau and Way Abung.

Batumarta

The Batumarta Transmigration project is located between Baturaja and Martapura (hence Batumarta), South Sumatra and covers about 65,000 hectares in Phase I and hectares in Phase II. Phase I was opened for settlement in 1976. Cropping Systems Research was started beginning with the crop season in 1977. Each family was to be given five hectares of land to be used as follows:

Land use	Area (ha)
Home lot	0.25
Food crops	1.50
Pasture	0.25
Rubber	1.00
Food crops (reserve)	1.00
Rubber (reserve)	1.00

However, up to the present time three hectares of land have been allocated. This includes one hectare of rubber (nucleus estate) and the rest for home lot, food crops and pasture.

The cropping systems research was supported by Transmigration from 1976-1982. Stable and economical cropping patterns have been identified and relevant component technologies to support the systems have been developed. The existing problems that need special research involve:

- Soil conservation
- Varietal improvement
    - Rice varieties more resistant to blast
    - Legumes with more tolerance to acid soil
- Yield stability (which includes varietal improvement)

- Economic stability (principally through diversification)
  - Upgrade animal component
  - Upgrade perennial crops component

- Land opening and management
  - Will be covered in the newly opened area under Agricultural Research to support Transmigration Project (P3MT).

These points were covered by Mr. Inu in his briefing of the group at the headquarters in Baturaja. Since the farming systems research in the new area is just beginning and is located far from the existing headquarters, it was decided to look at the fields of farmers who had been cooperators under the old project that was completed in the 1982-83 crop year. The contiguous area managed by the farmer cooperators represented a striking contrast with the surrounding area. The most obvious contrasts were:

- Use of introduced cropping pattern
- Crop arrangement
- Improved soil fertility (green healthy plants)
- Terracing
- Grass production for animal feed
- Interculture using coconut, clove, coffee, fruit trees

Nakau

In 1979 a research proposal was developed at IFDC headquarters in Muscle Shoals by IFDC, AARD and IRRI staff for research on fertilizer use efficiency for lowland rice and upland rainfed crop production. Because of CRIFC/IRRI experience in cropping systems research the need for study and evaluation of fertilizer use efficiency in cropping systems (rather than for one crop for one season) was emphasized in the proposal. It was hoped that a transect of sites on red-yellow podzolic soils across Indonesia could be established in collaboration with the Indonesian Cropping Systems Working Group. The Soil Research Institute would provide the soil classification and analytical expertise while the cropping systems researchers would manage the on site cropping systems plots for testing.

Because of funding problems and dry weather the 1982-83 trials were only partially successful. The 1983-84 trials have been planted at Nakau by the Center for Soils Research. The plots in Batumarta had just been planted and the seeds had not germinated yet. The plots have been established and the seedlings are about five centimeters high in Way Abung. Hopefully next year trials can be established in South Kalimantan and in Southeast Sulawesi to complete the transect.

These trials are expected to be a very valuable contribution to cropping systems research and development. We expect to develop techniques that will permit a single application of fertilizer that will be effective for the year around cropping pattern rather than applying fertilizer for each crop (a total of five) over the crop season. Consequently, the trials are designed to study:

- effects of different nitrogen release rates on crops in year around cropping patterns (Urea vs SCU)
- partial acidulation of rock phosphate and crop yields
- lime x phosphate studies (yields and economics)

Way Abung

The IDRC visitors returned to Jakarta while the rest of the group went on to Way Abung to look at the research and farmers' conditions in the Transmigration area. Cropping systems research has been conducted in Way Abung II (about 65,000 hectares). The support from Transmigration since 1976 for this research was terminated at the end of the 1982-83 crop year. The existing research is supported from the routine budget and consists of some cropping systems (lime phosphate trials - long term), fertilizer efficiency, upland crops breeding and minor elements studies. There are a total of 18 trials underway. The work load is very heavy for Mr. Imol who has assumed the responsibility for these trials after the other Cropping Systems staff were transferred to other places.

There were some observations that should be mentioned. First of all, the plots in general looked good and were well managed. Secondly, problems with broad leaf weeds have reached a critical point and more weed research is needed to develop practical and economical control measures particularly at the seedling stage for rice. The weeds are Boreria latifolia and Boreria laevicoulis (Kentangan). Thirdly, the response to phosphate fertilizer in the long term plots with lime x phosphorus treatments remains striking for both rice and corn. The upland rice appears to respond very little to lime. On the other hand corn grows very poorly at low phosphate rates on the no lime plots. From these plots, which are in the third consecutive year, we should be able to get a much better understanding of lime needs.

General

The trip was very useful for many reasons. Some general conclusion can be drawn. Lampung and the southern part of South Sumatra are developing very fast. The main roads through these two provinces are in excellent condition. (On the other hand the roads in the Transmigration areas are in bad shape).

The new irrigation project in north Lampung appears to be mostly completed. Consequently, there is a vitality in these areas that did not exist ten years ago. Furthermore, the Extension Service for Food Crops is active and viable. The development of production programs for cropping patterns is starting. This will be another major improvement for crop production.

JLM:fh

Appendix B

Trip Report

December 11-17, 1983

Purpose : To attend and participate in Workshop on "Farming Systems for Upland Areas in the Tropical Rain Forests of East Kalimantan".

Location : Kota Bangun, East Kalimantan - TAD Guest House and Rimbayu Transmigration Project Area

Objectives of Workshop:

1. Discussions about existing knowledge and current research activities for farming systems in upland areas in South East Asia - especially East Kalimantan.
2. Develop farming systems to be tested in representative upland sites in East Kalimantan.
3. Develop strategies for further improvement of coordination and cooperation in farming systems research among relevant concerned organizations.

Program : Appendix I

Participants : Appendix II

Discussion

The AARD research team on farming systems in Semboja, East Kalimantan that is being supported through P3MT (Agricultural Support for Transmigration Project) has developed a close working relationship with the TAD (Transmigration Area Development) Project funded by the West German Government. I was asked by representatives of these projects to attend the workshop. I was accompanied to East Kalimantan by Dr. Hidayat and Ir. Victor Manurung of the AARD. We left Jakarta on the first flight on Sunday December 11 for Balikpapan. We were met by a TAD driver and taken to Samarirda. At 1900 we boarded a TAD workboat

-36-

for the 12 hour ride upstream to Kota Bangun. The workshop was held in the TAD Guest House in Kota Bangun. The Rimbayu Transmigration Project area is nearby as well as other project activities of the local government and TAD on such things as fresh water fish culture, river bank irrigation and training.

The first day introductory formalities were completed and background presentations were made concerning the TAD and local government programs, soil and climate of the area and experiences in farming systems research in AARD for all of Indonesia.

The second day a visit was made to Rimbayu to interview key farmers, get a first hand impression of the soil and present farm activities and develop concepts for future research and demonstration trials.

The third day the TAD Technicians reported on much of their work and provided background information for planning purposes.

During the fourth and fifth days we divided into five groups and discussed, planned, evaluated (ex ante) and re evaluated farming systems models. Each group was permitted to develop strategies based on their collective judgments with one exception. Each group was given the responsibility of including a specific agricultural enterprise such as fish pond , small animals, large ruminants, perennial crops and lowland rice. Consequently, each of these different kinds of agricultural activities would be considered and evaluated, even though in the final analysis one system might be considered most appropriate for the area. This process was carried out and each group reported its results. On the final day a concensus was reached and one farming system was designed to be developed as a model for the farmers who have only upland area. The background materials used in the designing and the evaluating processes are included as Figures and Tables. Appendix III is a report provided by Mr. Michael Redshaw of the TAD on the use and management of cover crops in upland farming systems.

Upland Farm Description

Settlers arrived in Rimbayu from January to June, 1983. Most of the farmers received only upland. However, some of the lower lying land areas lend themselves to lowland rice culture and the farmers have proceeded to develop rainfed lowland areas. Each farmer has received two hectares of land. The land available to each family is divided into three lots — 0.25 hectare for the homelot, 1.0 hectare nearby (± 1 km) and the remaining 0.75 hectare farther away. The latter has not yet been given to the farmers. The soils tend to fall into the red yellow podzolic group (Tropudults) and are acid and infertile (Tables 1 and 2). But the rainfall is adequate for year around crop production (Figure 1).

The Rimbayu transmigration project is really divided into three smaller settlements due to the hilly topography of the area. Each farm family has or will be supplied with the following in addition to the first year's food subsidy (Table 3).

In our conversation with Pak Manto, who is a key farmer having only upland area, we learned that he and his wife and three children (son 15, daughter 11 and son 9) had arrived in Rimbayu in January 1983. They came from the vicinity of Solo and had previously cultivated lowland rice. The family members all appeared to be in good health and Pak Manto gave the impression of being very intelligent and industrious. The family home garden was completely filled with crops — mostly legumes being grown for seed. He had planted the perennial crops allocated by the project. The one hectare lot (Lahan I) was about three-fourth cultivated and planted to food crops. The 0.75 lot (Lahan II) has not yet been given to the farmers. The crops growing looked good - especially those in the home garden. Pak Manto had put all of his rock phosphate allotment on this land. Even though the soil is quite acid and high in exchangeable Al (4 - 10 m.e.) the legumes growing looked very good. We were served peanuts which were large and well filled. It is imperative that we develop a transect of research sites on red yellow podzolic soils across Indonesia and begin to relate crop production and soil chemical and physical analyses. Without this kind of research we will always have trouble understanding soils and their suitability for crop production.

Pak Manto has planted crops for three seasons since his arrival in Rimbayu. The first crops were planted in April (legumes) and did very well. The upland rice planted about the same time failed because of dry weather. Apparently local, long season varieties of upland rice were used. The second crops were planted in July (soybean and peanut). The yields were good. The third crops are growing now and all look reasonably good in the home garden.

Pak Manto is aware of the soil conservation and marketing problems. He is also acutely aware of the dangers of drought. Consequently, he is eager to diversify his farm operation. He would like to have livestock. It is significant that the border of his front yard is beautifully covered with flowers. Also, the eldest child stays in Kota Bangun to go to school.

Upland Farming Systems

The rationale for the use of the farmers' land for different agricultural enterprises included the following:

- Subsistence for food from food crops
  - calories needed
  - cropping patterns suitable
  - land area needed
  - labor needed
- Minimize risks
  - minimize inputs
  - stabilize production
  - sustain production
  - diversify production

To meet these requirements it was decided that food crops would be mostly determined by food needs and available labor. From past experiences and rainfall data it was decided that 0.5 hectare of a year around cropping pattern C + ULR (/ Cv) - C + leg - C + leg would meet most of the family food requirements. Family labor would still be available for other activities. It was concluded that perennial crops should be grown to stabilize and sustain production and minimize labor. Coconut appeared to be the most feasible perennial crop. Chickens (10 adults) for eggs for the family and some for sale would add to the family diet. Small ruminants such as goats (5 adults) would be suitable additions to the farming systems. In each case the numbers would be limited according to available labor and feed. The home garden would benefit from the manure produced and the animals could be fed to a large extent from forage shrubs and grasses from this area.

For soil conservation it was decided that the one hectate of Lahan I would be an interculture of food crops and coconuts. The coconuts would be planted in an appropriate contour fashion at a normal population in the rows. The rows would be spaced 20 meters apart to give about one half population. Food crops would be planted in a 10 meter strip between the coconut rows. The 10 meter strip under the coconuts would be planted to pueraria. The pueraria would be trimmed once a yearto provide mulch and green manure to the food crops. Bench terraces would gradually develop over time. Lahan II would be planted to a full stand of coconuts and pueraria.

The home garden would be planted, more or less, according to the design provided by Dinas Pertanian and shown in Figure 2. The fish pond would be replaced by a goat stable. Most of the food subsistence would be provided by the food crops grown in Lahan I. But a permanent reserve as well as variety would be provided by the home garden. The home garden would provide much of the oil (four coconuts), vegetables, greens and cassava for family needs. It would also provide the shade and other aesthetic qualities needed for the family. There would still be ample room for the chicken and animal shelters and pens and forage production from grasses and the living fence (glyricidia and leucaena).

Table 3 shows the commodity support available through the Transmigration Project for crop production. The basic fertilizers (urea, TSP and KCl) are available for three years. Tables 4, 5, 6 and 7 provide data for labor requirements, market and food values for different food commodities and basic human nutritional needs, respectively.

Labor Balance

Labor availability is a major constraint to more intensive and extensive use of land. It has been the common experience in cropping systems research that farmers have difficulty using more than one half hectare of land the first year land is opened for year around cropping patterns and about 0.7 hectare in subsequent years. The total labor requirement is not necessarily the problem for use of more land area. Mobilizing the labor force for specific crop management activities within a particular time frame represents the major constraint. The labor requirements and the labor supply for Pak Manto's farm are summarized in Table 8. There appears to be sufficient labor to carry out the necessary farm operations. Diversification of the farm operations permits better labor distribution and more efficient use.

Benefit-Cost

Tables 9-12 show the estimated yields and values of crop production and the amounts and costs of inputs. The food crop production from the home garden area is not included and will be considered as a reserve food source. This kind of breakdown helps us determine weak points in the farming systems and where modifications can be made. The breakdown of input costs for each crop and the home garden is shown in Table 13.

Calorie and Protein

It was assumed that the major source of calories and protein to meet the family food requirements would come from the food crops produced in Lahan I. Table 14 summarizes the family needs and compares this to the production from Lahan I. These data show that the rice production itself will provide about eighty percent of the family needs. The shortage is assumed to be available from the home garden and the livestock production. Consequently, the other food crops production - legumes and corn, may be sold or used partially for animal feed.

Estimated Cash Flow - 1989

A summary of all cash inputs and value of production is shown in Table 15. It is assumed that the perennial crops will be in production by 1989 and that a stabilized production and marketing system will exist. Since it is also assumed that the rice and corn produced will be used to meet family food needs the importance of the legume, coconut and animal enterprises for cash income becomes apparent. Furthermore, the perennial and animal crops tend to provide income stability. Cash flows for the years 1984-1989 are shown in Table 16. From this table we can see the dilemma the farmer faces in making major capital investments - such as clearing land, planting coconuts and buying animals. Even if credit is available through government programs, the farmer assumes great risk unless every effort is made to reduce costs. One example of a way to reduce costs for establishing coconuts is for the farmers to produce their own seedlings (as in our illustration). The price of hybrid coconut is only Rp.500 while a seedling is estimated to cost Rp.3,000 in East Kalimantan. Consequently, development of effective training and extension programs are essential to the success of the Transmigration project.

Conclusion

1. Before Model Farms and Test Farms are developed much more ex ante analysis is needed. Through this process many unviable systems may be eliminated before money and time are wasted in evaluation. But ex ante analysis requires background information and data. The National Farming Systems Working Group needs to compile these data and reach a concensus among relevant scientists for the acceptability of the data. Data needed for different agricultural enterprises includes food, vegetable and perennial crops, fish, poultry and animal production figures.

   a. Labor requirements for different farm operations

   b. Management practices to be followed for different crops.
      - Spacing
      - Seeding rates
      - Fertilizer practices
      - Pest and disease management
      - Crop cultivars

   c. Cost of production (revised as needed)
      - Cash inputs
      - Labor

   d. Expected yields
      - Individual crops
      - In combinations

   e. Expected sale prices (revised as needed)

2. Better national and international exchange of information is needed to facilitate research development and minimize duplication.

   a. Newsletters

   b. Workshops

3. Research site descriptions and transfer of technology.

   a. Soil description - should establish a transect of benchmark sites across major soils groups and relate crop production to soil classification and tests.

   b. Minimum climatic data set.

   c. Refine basic agro-economic profile surveys.

Appendix B

Appendix I

TAD Workshop FARMING SYSTEMS December 1983

Title of Workshop:

FARMING SYSTEMS FOR UPLAND AREAS
IN THE TROPICAL RAIN FORESTS OF EAST KALIMANTAN

Date : 12th to 16th December 1983

Location : KOTA BANGUN (East Kalimantan), TAD Guest House

Working Language : English

OBJECTIVES OF THE WORKSHOP

- Brainstorming about the existing knowledge and current research activities for farming systems in upland areas in South East Asia, especially East Kalimantan.
- Develop different farming systems to be tested in representative upland sites in East Kalimantan.
- Proposals for further improvement of coordination and cooperation in farming system research between all organizations concerned.

PARTICIPANTS

- Representatives of the provincial government
- Representatives of Kanwil Transmigrasi and Kanwil Pertanian
- Representatives of the respective DINAS in the agricultural sector
- Representatives of the Indonesian Agency forAgricultural Research and Development (AARD)
- Representatives of the Mulawarman university, Samarinda
- TAD experts
- Guests from South East Asia working in Farming System Research

PROGRAMME OF TAD "FARMING SYSTEMS" WORKSHOP, December 12th - 16th, 1983.

12 DECEMBER 1983 (Monday)

Time	Activities/Contents	Forum/Responsible
09.00 - 09.30	- Opening of the workshop - Presentation of the participants	Plenum BAPPEDA/TAD
09.30 - 10.00	Introduction - Objectives of the workshop - Methods and techniques - Programme - Organization	Plenum TAD
10.30 - 11.00	COFFEE BREAK	
11.00 - 12.00	An outline of the General Agriculture Development in East Kalimantan	Plenum BAPPEDA
12.00 - 14.00	LUNCH BREAK	
14.00 - 15.30	Actual and planned activities in farming systems research for uplands in East Kalimantan and first experiences in this sector	Plenum short reports from the involved organizations
15.30 - 16.00	COFFEE BREAK	
16.00 - 17.30	Experiences with farming systems in comparable positions outside Kaltim	Plenum AARD

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13 DECEMBER 1983 (Tuesday)

Time	Activities/Contents	Forum/Responsible
07.30 - 13.00	- Visit to Rimbayu - General introduction in the situation of the transmigration settlement Rimbayu - Visit of two selected farms, and interview of the farm families	Field Trip Transmigrasi/TAD Group-work
13.00 - 15.00	LUNCH BREAK	
15.00 - 16.00	- Definition of the targets of the farmer families and the most constraints to them	Group-work
16.00 - 16.30	COFFEE BREAK	
16.30 - 17.30	- Presentation of the results of the groups - To quarry of realistic and attainable targets for both farms	Plenum

14 DECEMBER 1983 (Wednesday)

Time	Activities/Contents	Forum/Responsible
08.00 - 09.30	The field of opportunities and restrictions to achieve the formulated targets from the point of the experts	Plenum Brainstorming short lectures
	- New systems in using cover-crops - Duration of growing and realistic yields for different food crops - The most important problems of plant protection - Results of tested Cropping Systems	TAD experts
09.30 - 10.00	COFFEE BREAK	
10.00 - 11.30	- Feasibilities for tree crops in MMA - Chances and problems for animal husbandry in MMA uplands - Experience with pond fisheries in Teluk Dalam - Marketing situation in the MMA uplands	
11.30 -12.30	Definition of feasible farming systems for the 2 model farms	Discussion
12.30 - 14.30	LUNCH BREAK (Formation of new groups)	
14.30 - 17.30	Elaboration of a land using plan for the different farming systems in view of: - self sufficiency in nutrition - covering of the demand of animal fodder - saving of soil fertility - opportunities for cash income COFFEE BREAK individual	Group-work

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15 DECEMBER 1983 (Thursday)

Time	Activities/Contents	Forum/Responsible
08.00 - 08.30	Working plan for the morning	Plenum
08.30 - 12.30	Continuing of farm planning - Labor balance - Economic calculations for the planned farm model (input - output analysis) COFFEE BREAK individual	Group-work
12.30 - 14.30	LUNCH BREAK	
14.30 - 16.00	Presentation of the planning results of each group	Plenum (no discussions, only questions for understanding)

47

15 DECEMBER (cont'd)

16.30 - 17.30	Presentation of the planning results	
19.30	P A R T Y	

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16 DECEMBER 1983 (Friday)

08.00 - 11.00	Discussion of the planning results in view of: - reaching the targets - feasibility of the plan - suitability for implementation (to be tested)	Plenum
14.00	LUNCH BREAK	
14.00 - 15.15	- Discussion and definition of the most important research lacks for farming systems - Recommendations for the improvement*) of the further cooperation and coordination in farming systems research	Plenum
15.15 - 15.30	COFFEE BREAK	
15.30 - 16.00	Closing of the workshop	Plenum

*) In the beginning of the workshop should be selected a committee with the order to prepare a proposal for respective recommendations

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TRANSFER FROM SAMARINDA TO KOTA BANGUN

- The travel from Samarinda to Kota Bangun will be arranged by TAD. The long boats will leave on 11th December (Sunday), at 07.00 p.m. from the TAD jetty.
  If you do not know this place, please come to TAD Guest House, Jl. Pahlawan, Samarinda, at 06.30 p.m.
- Return from Kota Bangun to Samarinda is planned on Friday night, arrival in Samarinda on Saturday morning at 06.00 o'clock.

Appendix II

List of Participants

TAD WORKSHOP "FARMING SYSTEMS FOR UPLAND AREAS IN THE TROPICAL RAIN FOREST OF EAST KALIMANTAN"

KOTA BANGUN, 12 - 16 December 1983

NAME	POSITION/INSTITUTION	ADDRESS
1. Dr. Hidayat Nata-atmadja	Agro Economist	Jl. Merdeka 99, Bogor
2. Ir. Fadjar Sidik	Planter/PTP VI Muara Marah Plantation	T.A.D. Bappeda Building Jl. Kusuma Bangsa 140 Samarinda, East Kalimantan
3. Ir. Suhaimi Sulaeman	Plant Breeder BARIF - Banjarmasin	BALITTAN (BARIF) P.O. Box No. 1 Banjarmasin, South Kalimantan
4. Ir. Victor T. Manurung	Litbang Pertanian	Pusat Penelitian Agro Ekonomi Jl. Ir. H. Juanda 20 Bogor
5. Ir. Nuryadi	Direktorat Jenderal Pertanian Tanaman Pangan (Multiple Cropping Systems Specialist)	Jl. Damarsari 16 Pasarminggu, Jakarta
6. Ir. Burton Pandjaitan	Dinas Pertanian TK.I Kalimantan Timur	Jl. Basuki Rachmat Samarinda, East Kalimantan
7. Ir. Wismono Hs	Dinas Pertanian TK I Kalimantan Timur	Jl. Kusuma Bangsa Samarinda, East Kalimantan
8. Ir. Sumardji	Dinas Pertanian TK. I Kalimantan Timur	Jl. [illegible]asuki Rachmat Samarinda, East Kalimantan
9. Ir. Buwono	Dinas Peternakan Dati I Kalimantan Tinur	Jl. Bhayangkara Samarinda, East Kalimantan
10. Ir. Husaini	Dinas Peternakan Prop. Dati I, Kalimantan Timur	Jl. Bhayangkara Samarinda, East Kalimantan
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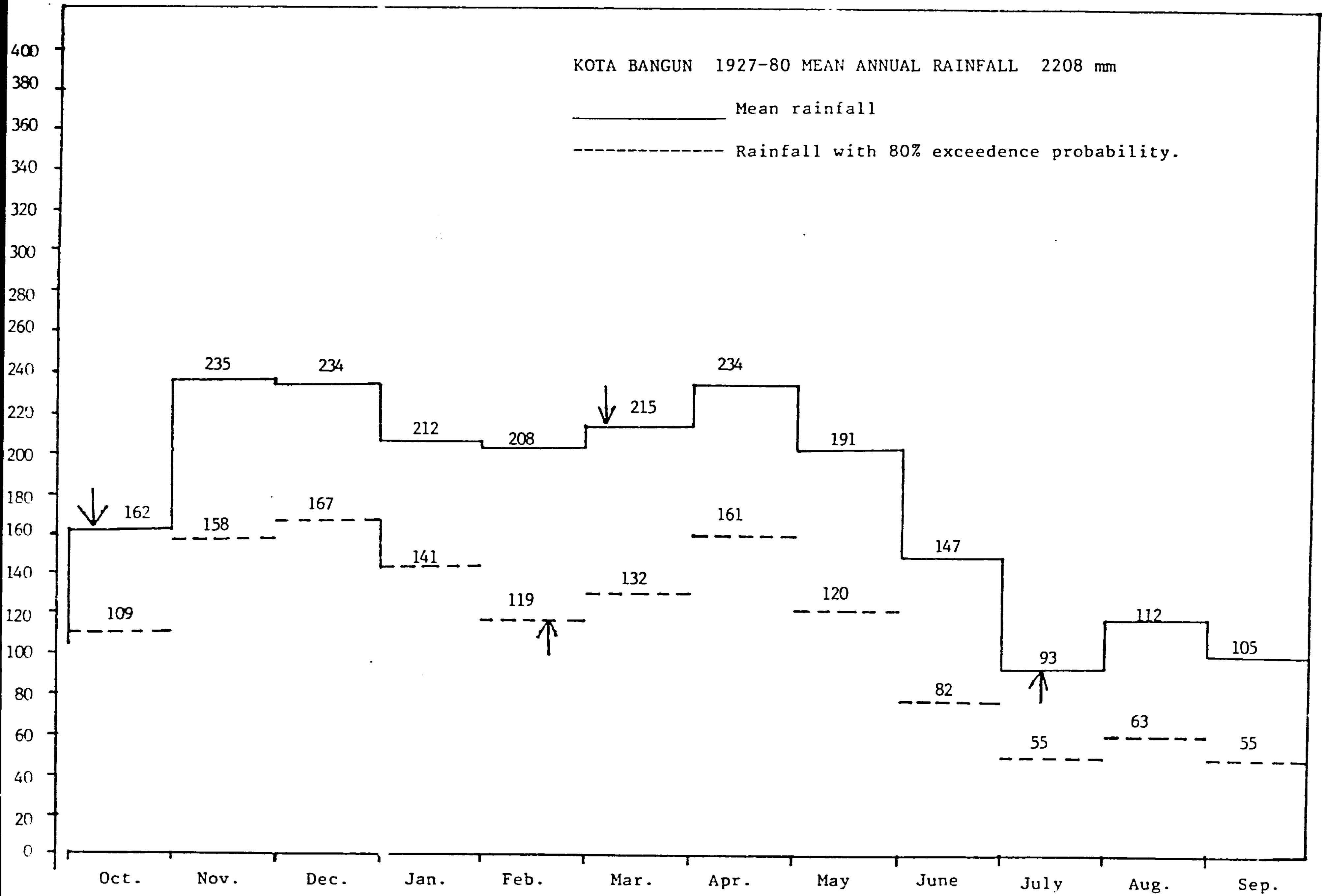
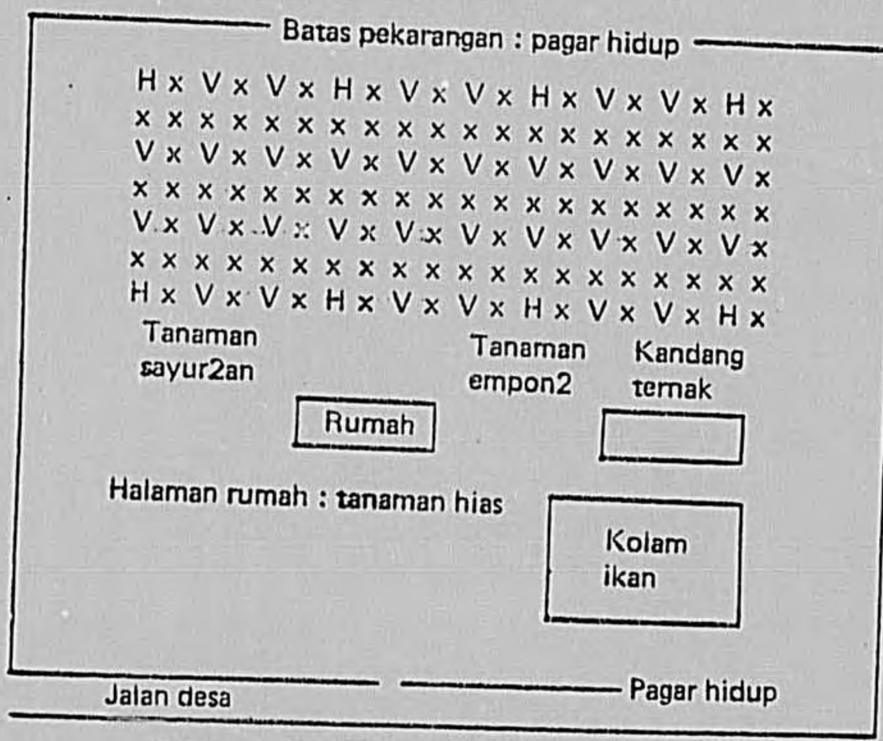


Figure 1. Rainfall distribution and 80% probabilities for each month.

Pola Usahatani Pekarangan (0,25 Ha).
Usahatani yang dapat dilaksanakan pada tanah pekarangan adalah usahatani terpadu yang terdiri dari tanaman pangan (tanaman semusim dan tanaman tahunan/buah-buahan), tanaman perkebunan, usaha peternakan dan perikanan. Pola usahatani pada tanah pekarangan seperti pada daerah berikut.



Catatan : H = Tanaman tahunan (Buah2an, Tanaman perkebunan dan sebagainya) jarak tanam tergantung kepada jenis komoditi.
x = Tanaman ubi kayu, jarak tanaman 2 x 2 m.
V = Tanaman jagung, jarak tanaman 2 x 1 m.

Figure 2. Generalized arrangement of pekarangan for 0.25 hectare for upland Transmigration areas.

53

Table 1. Soil analyses - chemical and physical for soil in Rimbayu.

Project: RIMBAYU SP II
Map 1:000

Borehole
Profile 2027

Sampling : Date: 1.11.83
by : NITSCH

Analyzed by:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Analyses No.	Field No.	Field Description Colour	Sampling Depth cm below surface	pH in 1:2.5 suspension KCl	pH in 1:2.5 suspension H_2O	EC	Organ C %	Organ Mat %	Carbonates %	Cat.Exch.Cap meq/100 g soil pH 8.2	Cat.Exch.Cap meq/100 g soil Eff	Exchangeable Cation in meq K	Ca	Mg	Na	Al	100 g H Res Cat	Soil Al	Sat (Ca&Al) Eff CEC (Col 12)	Total Cal Co (13:17)	Base Saturation % Pot CEC	Base Saturation % Eff CEC	Cation Ratios Ca/Mg	Mg/K	Na/K	HCl H_2SO_4 Extr	P	Plant Nutrients in ppm Total (HClO$_4$ Extr.)	HCl H_2SO_4 Extr.	K	Total (HClO$_4$ Extr.)			Fertility index
3957	4680		0-15	4.1	4.2		1.1	1.9				14.3			0.2	0		4.55								6		119	72		1500			
3958	4681		-52	3.5	4.3		0.3	0.5				8.5			0.1	0		6.10								16		170	34		1680			
3959	4682		-75	3.5	4.4							15.0			0.1	0		9.02								3		68	34		2880			
3960	4683		-112	3.5	4.5							14.0			0.1	0		10.72								4		126	34		3460			
3961	4684		-150	3.5	4.3							27.0			0.2	0		10.06								2		242	72		2130			

36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
Layer horizontal Depth in cm b.s.	Field description Colour	Field No.	Sample depth in cm below surface		Particle Size Distribution in % in soil: Clay <2	Silt 2-20	20-63	Sand fine 63-112	112-200	med 200-630	coarse 630-2000	Gravel %		Texture	Permeability (K) Max. Min.		Moist.		Pore Size Distribution: free Pore space of pF <1.8	1.8-2.5	2.5-4.2	>4.2		Total pore	Field capacit. Vol %	Avail. Moist Cap. Vol %	Bulk density	Moist Cap.	Avail. Field Moist			
		3957			11.2	53.8		[illegible]		[illegible]			S	L																		
		3958			19.2	40.0		[illegible]		5.6				L														[illegible]				
		3959			33.2	[illegible]		26.1		3.8				L														10.33				
		3960			30.0	42.0		24.0		3.2				L														[illegible]				
		3961			44.0	24.2		22.0		9.2				C																		

Appendix B

15

Table 2. Profile description for soil in Rimbayu

Horiz.	Description
A1	0 - 15 cm; yellowish brown (10 YR 5/6); silty loam; moderately fine to medium subangular blocky structure; slightly hard (dry); little organic material (1.9%); very many very fine, many fine, common medium pores; many very fine, common fine, few medium roots; clear smooth boundary;
B21	15 - 52 cm; strong brown (7.5 YR 5/8); loam; moderately to strong medium subangular blocky structure; firm (moist); little organic material (0.5%); many very fine, common fine, few medium pores; few very fine, few medium roots; gradual smooth boundary;
B22t	52 - 75 cm; yellowish red (5 YR 5/8); clay loam; strong medium to coarse blocky structure; very firm (moist); common very fine, common fine pores; few very fine, few medium roots; gradual smooth boundary;
B23t	75 - 112 cm; yellowish red (5 YR 5/8) with many prominent brown (7.5 YR 5/4) medium mottles; clay loam; moderately medium angular blocky structure; firm (moist); common very fine, common fine pores; few very fine, few medium roots; abrupt smooth boundary;
B24t	112 - 150 cm; mixture of strong brown (7.5 YR 5/8) with dark yellowish brown (10 YR 3/4) and yellowish red (5 YR 5/8); clay with many iron concretions, flat, partly rounded edges, 5 - 15 mm.

Table 3. Materials supplied for crop production during first year to each transmigrant family. Rimbayu.

Seed	Amount
Rice	30 kg
Corn	8 kg
Soybean	7.5 kg
Peanut	6 kg
Cassava	400 sticks
Seedlings	
Banana	8 bibit
Citrus	1 bibit
Jackfruit	2 bibit
Fertilizer	
Rock phosphate	600 kg
Urea	100 kg
TSP	50 kg
KCl	50 kg
Pesticides	
Diazinon	1 liter
Lebaycide	1 liter
Klerat	1 kg
Cytrolene	0.25 kg
Terik	45
Hand sprayer	1 for 5 families

Table 4. Standards used for labor inputs (concensus).

	1st (main) crop (Sept. - Jan.) (Upland rice + maize + cassava)	2nd crop (Feb. - June) (maize + legume crops)
Land preparation	70 MD/ha	20 MD/ha
Planting	20 MD/ha	20 MD/ha
Weeding (2x)	20 MD/ha	15 MD/ha
Spraying	10 MD/ha	10 MD/ha
Fertilizing	10 MD/ha	10 MD/ha
Harvesting	60 MD/ha	30 MD/ha
	190 MD/ha	105 MD/Ha

Table 5. Marketable products and prices for perennial crops suitable for Rimbayu.

Crop	Marketable product	Current Local price per unit (Rp.)	Comments
Coconuts	- whole seednut - dry copra	250/nut /kg	- possible for Lahan II (no local price)
Rubber	dry sheet rubber	400/kg	- long-term market prospects good - ? planting material
Oilpalm	crude oil*	/kg	- requires simple processing equipment - ? for local soap production - not usually used as cooking oil
Pepper	dry white pepper	1,000/kg	- marketing easy
Cloves	dried cloves	8,000/kg	- very intensive cultivation

* 10% of fresh fruit bunch (ffb) yield

NB.: coffee - no large-scale planting allowed, only few trees for own consumption.

Table 6. Food value of rice, palawija and vegetable crops

Crop	Part of crop	Food Calories/100 gm	Protein/100 gm
Rice	seeds	360	6.8
Soybean	seeds	331	34.9
Mungbean	seeds	345	22.2
Cowpea	seeds	342	22.9
Peanut	seeds	452	25.3
Corn	seeds	355	9.2
Corn	green ear	129	4.1
Cassava	leaf	73	6.8
Cassava	whole roots (67.8% H_2O)	120	0.7
Cassava	edible portion (62.5% H_2O)	146	1.2
Sweet potato	whole roots	123	1.8
Winged bean	leaf	47	5.0
	pods	35	2.9
	seeds	405	32.8
String bean	leaf	34	4.1
	pods	44	2.7
	seeds	357	17.3
Tomato	fruit	23	2.0
Cucumber	fruit	12	0.7
White cabbage	fruit	24	1.4
Pumpkin	fruit	29	1.1
Water spinach	leaf	29	3.0

Source: Daftar Komposisi Bahan Makanan
oleh: Direktorat Gizi Departemen Kesehatan R.I.
Bhratara Karya Aksara 1979, Jakarta.

59

Table 7. Daily contribution of food energy/person (food calories) and protein/person by food from subsistence package compared with the recommended dietary allowances 1), 2)

	Rice			Fish a),b)			Oil c),e)			Sugar d),f)					Recommended dietary allowance	
	Amount g/day	Energy cal	Protein g	Amount g/day	Energy cal	Protein g	Amount g/day	Energy cal	Protein g	Amount g/day	Energy cal	Protein g	Energy total cal/day	Protein total g/day	Energy cal/day	Protein g/day
Household head	583	2100	39.6	33.3	45.0	9.8	53.3	463.7	0.5	20.0	73.0	0	2680.0	50.0	2600.0	55.0
Wife	333	1200	22.6	33.3	45.0	9.8	53.3	463.7	0.5	20.0	73.0	0	1780.0	33.0	2000.0	47.0
1st child g)	250	900	17	33.3	45.0	9.8	53.3	463.7	0.5	20.0	73.0	0	1480.0	27.3	1500.0	42.0
2nd child h)	250	900	17	33.3	45.0	9.8	53.3	463.7	0.5	20.0	73.0	0	1480.0	27.3	1600.0	30.0
3rd child i)	250	900	17	33.3	45.0	9.8	53.3	463.7	0.5	20.0	73.0	0	1480.0	27.3	1200.0	25.0

Remarks:

a) Based on nutrition value of ikan asin.
b) Assumption fish is shared equally.
c) Assumption oil is shared equally.
d) Assumption sugar is shared equally.
e) Value of coconut oil (minyak kelapa)
f) Value of white sugar (gula pasir)
g) Assumption 1 child in age group 7-9 years.
h) Assumption 1 child in age group 4-6 years.
i) Assumption 1 child in age group 1-3 years.

Source: 1) Dafter Komposisi Bahan Makanan Direktorat Gizi Departemen Kesehatan R.I. Bhratarakarya Aksara - 1979 - Jakarta.

2) Djumadias Abu Main and Sunawang: The Recommended Dietary Allowances for Use in Indonesia. Journal of the Indonesian Nutrition Association, Vol.2, No.1-2, 1969, p. 115-123.

Table 8. Balance of labor demand and supply on Pak Manto's farm, 1989.

LABOR DEMAND		LABOR SUPPLY	
Required for	Man-days/year	Source	Man-days/year
A. PLANT PRODUCTION			
- Rice + corn (1/2 ha)	95	- Head of family (100%)	300
- Corn + leg (1/2 ha)	52.5	- Wife (40%)	200
- Corn + leg (1/2 ha)	52.5	- Son (20 yrs) (50%)	150
- Cassava		- Son (16 yrs) (50%)	150
- Cover crop (1/2 ha)	40	- Daughter	
- Coconut (1.25 ha)	200		
- House garden			
-			
-			
- Cover crops			
TOTAL PLANT PRODUCTION	540		800
B. ANIMAL PRODUCTION			
- Goats	50		
- Chicken	25		
TOTAL ANIMAL	75		
OTHER ACTIVITIES			
TOTAL DEMAND	615		

61

Table 9.

Crop: Rice/corn

Farm model: Manto D.

Planting Season: September/October, 1989.

INPUT / OUTPUT	Kg/0.5 ha	Rp/kg	Rp/0.5 ha	Calories Cal/100g	Calories Kcal/ha	Protein g/100g	Protein kg/ha
OUTPUTS - Seeds							
- Rice	1000 gabah	145	145,000	360	2376	6.8	44.9
- Corn	100	75	7,500	355	355	9.2	9.2
- Green corn	2500 ears	25	62,500	129	322.5	4.1	10.25
roots							
leaves							
stems							
TOTAL OUTPUTS			215,000		3053.5		64.35
INPUTS - Seeds							
- Rice	20	300	6,000				
- Corn	5	500	2,500				
Fertilizer							
- Urea	50	90	4,500				
- TSP	50	90	4,500				
- Potassium							
- Lime	300	85	25,500				
....							
- Animal manure							
- Green manure	5000		-				
Pesticides							
- Furadan	17 kg	500	8,500				
- Lebacid	2.5	1500	3,750				
Other costs							
- Transport etc.			8,750				
CASH INPUTS			64,000				
CROSS RETURNS - CASH INPUTS			151,000				

LABOR INPUT (in man-days per ha)

Soil preparation	Planting	Weeding	Fertilizing	Plant Prot.	Harvesting	Total
35	10	10	5	5	30	95

62

Table 10

Crop: Peanut/Corn Farm model: Manto D.

Planting Season: March/June, 1989.

INPUT / OUTPUT	Kg/0.5 ha	Rp/kg	Rp/0.5 ha	Calories		Protein	
				Cal/100g	Kcal/ha	g/100g	kg/ha
OUTPUTS - Seeds							
- Peanut	300	400	120,000	452	1260	25.3	45.9
- Corn	100	75	7,500	355	355	9.2	9.2
- Green corn	2500 ears	25	62,500	129	322.5	4.1	10.25
roots							
leaves							
stems							
TOTAL OUTPUTS			190,000		1937		98.75
INPUTS - Seeds							
- Peanut	25	1000	25,000				
- Corn	5	500	2,500				
Fertilizer							
- Urea	25	90	2,250				
- TSP	50	90	4,500				
- Potassium							
- Lime							
....							
- Animal manure							
- Green manure							
Pesticides							
- Furadan	17 kg	500	8,500				
- Lebacid	1.5	1500	2,250				
Other costs							
- Transport etc.			7,500				
CASH INPUTS			52,500				
CROSS RETURNS-CASH INPUTS			137,500				

LABOR INPUT (in man-days per ha)

Soil preparation	Planting	Weeding	Fertilizing	Plant Prot.	Harvesting	Total
10	10	7.5	5	5	15	52.5

Table 11

Crop: Legume/Corn

Farm model: Manto D.

Planting Season: June/July, 1989.

INPUT / OUTPUT	Kg/0.5 ha	Rp/kg	Rp/0.5 ha	Calories		Protein	
				Cal/100g	Kcal/ha	g/100g	kg/ha
OUTPUTS - Seeds							
- Legume	400	300	120,000	340	1360	28	112
- Corn	100	75	7,500	355	355	9.2	9.2
- Green corn	2500 ears	25	62,500	129	322.5	4.1	10.2
roots							
leaves							
stems							
TOTAL OUTPUTS			190,000		2037.5		214.25
INPUTS - Seeds							
- Legume	20	500	10,000				
- Corn	5	500	2,500				
Fertilizer							
- Urea	25	90	2,250				
- TSP	50	90	4,500				
- Potassium							
- Lime							
....							
- Animal manure							
- Green manure							
Pesticides							
- Furadan	17 kg	500	8,500				
- Diazinon	1.5	1500	2,250				
Other costs							
- Transport etc.			7,500				
CASH INPUTS			37,500				
CROSS RETURNS-CASH INPUTS			152,500				

LABOR INPUT (in man-days per ha)

Soil preparation	Planting	Weeding	Fertilizing	Plant Prot.	Harvesting	Total
10	10	7.5	5	5	15	52.5

64

Table 12

Crop: Coconut (1,25 ha)

Farm model: Manto D.

Planting Season: April/September 1985, harvest year 1989.

INPUT / OUTPUT	Kg/1.25 ha	Rp/kg	Rp/1.25 ha	Calories		Protein	
				Cal/100g	Kcal/ha	g/100g	kg/ha
OUTPUTS -							
- Dry copra	1250	400	500,000				
-							
- fruits/cob							
roots							
leaves							
stems							
TOTAL OUTPUTS			500,000				
INPUTS - Nut			10%				
- Seedling	180	500*	9,000**				
- Production	180	500	9,000**				
Fertilizer							
- Urea	125	90	11,250				
- TSP	125	90	11,250				
- Potassium	125	90	11,250				
- Lime							
- Kieserit	62.5	300	18,750				
- Animal manure							
- Green manure							
Pesticides							
- Bayrusil	2 liter	7500	15,000				
Other costs							
- Transport			25,000				
- Processing			10,000				
CASH INPUTS			120,500				
GROSS RETURNS-CASH INPUTS			379,500				

* Price for the nut only !

** Costs for seedling production are calculated 10%/yr pay back on credit.

Recommendation

- A training course for implementation and maintenance of a coconut nursery in R.E.C. Kota Bangun, should be organized at least by April 1984 !

LABOR INPUT (in man-days per ha)

Soil preparation	Planting	Weeding	Fertilizing	Plant Prot.	Harvesting	Total
0,5 ha cleared 0,75 ha to clear	-	36	8	4	48	96

+ 64 MD for processing = 160/ha

TOTAL = 200 Man-days/1.25 ha.

Table 13. Breakdown of cash inputs for each crop and the home garden per year.

COSTS	Rice	Corn	Peanut	Legumes (50% soybean) (50% peanut)	Coconuts	Cover crops	House garden	House stores	TOTAL
Seeds	6,000	7,500	25,000	10,000	18,000	10,000	5,000		81,500
Urea	4,500	-	2,250	2,250	11,250	-	-		20,250
TSP	4,500	-	4,500	4,500	11,250	-	-		24,750
Lime	25,500	-	-	-	-	-	-		25,500
Pesticides	9,000	-	6,750	6,750	15,000	-	10,000	2,500	50,000
Potassium	-	-	-	-	11,250	-	-	-	11,250
Kieserit	-	-	-	-	18,750	-	-	-	18,750
Transport: Processing, etc.	8,750	-	7,500	7,500	35,000	-	-	-	58,750
TOTAL PLANTS	32,750	7,500	46,000	34,000	120,500	10,000	15,000	2,500	290,750

Table 14. Farm family calorie and protein requirements and production (0.5 ha)

REQUIREMENTS

Required for	Needs per year: Energy (KCal)	Needs per year: Protein (kg)
A. FARMER FAMILY		
- household head	2600/day	55 gm
- wife	2000/day	47 gm
- child	2000/day	47 gm
- child	2000/day	47 gm
- child	2000/day	47 gm
- child		
- others		
NEEDS, FARMER FAMILY	3869 KCal/yr	88.7 kg/yr
B. ANIMALS		
- cattle		
- sheep/goats		
- rabbits		
- chickens		
- fish		
NEEDS, ANIMALS		
TOTAL NEEDS		

SUPPLY

Source	kg/year	Supply per year: Energy (KCal)	Supply per year: Protein (kg)
A. OWN PRODUCTION			
- rice	1000 gabah	3053.5	64.35
- corn grain		1937	98.75
- corn ears			
- cassava			
- sweet potato			
- legumes		2037.5	214.25
-			
-			
-			
- Vegetables/fruit			
-			
-			
-			
FARM GOODS from 1/2 ha.		8202	400.45
TOTAL PURCHASED			
TOTAL SUPPLY			

Notes: 1. 80% of calorie requirement can come from rice.
2. Corn may be sold or used for animals.
3. Remainder of calories, protein and vitamins can come from home garden and chickens.
4. Legumes may be sold.

Table 15. Estimated cash flow (expense-income) for the year 1989.

EXPENDITURE	Rp/year	INCOME	Rp/year
A. PLANT PRODUCTION		A. SALES OF PLANT PRODUCE	
- Seeds	81,500	- Rice	
- Fertilizer	100,500	- Corn	
- Pesticides	50,000	- Cassava	
- Rent machines/draught animal		- Fruits	
- Rent labor force		- Vegetables	
- Other expenses	58,750	- Peanuts	120,000
		- Legumes (others)	120,000
		- Coconuts	500,000
TOTAL EXPENDITURE PLANT PRODUCTION	290,750	TOTAL INCOME PLANT PRODUCTION	740,000
B. ANIMAL PRODUCTION		B. SALES OF ANIMAL PRODUCTS	
- Purchase animals		- Goats 180,000 - 60,000	120,000
- Food	10,000	- Eggs and chicken (consume)	20,750
- Veterinary service	20,000	-	
- Other expenses, salt, minerals	20,000	-	
- Stable	10,000	-	
C. OTHER EXPENSES		C. OTHER INCOME	
- Cost of loans		- Credit (cash)	
- Food purchase for families		- Programmes	
- Others		-	
OTHER EXPENSES			
TOTAL EXPENSES	350,750	TOTAL INCOME	880,750

Table 16. Summary of income and cash inputs for farm operations for 1984-1989.

	Income	Expenditure			
		Seeds Fertilizers Pesticides	Seeds Coconuts	Vet/Feed Medicine	Credit
1984	247,500	115,000	(90,000)	40,000 10,000	(90,000)
1985	367,500	115,000		40,000 10,000	
1986	367,500	230,000		40,000 10,000	
1987	367,500	230,000		50,000 10,000	
1988	492,500	230,000		50,000 10,000	
1989	880,750	290,750		50,000 10,000	

Appendix III
M.J. Redshaw
14.9.1983

TAD

PROPOSAL FOR MANAGEMENT SYSTEM FOR SUSTAINED FOOD CROPPING ON RAINFED UPLAND SOILS

Suggestions are given here for a system of managing the rain-fed upland soils, characteristic of large parts of East Kalimantan (and especially for many of the future transmigration settlements), based on experience at the TAD Pilot Plantation Project, Muara Marah.

This system has tentatively been called 'strip cropping'. It quite simply involves the growing of food crops in plots (or strips) that have previously been under a dense leguminous cover crop. This method aims to provide a solution to the main factors that limit sustained arable farming by conventional means:

(i) low inherent soil fertility;
(ii) low water retention, therefore yields limited by water stress;
(iii) soils easily eroded by heavy rain;
(iv) rapid establishment of alang-alang (Imperata cylindrica) if the land is neglected.

Details of 'Strip Cropping' System

1. Establishment of heavy cover crop. For East Kalimantan conditions, 100% *Pueraria javanica*, or a mixture with *Calopogonium muconoides* is recommended.

2. Once sufficient organic material (mulch) has built up (experience to date suggests that 2 years would be long enough), strips, 5-10 metres wide, are sprayed out or hand-cut, the dead material being left in situ.

No cultivation is carried out.

In our experience, one spray of 0.3% Paracol (paraquat) is very effective, provided sufficient water is applied. Planting can be done about 3 days after spraying. Cheaper "hormone" herbicides (2,4-D or MCPA) could possibly be used, but there may be a risk of carry-over to the new crop, especially legumes.

71

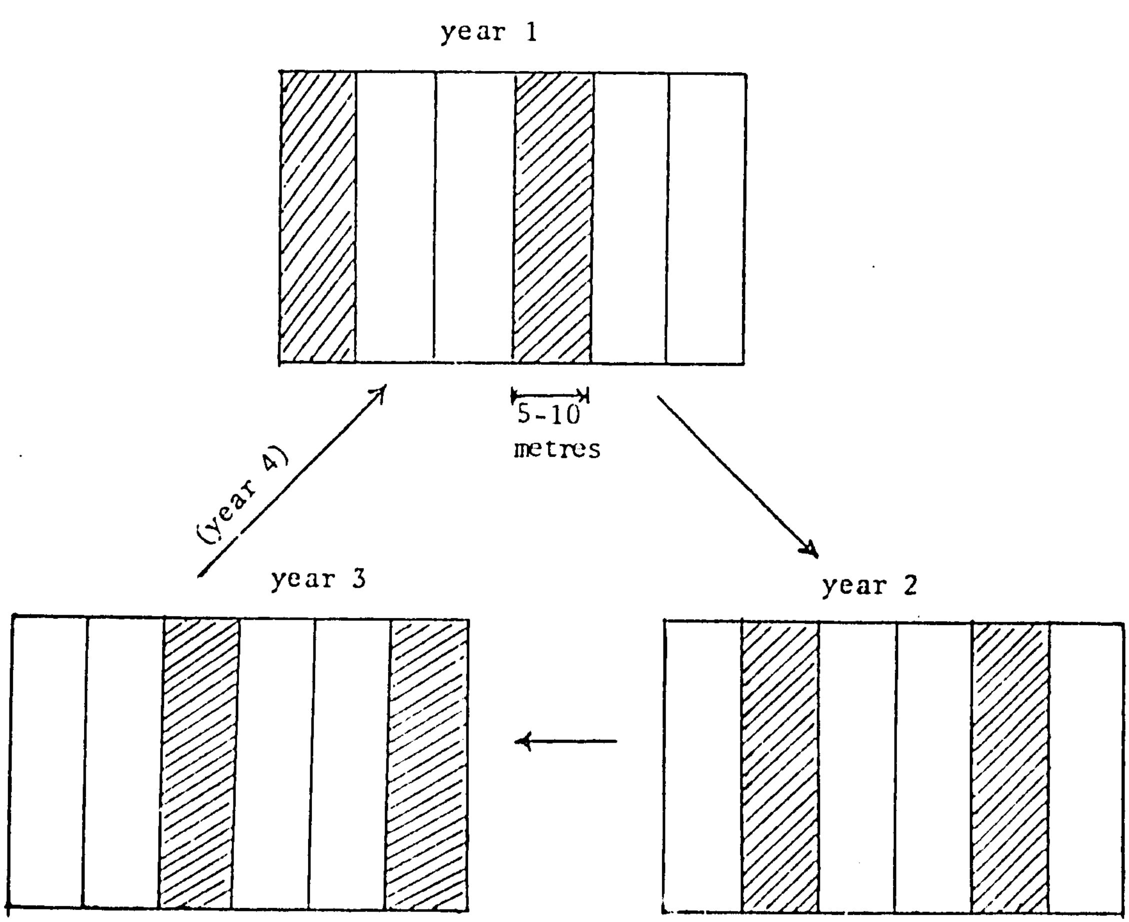
3. Planting of food crops (upland rice, maize, groundnuts, soybean) is done by use of a planting stick in the usual way.

4. No fertilizing is recommended. The mulch will contain adequate N and P to sustain food crops for one season.

5. Weeding should not be necessary, except to cut back regrowth of the cover crop and to stop it encroaching into the food plots.

6. After harvesting (1-3 crops), the cover crop is allowed to grow back into the cropped areas and re-establish itself. Planting of rooted cuttings is desirable to speed up this process.

It is envisaged that food crops can be grown one year in three in the following rotation :



The advantages of this system are manyfold:

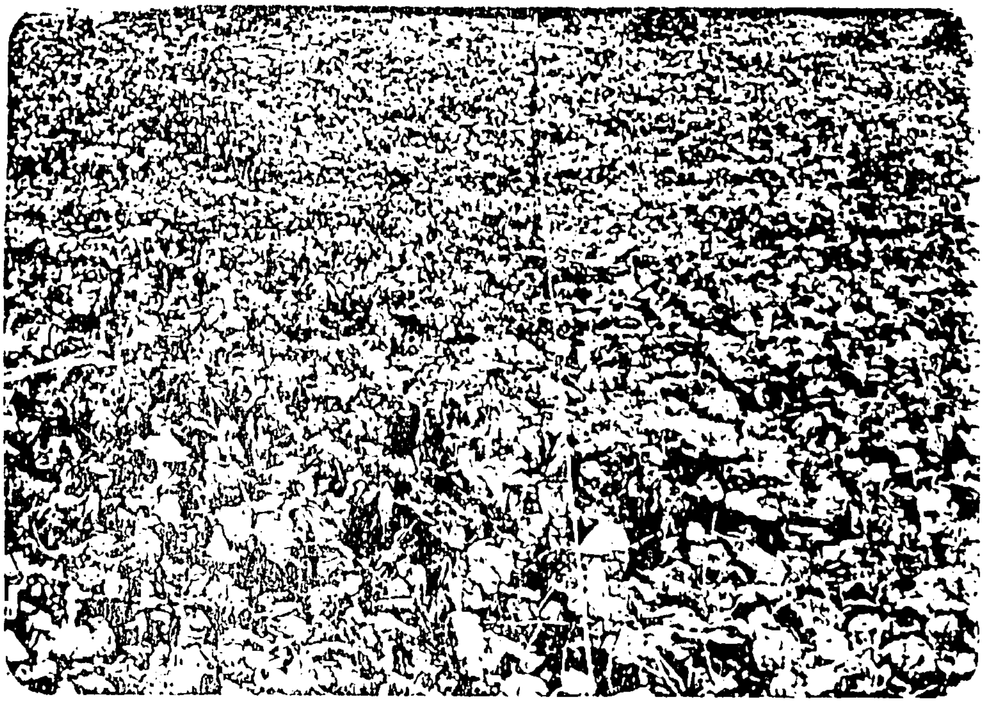
- zero or minimal cultivation;
- soil is covered continuously, thereby minimising surface erosion and preventing excessive soil temperatures;
- fertiliser requirements are reduced, especially urea;
- no, or very little, weed control required; and alang-alang cannot establish;
- greater water retention, therefore reducing the risk of water stress limiting yields;
- soil fertility and structure are maintained;
- cover crop is a renewable resource and so does not require replanting each year.

The experience gained from trials with this system at the TAD Pilot Plantation Project, in Muara Marah, have been very encouraging. We believe that this technique could be usefully employed in many areas of East Kalimantan, especially existing and proposed transmigration settlements. Indeed, demonstration plots could be set up in new settlements where cover crops have already been established by the land-clearing contractor.

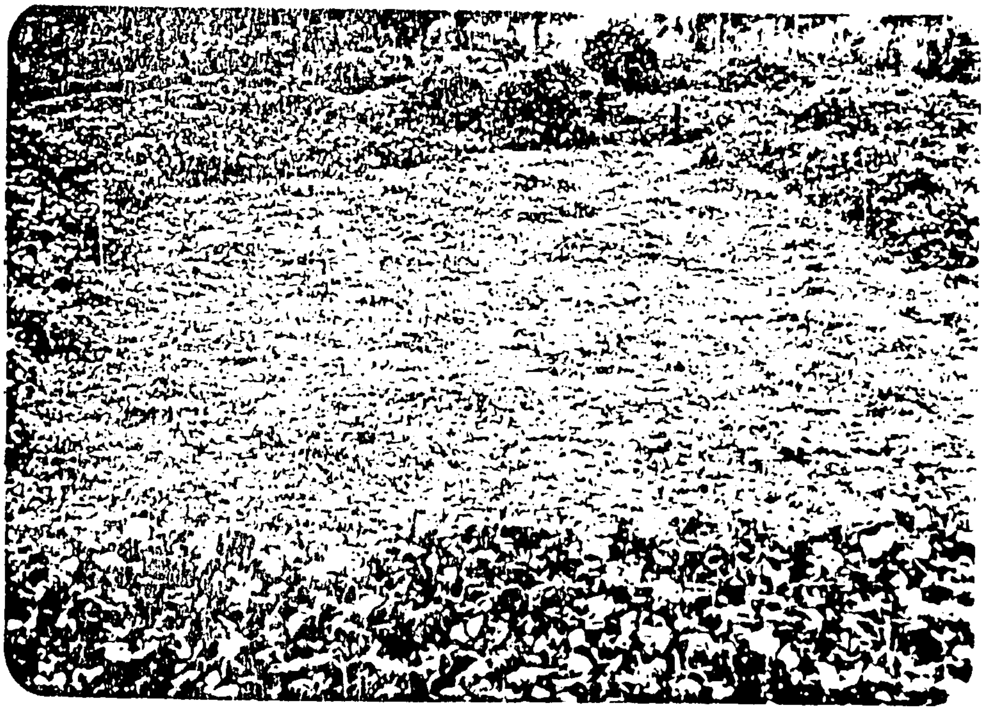
Further work is necessary to evaluate this method and to examine certain aspects, for example:

- the effect of liming;
- benefits of additional N and P;
- investigate whether other elements (K, Mg?) are limiting;
- test other herbicides for killing the cover crop prior to planting;
- devise a suitable combined 'dibbler'/seed applicator that would much reduce planting time;
- investigate specific associated pest and disease problems;
- work out labour requirements per unit area for this method and compare this with conventional systems;
- long-term soil fertility studies.

72



Pueraria javanica 3 days after spraying with 0.3% Paracol



Maize seedlings, 11 days after planting.

Maize (above) and groundnuts (below) growing

in thick, cover crop mulch.

Maize at 41 days after planting, and 63 days after spraying out the cover crop.

No weeding has been done and no fertiliser applied.

Note vigorous, healthy maize; no weeds or regrowth of cover crop.

APPENDIX I. F.

QUARTERLY ACTIVITY REPORT

October - December, 1983

Chhorn Lim

I. PRINCIPAL ACTIVITIES

1.1. Research Activities

1.1.1. Conducted a preliminary trial in collaboration with Mr. Hidayat and Mrs. Ningrum to determine the acceptability of artificial diets by frogs (Rana sp). Summary of the experimental results is given Appendix I. F I..

1.1.2. Involved in the researches on maturation of milkfish broodstock at Japara. Two experiments, maturation of milkfish using two feeding regimes and the effect of tanks size, shape and depth on milkfish maturation were conducted. These experiments were started on November 15, 1983. These are the collaborative researches between the Research Institute for Inland Fisheries (RIIF) and the Brackishwater Aquaculture Development Center(BADC).

1.1.3. Formulated three experimental diets (isonitrogenous and isocaloric) for Mrs. Ningrum Suhendra. The objectives of the experiment are to evaluate the effect of the levels of supplemental lipid on the maturation, fecundity and egg hatching rates of common carp in a controlled environment. Assistance was also given in the research methodology and experimental design.

1.1.4. Assisted Mrs. Noveni Wahyudi in the preparation of fish meal, beef liver meal and other ingredients required for the preparation feed for giant gourami larvae.

1.2. Demonstration/Training

1.2.1. Demonstration was done to the staff of Nutrition subdivision and chemistry laboratory on the methods of preparation of vitamin and trace mineral premixes from individual vitamins and mineral salts. Explanation was also given on the importance of various steps of preparation in ordor to obtained a homogenous premixes. These premixes are presently being used in the various nutrition and feeding experiments, including researches at BADC, Japara

1.2.2. The techniques of preparation of the experimental diets were demonstrated to the staff of the Nutrition subdivision. Discussion was done on the importance of grinding, sieving, mixing, pelleting, drying and storing. A similar demonstration and explaination was also conducted for the nutrition staff of the Brackishwater Aquaculture Development Center, Japara.

1.2.3. Demonstrated to the research staff of the SBPPD, Depok on technique of fabrication of fish meal. Prior to the demonstration an explaination/discussion was done on the various processing method [illegible] by the industry (wet reduction process and batch process.

77

1.2.4. Trained Mr. Hari, a new staff member of the Nutrition on the techniques for the preparation of experimental diets, and vitamin and mineral premixes. He was also explained on the importance of nutrition and feeding, and the basic information, knowledge and skill needed for him to understand and conduct experiments in nutrition.

1.3. Lectures/Seminars

1.3.1. A two-hour seminar was given. The topic discussed was the availability of commercial fish feeds in Indonesia, their uses and problems.

1.3.2. Six series of lecture were offered. Each lecture lasted from 2 hours to 2 hours and 15 minutes. One lecture was the continuation of the discussion on the principles of fish production. The other five were in fish nutrition which included carbohydrate, vitamin and mineral requirements, and fish feed formulation.

1.4. Travel

1.4.1. Trip to BADC, Japara. Four trips were made to Japara in connection with the researches on milkfish broodstock.

- October 24 - 26. This trip was made with Dr. W. Vanstone and Mr. Tadjuddin Daulay. The report is given in Appendix I. F2.

78

- November 14 - 19. With Dr. W. Vanstone and Mr. Tadjuddin (see Appendix I.F 3)
- December 14 - 16. The trip report is shown in Appendix I.F4..

1.4.2. Trip to SBPPD, Depok . Five trips were made with Mr. Hidayat or Mrs. Ningrum to SBPPD, Depok. The activity report is given in Appendix I. F 5.

1.4.3. Trip for the surveys on the status and problems of common carp culture in running water

- November 1 - 5. Trip to Tasikmalaya and Garut with Mr. Hidayat.
- December 7 - 9. Trip to Purwakarta and Subang with Mr. Atmadja Hardjumulia and Mrs. Ningrum. The trip report is given in Appendix I.F 6 .

1.4.4. Trip to Pasar Rebo with Mrs. Ningrum to visit P.T. Bina Setwa feed mill. (see Appendix I.F7).

2. MISCELLANEOUS ACTIVITIES

2.1. Discussion and consultation by the RIIF's staff

2.2. Consultation by the graduates students on the results of their experiments in Nutrition and feeding

2.3. Consultation by the private sectors such as P.T. Sinta Prima Feed mill and Dharmala Group

2.4. Attended seminars/meetings

2.5. Assisted Mr. Hidayat in checking the construction of the 20 concrete ponds at Cibalagung to be used for the feeding experiments.

3. PROBLEMS

The lack of some equipments such as grinder and dryer are the major problems which hamper the activities of the Nutrition Subdivision. At present this subdivision has a small grinder capable of grinding only little quantity of feed ingredient. It is recommended that a larger capacity grinder be purchased so that the feed ingredients could be ground finely. This is necessary in the preparation of larval feeds and shrimp feeds.

Feeds or feed ingredients prepared at the laboraory are dried under the sun. Although this practice is economical there are several drawbacks which should be considered such as the destruction of feed nutrients by U.V. light, the long duration of drying and difficulty of drying in rainy season. Thus, acquisition of a locally made air-forced electric dryer would solve this problem.

The other problems which hamper the works of the Nutrition Subdivision are the delay in the construction of the concrete tanks at Cibalagung, insufficient water supply for the wet laboratory at Bogor, and lack of working space and space for storage of feeds or feed ingredients.

4. PLAN FOR NEXT QUARTER

4.1. Continue the survey on the status and problems of common carp culture in running water

4.2. Write a report on the commercial fish feeds in Indonesia

4.3. Continue milkfish broodstock experiments

4.4. Conduct other experiments in collaboration with RIIF's staff

4.5. Continue lecture/seminar series

4.6. Consultation trip to subbalai.

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APPENDIX I. F.I.

SUMMARY OF THE EXPERIMENTAL RESULTS ON THE ACCEPTABILITY OF ARTIFICIAL DIETS BY FROGS

CHHORN LIM

This study was conducted in collaboration with Mrs. Ningrum Suhenda and Mr. Hidayat Djijasewaka of the Nutrition subdivision of the RIIF. The objective of the experiment was to determine the acceptability of artificial diets by frogs (*Rana* sp.)

A 3 x 3 m concrete tank was divided into four compartments using wire screen with 1 cm mesh as divider. Each compartment was filled with water to a depth of 2 cm and provided with a 0.5 x 0.7 m wooden plateform of 4 cm high. The frogs with an average weight of 126.5 g were stocked at a rate of 10 per compartment. The frogs in each of compartments were fed with one of the four experimental diets once per day at a daily rate of 4% (dry matter) biomass for a period of two weeks.

The diets (Table 1) were formulated to contain approximately 30% crude protein and 8% crude fat. They were prepared in form of moist pellet containing apprimately 50% moisture. They were stored in top sealed plastic jars and kept refrigerated throughout the feeding period. Feeding was done by placing the feed in an alumunium plate of 20 cm diameter and 3 cm deep. A little amount of water was added to the feed to form a paste.

The plate was then placed on the wooden plateform located in one corner of the compartment.

Table 1. Composition of diets used for the determination of their palatability by frogs *

Ingredient	Percent in diet			
	A	B	C	D
Fish meal	30	30	-	-
Ground trash fish**	-	-	23(87)	23(87)
Soybean meal	30	30	29	29
Rice bran	15	15	20	20
Wheat flour	19	19	23	23
Fish oil	3	3	2	2
Vitamin and trace mineral mix	3	3	3	3

* In diets B and D all the ingredients, except fish meal or ground trash fish, were cooked in boiled water for approximately 5 minutes.

** Numbers in parentheses represent wet weight.

Everyday, observation was made to determine if the frogs consumed the feeds. Furthermore, when the feeding plates were removed, the amount of feed consumed was estimated.

The frogs started to consume feeds on the fourth day of feeding. The amount of feed consumed was highest for feed D and was approximately the same for feeds A,B and C. The estimated feed, consumption ranged from 10% to 60% of the amount fed for feed D compared to usually less than 10% for A, B and C.

The average weight gain per frog was highest for frogs fed diet D (20.4 g). The weight gains of frogs fed diets A, B and C were 5.0, 6.2 and 4.1 g, respectively. Thus, the results of this preliminary study show that diet D, which made of cooked ingredients plus raw ground trash fish, was superior to the other diets.

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APPENDIX I. F2

TRIP REPORT

TRIP TO BADC, JÉPARA

OCTOBER 24 - 26, 1983

CHHORN LIM

PARTY : Dr. W. Vanstone, Milkfish Breeder and Mr. Tadjuddin Daulay, counterpart researcher of Dr. Vanstone.

ITINERARY :

Place visited	Date	Purpose
Brackishwater Aquaculture Development Center (BADC)	10/24-26	- Investigate the status of milkfish broodstock - Discuss with the Director and researchers of the center about researches on milkfish maturation.
Pati's Fisheries District Office		- Determine the availability and the use of fish feed in aquaculture.

ACTIVITY REPORT

1. At BADC, Japara

Upon arrival my party and I proceeded to the office where a brief discussion was held with Mr. Kisto Mihardja, Program Leader and OIC of the center, and two other research staff. Mr. Bambang Salamun. Director of the Center was on official trip to other provinces. We were informed that a total of about 200 milkfish with an average weight of about 3 kg are available at the center. These fish were held in two 1-hectare brackishwater earthen ponds.

On October 8, 1983, 38 fish were tranfered to a 200 m^2 (10 m x 20 m) concrete tank with a water depth of about 1.80 m. Pond water salinity and that of the tank are the same at 30 ppt.

No mortality occured during handling and transport. However, one week after stocking three fish were found dead.

Fish were fed with an artificial diet containing approximately 36% crude protein at a daily rate of 5% body weight (air dry weight). Feeding was started one day after stocking. Feed was given once a day. The composition of the feed used is given in Table 1.

Table 1. Composition of feed used for Milkfish Broodstock

Fish meal (local)	47%
Soybean meal (full fat)	26%
Rice bran	15%
Cassava flour	10%
Aquamix	2%

In the afternoon of the same day, six fish were sampled for length and weight measurements, sex determination and sampling of the gonads. Gonad samplings were done by Dr. Vanstone through the process of catheterization, in which a plastic tubing of about 1.2 mm diameter was inserted into the gonads by way of the genital pore. However, this method of biopsy was not successful. The lengths and weights of fish sampled are given in Table 2.

46

Table 2. Length and weight of milkfish broodstock sampled on October 24, 1983

Sample No.	Fork Length (cm)	Weight (kg)
S-1	56	2.50
S-2	55	2.28
S-3	58	2.40
S-4	53	-
S-5	54	-
S-6	54	1.70

After sampling, two fish (S-3 and S-6) were sacrified for determination of sex and stage of gonad development, and measurements of the intestinal length. Both fish were female with developing gonads. Sample S-3 had a gonad weight of 5.40 g and that of S-6 was only 2.90 g. The total lengths of the intestin were 443 cm and 420 cm for S-3 and S-6, respectively. Fish S-3 has a total length of 68 cm and that of S-6 is 61 cm. The ratios of total intestinal length to total body length were 6.5 to 1 for S-3 and 6.9 to 1 for S-6.

In the afternoon of October 25, another meeting was held at BADC, Japara to discuss about the availability of tanks and staff of BADC which will involve in milkfish broodstock researches. Represented the BADC was Mr. Made Nurjana. Other staff presented during the meeting were Ms. Anindiatuti, Mr. Pujiatno, Mr. Endhay, Ms. Ivonne and Mr. Murdjani.

According to Mr. Made, three concrete tanks will be made available for milkfish broodstock researches. One tank has a dimesion of 10 m x 20 m x 2 m and the other two have dimension of 5 m x 8 m x 1.5 m. It was agree upon that, although these tanks are of different sizes, they will be used for an experiment to test the effect of various feeding regimes on the maturation of milkfish. The staff of BADC which will assist in this experiment are Ms. Anindiatuti, Mr. Pujiatno and Mr. Murdjani. Ms. Ivonne will be resposible for the preparation of the experimental diets and puchasing feed stuff needed for feed preparation.

Recommendations were made to reduce the daily feeding rate to 3% of the body weight. Fish should be fed two times per day instead of once daily. If any mortality occurs, fish should be dissected. Sex should be identified and gonads (if any) should be weighed and preserved in formalin solution. Length and weight measurements should also be done. Suggestion was also made that another batch of 80 fish should be transfered from ponds to the 200 m^2 tanks. It was agreed upon that the next trip to BADC will be on November 14, 1983.

At this discussion, Mr. Made requested the assistance of the undersign in the areas of Penaeus monodon nutrition, feed and feeding. These include the development of feeds for the broodstock grown in tanks and the diets for grow-out in ponds. The budget, staff and facilities needed will

88

be provided by the BADC, Japara. I agreed in priciple to this request subject to the confirmation with Mr. Alie Poernomo, Director of RIIF. Upon arrival, I relayed these messages to Mr. Alie. He has no objection to this request.

In the morning of October 26, Mr. Tadjuddin and I observed the feed laboratory and had a discussion with Mrs. Ivonne Lantang on the availability of feed ingredients and equipment for feed preparation. The feed laboratory has sufficient equipment necessary for feed preparation. However, most of the equipment are out of order or has not been used for sometimes. Instruction was given to Mrs. Ivonne to repair and test the needed equipment such as bowl mixer, siever, CPM pellet mill and meat grinder. The feed ingredients to be used are all available either in Japara or in Semarang. Their costs are comparable to those in Bogor. The vitamin and trace mineral premixes will be prepared from Bogor.

2. <u>At Pati</u>

On October 25, 1983 a trip was made to Pati with Mr. Tadjuddin. The purpose of this trip was to investigate the availability and use of fish feed in Pati. There, we were briefed by Mr. Sutjoko, Head of the Fisheries District of Pati. According to him, there is a feed produced locally and sale under a brand name "Makanan Tambahan-Ikan". The owner of this home industry is Mr. H. Moch. Thohari, which was out of town during this visit. However, according to Mr. Sutjoko, this feed was made mostly from the locally available materials such as fish meal, rice bran, filamentous algae and leaf meal. It is sold at a retail price of Rp. 190/kg. The quantity of feed produced was based on the amount ordered.

At Pati, there were some fish farmers who used this feed for milkfish. The total amount of feed used was only about 50 kg/ha/crop. Fish production was increased from 300 kg/ha to 360 kg/ha.

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90

APPENDIX I. F3

TRIP REPORT

TRIP TO BADC, JAPARA AND JOWANA

NOVEMBER 14 - 19, 1983

CHHORN LIM

PARTY : Dr. W. Vanstone, Milkfish Breeder and Mr. Tadjuddin Daulay, counterpart researcher of Dr. Vanstone.

ITINERARY :

Place visited	Date	Purpose
BADC, Japara	11/14/16 11/18/19	- Start the experiments on milkfish maturation - Purchase ingredients, formulate and prepare feed needed for the experiments.
Jowana	11/17	- Discuss with Mr. Moch Thohari, owner of a feed cottage industry about feed formulation, ingredients used and equipment available in feed preparation.

ACTIVITY REPORT

1. At BADC, Japara

In the afternoon of November 14, a meeting was held with Mr. Bambang Salamun and Mr. Made Nurjana to discuss about the availability of the tanks and other facilities which will be used for the experiments. Four tanks (three concrete tanks and one convas tank) of different sizes are available for milkfish maturation experiments. Two concrete tanks are of the same size with a dimension of 5 m x 8 m x 1.5 m and that of the other one is 10 m x 20 m x 2 m. The convas tank is circular with 7.2 m diameter and 1.2m deep. The capacity of root blower is large enough to provide adequate aeration. However, the capacity of water pump is limited to a daily total water exchange rate of only one-third.

In the evening of the same day, another meeting was held with Dr. Vanstone and Mr. Tadjuddin to discuss about the researches to be conducted, research methodology, and scheduling and planning of the research activities. It was agreed that, to maximize the use of the available facilities and resources, two experiments will be conducted simultaneously : the effect of feeding regimes on gonadal development of milkfish and maturation of milkfish using different sizes and shapes of tanks. The brief description of the research methodology is given in Appendix I. F3a. Stocking of the experimental fish was done on November 15 by Dr. Vanstone and Mr. Tadjuddin with the assistance of BADC's staff involved in the project. I was responsible for the formulation and preparation of the experimental feed and purchase of feed ingredients.

On November 15, a trip was made to Japara town and Semarang with Ms. Ivonne of the Nutrition laboratory to purchase the needed feed ingredients. Dried fish (about 20% moisture), rice bran, corn meal and wheat flour were bought in Japara at the cost of Rp. 450/kg for dried fish, 80 for rice bran, 190 for corn meal and 350 for wheat flour. Defatted soybean meal and fish oil were pychased in Semarang a the prices of Rp. 100/kg and 1750/liter, respectively. During this trip, discussion and explaination were done to Mrs. Ivonne about the characteristics of different ingredients and techniques commonly used to detect their quality.

The equipments needed for feed preparation (hammer mill, mixer, meat grinder, siever and dryer) are available at BADC, Japara. However, some of them are out of order or have not been used for quite sometimes. Thus, most of the day of November 16 was spent for cleaning, repairing and testing the equipments. There after, a discussion was done with Mrs. Ivone and two of her staff about the importance of the physical quality of fish feed. Instruction was also given to her to grind all the ingredients to pass through U.S. standard sieve No. 40.

On the same day, Dr. Vanstone and Mr. Tadjuddin, with the assistance of the BADC staff, sampled two milkfish from ponds. These fish were sacrified and dissected. The gonads were weight and preserved in Bouin's solution for further histological studies. Length and weight measurement, were also done. The data is presented in Table 1.

Table 1. Length, weight, sex, condition factor and gonad weight of two milkfish broodstock sampled from ponds on November 16, 1985

Sample No.	Standard Length (cm)	Total length (cm)	Weight (g)	Condition factor *	S e x
1	50.4	63.3	1710.8	0.67	Sex identification was not possible due to very small size of gonads
2	56.0	66.2	1917.3	0.66	

* Condition factor $C = \frac{W}{L^3} \times 10^5$ where W is the weight in gram and L is the total length in milimeter.

Demonstration on the techniques of feed preparation to the nutrition staff was done on November 18. This was assisted by Mr. Tadjuddin, especially the translation of english to Bahasa Indonesia. Grinding and seiving of the ingredients was done only on the same day, before feed preparation, due to power failure on November 17.

2. At Jowana *

On November 17, a trip was made to Jawana with Mr. Tadjuddin to gather information on fish feed manufactured by Mr. H. Moch Thohari, Jl. Doropayong 155, Jowana, Pati Jateng. Before proceeding to Mr. Moch's residence, a stop was made at the Pati's Fisheries District Office. There, a brief discussion was made with Mr. Sutjoko, Head of the Fisheries District about the purpose of the trip. Mr. Sutjoko was so kind to allow one of his staff to accompany us to Jowana.

At Jowana, a discussion was held with Mr. Moch concerning the feed formulation, ingredients used and feed processing. A tour of the facilities was done after the discussion.

Mr. Moch is a fish farmer. He started culturing brackishwater shrimp in 1974. In 1976 he started to produce artificial feed but mainly for his own consumption. The quantity of feed sold during this period was only about 15 kg/day. However, from 1979 up to the present

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* This report does not mean to endorse or discount the value of feed produced by Mr. H. Moch. Thohari.

94

the amount of feed sold increased significantly to about 1 ton/day (350 tons/year).

The feed is available in pellet form of about 4 mm diameter and 10 to 15 mm long. The feed is produced only during the dry season from August to December. It is dried under the sun. The quantity produced varied depending on the amount ordered, but the average production ranged from 12 to 14 tons/week.

This cottage industry consists simply of a small building which houses the equipment and spaces for ingredients and feed storages. Behind the building there is a large cimented area used for drying the feed. The feed processing equipment consists simply of a locally built horizontal-type drum mixer and meat grinders powered by a motor.

The feed was formulated to contain about 20% protein. The ingredients used were purchased locally, in the vinicity of Jowana. The costs were much cheaper than those in the common market. The feed materials used are :

Fish meal
Bone meal
Rice bran
Ipil-ipil leaf meal
Filamentous algae
Aquamix
Fish oil

Feed preparation consisted simply of mixing the dry ingredients together, added oil and water and extruded through a meat grinder. The resulting moist pellet was dried under the sun to reduce the moisture content to 10 - 12%. The dried feed was then packed in 5 kg clear plastic bag and sealed.

95

The feed was sold to Ujung Pandang, Surabaya, Gresik, Sidoarjo, Tangrang and Semarang. The whole sale price of the feed was only Rp. 150/kg.

During the visit of the feed preparation facilities, comments/recommendations were made to Mr. Moch to improve the feed quality without increasing its cost. The feed formula was modified. The importance of the physical quality of feed such as the fineness of the ingredient and the water stability of the feed was explained. The characteristics of various feed materials and the various methods used to detect the quality of ingredients were also discussed. Suggestions were also made for him to modify the feeding recommendation printed in the bags.

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APPENDIX I F3a

DESCRIPTION OF METHODOLOGY OF MILKFISH MATURATION RESEARCHERS BEING CONDUCTED AT BADC, JAPARA

CHHORN LIM

Two studies are being conducted at the Brackishwater Aquaculture Development Center (BADC), Japara :

I. The effect of Feeding Regimes on the Gonadal Development of Milkfish

II. Maturation of Milkfish using different tanks.

OBJECTIVES

The objectives of these experiments are to evaluate :

1. The effect of feeds on the maturation of milkfish
2. The effect of tanks (size, shape and depth) on the gonadal development of milkfish.

MATERIALS AND METHODS

Experiment I. Feeding regimes

1. Facilities. Two concrete tanks with a demension of 5 m x 8 m x 1.5 m, located at the wet laboratory of the BADC, Japara were used for this study. Each tank had a water supply line and a stand-pipe drain, and was filled with seawater to a depth of 1.30 m. Aeration was also provided to each tank.

2. Experimental fish. Milkfish broodstock which were grown in captivity from fry to an average weight of about 2 kg was used. These fish were reared since Mr. Alie Poernomo was the Director of the Center. The age of fish could not be determined

because the research staff in charge of keeping the records is on study leave. However, based on the existing information, they are at least 6 years old.

The fish were initally grown in cages and later transfered to 2 one-hectare brackishwater ponds with an average depth of about 50 cm. They depended mainly on the natural foods grown in ponds. Supplementary feeding was sometimes done when natural foods were exausted.

Before the beginning of the experiment, two batches of fish were transfered from ponds to the 200 m^2 concrete tank for acclimatization. The first batch (38 fish) was transfered on October 8, 1983 and the second batch (80 fish) was on October 28, 1983. One day after transfer, they were fed with an artificial feed (Appendix I.F2) twice daily at a rate of 3% (air dry wet) of body weight per day.

On November 15, 1983, the fish were randomly selected and stocked at a density of 20 fish per tank. Prior to stocking, 11 fish were sampled for measurements of lengths, weight and stage of gonadal development (Table 1). Gonad sampling was done by cannulation. However, since the gonads were immature, this sampling technique was not successful. Thus, 3 fish were sacrified. The gonads were weighed and preserved in Bouin's solution for further biological studies.

Table 1. Lengths, weight, condition factor, sex and gonad weight of milkfish sampled November 15, 1983

Sample No.	Length (cm)		Weight (g)	Condition factor*	Sex	Gonal weight (g)	Remarks
	Standard	Total					
1	50	62	1,744	0,73	Female	6.6	Sacrified
2	52	65	2,968	1.08			
3	51	59	1,540	0.75			
4	54	67	3,000	1.00	Female	15.5	Sacrified
5	54	65.2	2,540	0.92			
6	55	68	2,840	0.90	Female	12.9	Sacrified
7	51	60	1,440	0.67			
8	49	56	1,260	0.72			
9	60	71.8	3,090	0.83			
10	51.8	61	840	0.37			
11	53	63.6	1,440	0.60			
		Av.	2,064	0.80			

*Condition factor was calculated based on the following equition :

$C = \frac{W}{L^3} \times 10^5$, where : W = Weight in gram

L = Total length in millimeter

3. Feeding regimes. Two feeding regimes were used : the artificial feed and the artificial feed plus trash fish at a 50 : 50 ratio. The artificial feed was formulated to contain approximately 35% crude protein, 8.5% crude fat and 3,500 kcal of M.E./kg diet (Table 2.). The feed was prepared at the nutrition laboratory of BADC, Japara, in form of dry pellet of about 3 mm diameter. The trash fish used was fresh sea trash fish purchased at Japara.

99

Table 2. Composition of the Experimental diet used for milkfish broodstock at Japara

Ingredient	Percentage
Fish meal (local)	31.0
Soybean meal	30.0
Corn meal	6.0
Rice bran	15.8
Wheat flour	10.0
Fish Oil	2.0
Dicalcium phosphate	0.5
Vitamin mix *	1.5
Trace mineral mix **	0.2

* Vitamin mix (mg/kg diet) : Thiamine, 7.5; riboflavin, 12; pyridoxine, 9; pantothenic acid, 45; nicotinic acid, 45; biotin, 2; folic acid, 1.5; vitamin B_{12}, 0.08; choline chloride, 1,500; vitamin C, 225; vitamin E, 150; vitamin A, 15000 IU; vitamin D_3, 75010; vitamin K, 7.5.

** Trace mineral miz (mg/kg diet): Mn, 60; Zn, 50: Fe, 40; Cu, 5; I, 3: Co, 0.25; Se, 0.4.

4. Management. Feeding commenced on November 19, 1983. Fish were fed twice daily (half of the ration at 8 AM and half at 4 PM), 7 days per week at a rate of 3% (dry matter) of their body weight per day. For the treatment receiving artificial feed plus trash fish, the artificial feed was given in the morning and trash fish in the afternoon. The feeding rate will be reduced to 2% only after two months of feeding or when the condition of fish is improved.

100

Sampling for length and weight measurements, and checking the stage of gonadal development will be done at every 2 month interval. About 20 to 25% of the fish stocked will be sampled each time. If gonad sampling by means of cannulation is not successful, 2 fish from each tank will be sacrified. The sex will be identified, and the gonads will be weighed and preserved in Bouin's solution for further histological studies. More frequent samplings will be done if the results of the previous sampling indicate that the gonads are developing well. If the egg diameter reaches to about 0.6 mm, induced breeding will be done using HCG or dried salmon pituitary. If spawning occurs, several studies will be conducted to determine the egg quality, hatching rate, larval survival and nutritive values of foods/feeds for larvae up to 21 days.

Feed allowances will be changed monthly. Calculations of total feed allowances were initially based on the average weight of fish in all treatments. In between sampling, they will be computed based on an assumed feed conversion of 2.5. After sampling they will be adjusted based on the average weight of fish in each treatment and the number of fish present.

The water was allowed to flow continuously at a rate necessary to change one-third of the water daily. Siphoning of the waste will be done twice per week. Water temperature and dissolved oxygen will be minitored twice daily before feeding. Salinity will be determined only once per day, in the morning.

Experiment II. Effect of tanks

The research methodology for this experiment is similar to that of the experiment I, except that the tank used varied in size shape and depth. Two tanks are made of concrete with dimensions of 5 m x 8 m x 1.5 m and 10 m x 20 m x 2 m. The other one is a circular convas tank with a diameter of 7.2 m and a depth of 1.2 m. The stocking rates used were 45 fish in the 200 m^2 concrete tank and only 20 fish in each of the other 2 tanks. Only artificial feed are being used for this study.

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10 V

APPENDIX I, F4

TRIP REPORT

TRIP TO BADC, JAPARA

DECEMBER 14 - 16, 1983

CHHORN LIM

The purposes of this trip were to check to progress and problems of milkfish broodstock experiments, change the daily feed allowances and bring the vitamin premixes needed for feed preparation.

In the morning of December 14, upon arrival I proceeded directly to office of Mr. Bambang Salamun to inform him about the purposes of my trip and my planned activities. I relayed to him also the messages of Mr. Zulkifli Jangkaru about the hororia for the two technicians (Mr. Dyanto and Mr. Kaswadi) involved in milkfish project, in an amount of Rp. 15.000/ month/person However, Mr. Bambang suggested me to discuss the matter with Mr. Made.

Thereafter, I went to see Mr. Made and relayed to him the same messages. He indicated that Mr. Dyanto do involve in the milkfish project but not Mr. Kaswadi. However, in addition to Mr. Dyanto there are more than one technicians who are actively participated in this project. He suggested that the amount should be divided equally to the various technicians involved in the project.

In the afternoon of the same day a discussion was held with Mr. Pujiano and Ms. Anindiastuti to check the progress and the problems encountered in conducting these milkfish maturation experiments. Mrs. Ivonne who is in charge of feed preparation was also present. I was briefed on the status of the experiments by Ms. Anindiastuti and Mr. Pujiano. The experiment progressed as planned. However several problems were encountered during the first one month period. There was a 6-days brown-out (from November 25 to December 1) causing lack of water supply. Two fish (1 male and 1 female) in a 40 m^2 concrete tank fed with the artificial diet alone were dead on November 26 due to low dissolved oxygen (2.0 ppm). On December 12, one fish (male) in a 40 m^2 concrete tank feed with artificial feed and trash fish was found dead. The condition of this fish was very poor. The averages and ranges of the physico-chemical parameters are given in Table 1.

Table 1. Ranges and averages of the physico-chemical parameters in various tanks

Treatment (feed used)	Tank	Temperature (^oC*) AM	Temperature (^oC*) PM	D.O. (ppm)* AM	D.O. (ppm)* PM	Salinity (ppt)
A (artificial+trash fish)	Concrete tank 5 x 8 x 1.5 m	26.0-29.0 (28.2)	27.0-30.0 (28.4)	3.1-30.[illegible] (5.1)	3.1-6.2 (4.9)	3[illegible]
B (Artificial feed)	Concrete tank 5 x 8 x 1.5	26.0-29.0 (28.2)	27.0-30.0 (28.2)	2.0-6.0 (4.7)	3.4-[illegible] (4.8)	33
C (Artificial feed)	Circular convas tank (7.2 m diameter)	26.0-28.0 (27.6)	27.0-29.0 (27.9)	2.8-5.1 (4.2)	2.8-5.5 (3.9)	33
D (Artificial feed)	Concrete tank 10 x 20 x 2 m	26.0-29.0 (28.1)	27.0-29.0 (28.3)	5.0-7.2 (5.9)	5.3-8.6 (6.3)	33

* The numbers in parentheses represent the average values.

There was no problem in feed preparation and purchasing of the trash fish.

After the meeting, observation of the experimental facilities was made. It was, found that the colour of the water in the 3 concrete tanks was brownish with a visibility of less than 30 cm. Instruction was given to Ms. Anindiastuti and Mr. Pujiano to change about $\frac{2}{3}$ of the water and check the water flow regularely to enssure that the flow rate is sufficient to change $\frac{1}{3}$ of water daily. The method of feeding used was not the same as previously suggested. Instead of broodcasting, the feed was just droped on a small area right next to the wall of the tanks. Suggestion and demonstration were again made on this matter.

Although Mrs. Ivonne and her staff are capable of preparing sufficient quantity of feed for these experiments, it was found that the feed was not properly prepared. Some feed ingredients were not ground according to the specification given. The feed was not dried and stored moist in plastic basins at room temperature. The product became fermented and the mold started to grow. Discussion with Ms. Ivonne and her staff revealed that they were not able to dry the feed because the oven was used for other purposes. Recommendations were made for them to dry the feed under the sun if the oven if not available. If the feed is still moist it should be spread in a thin layer on a mat to avoid fermentation and grow of mold.

On December 15, a trip was made to Japara town with Ms. Ivonne to purchase the feed ingredinets. After returning, a meeting was held with Ms. Ivonne, Mr. Pujiano and Mrs. Anindiastuti

102

to discuss about the past and future problems. Solutions to the various problems were suggested. The importance of data collection and recording was also stressed. Two sets of table for keeping the records of feed and feeding, and physico-chemical parameters were recommended.

In the afternoon of the same day, another discussion was held upon the request of Mr. Endhay Kusnendar, chief of the shrimp pond culture subsection. The topics discussed were on shrimp feeds and feed formulation. Mr. Pujiano, Ms. Ivonne, Ms. Anindiastuti and a staff of Mr. Made in charge of shrimp broodstock were also present An overview on the nutrient requirements of penaeid shrimp, availability of shrimp feeds and criteria used in feed formulation was given. The various steps in feed preparation was discussed. The importance of the physical quality of the pellet (water stability) was also stressed.

The computations of the new feed allowances were done in the evening of December 15. These feed allowances were estimated based on an assumed feed conversion value of 2.5. This new feeding schedule was given to Ms. Anindiastuti before my departure to Jakarta on December 16. Instruction was also given to her to reduce the amount of feed in case there will be mortality.

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106

APPENDIX I. F5

TRIP REPORT

TRIP TO SBPPD, DEPOK

CHHORN LIM

During this quarter, five trips were made to the SBPPD, Depok with Mr. Hidayat or Mrs. Ningrum. The purposes of the trips were for consultation, to determine the availability of the equipments for feed and fish meal preparation, and to assist Mrs. Noveni Wahyudi in the fabrication of fish meal.

1. October 3

A tour of Clarias sp. hatchery was made. It was observed that several broodfish held in concrete tanks were deformed indicating a sign of vitamin C deficiency. These fish were fed with a laboratory prepared diet containing approximately 28% protein. A commercial vitamin and trace mineral premix was used. Observation of the label showed that vitamin C was omitted in the premix. The quantity of several vitamins was very low and would not meet the requirements of fish grown in tanks.

After ward, a group discussion was held with the researcher. The above observation was reported to Mrs. Sri Sumastri, the researcher in charge of clarias hatchery. Suggestion were given to her to discard the deformed fish and to improve the quality of the feed. The diet should be nutritional complete since they were confined in tanks without access to natural foods. If the complete feed could not be prepared, it was recommended that fresh foods should also be given as supplement.

The other discussion included foods/feeds and feeding habit of Clarias fry. The problems encountered in Clarias research were also reviewed. Solutions to the problems were discussed and research studies were suggested.

2. October 15

The feed laboratory was observed to determine the availability of the equipments and their status. Three grinders (hammer mills) of various sizes are available. However, two of them have never been used and one was used but it was not funtional at the time of observation. A horizontal mixer is used for mixing the feed. The pelleting equipments consist of a laboratory scale pellet mill, a large capacity meat grinder and hand grinder. Only the pellet mill and meat grinder are being used. The large capacity meat grinder have not yet been tested due to lack of some parts and electrical consumption is higher than the available power at the station. A dryer is also available but was seldon used. Feeds were dried under the sun. It was observed also that the feed materials were unproperly stored and several of them were spoiled and infested by insects.

102

This information was related to the researchers during the consultation meeting. Recommendations were made for them to make inventory of the stored feeds/feed materials, discard the spoiled ingredients and to properly store the feeds/ingredients to improve their shelflives. The importance of ingredient quality in relation to the quality of the finished feed was discussed. The repair of at least one hammer mill was suggested. The effect of fineness of feed ingredients on the physical property and nutritive value of feeds was emphasized. The other topics discussed were feed formulation, the importance of energy in fish feed and feeding practices.

3. November 12

During this trip, a consultation meeting was held with the SBPPD, Depok. The discussion was concentrated mainly on experimental designs. Analysis and interpretation of the research data on natural food culture conducted by Mr. Chumaidi were also discussed.

4. November 26

The main purpose of this trip was to determine the availability of the equipments needed for the preparation of fish meal. The presser, dryer and hammer mill were, available. However, they have not been used for quite sometimes. Suggestions were made to the person in charge of the feed laboratory to clean and test these equipments.

A meeting was also held with the researchers to discuss about the major problems encountered in giant gourami. The various research activities and results were briefed by Mrs. Noveni Wahyudi. It was determined that the most critical problems associated with low survival of larvae are foods/feeds and feeding. Thus, suggestions were made for Mrs. Noveni to conduct various experiments to evaluate different natural foods/feeds, and to develop feeding techniques and standard for giant gourami larvae.

5. <u>November 29</u>

The purpose of the trip was to assit Mrs. Noveni in preparing fish meal needed for formulationg feeds for giant gourami larvae. However, while waiting for the fish to arrive, a seminar was given to the research staff on the methods of processing of fish meal used by the industries. The various steps involved in "Wet Reduction Process" and "Batch Process" were discussed. Explaination was also made on the techaiques used for the preparation of fish meal for Mrs. Noveni.

The fish arrived at about 11:30 AM. An actual demosntration on the preparation of fish meal were performed. This lasted for approximately one hour.

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APPENDIX I. F6

TRIP REPORT

STATUS AND PROBLEMS OF COMMON CARP

CULTURE IN TASIKMALAYA, GARUT, PURWAKARTA

AND SUBANG

CHHORN LIM

During this quarter, two survey trip was conducted to determine the status and problems of commen carp culture in running water. The first trip (November 1 - 5) was made with Mr. Hidayat Djajasewaka to Tasikmalaya and Garut. Four fish farmers in the Tasikmalaya area and three in Garut were interviewed. The second trip (December 7 - 9) was made with Mr. Atmadja Hardjamulia and Mrs. Ningrum Suhenda to Purwakarta and Subang. Three fish farmers in each district were interviewed.

The size of running water common carp farms in these areas ranges from 100 m^2 to 700 m^2. The pond size varies from 15 m^2 to 80 m^2. The most common size falls within 25 to 50 m^2. The ponds are mostly rectangular in shape and made of concrete However, the newly constructed ponds are hexagonal. Each pond has a water inlet gate of 50 to 80 cm wide and a water outlet The outlet gate is constructed in such away to allow the dischage of bottom water. The screen made of either bamboos or steel wire (1 to 2 cm a part) is provided to each gate to prevent the fish from escaping or the trash to enter the ponds. The effective depth of the ponds ranges from 0.8 to 1.2 m.

In some farms where the water supply is turbid, a sedimentation pond is constructed. Some farmers, instead of building a sedimentation pond, use the main water supply canal as sedimentation faci ities. In this case, the water supply canal is much larger and deeper than that with a sedimentation pond.

River water which is used for irrigation is the source of water supply. The water flows continuously into the ponds by gravity. The quantity of water varies greatly from farm to farm and with the season (20 to 500 l/second). The water turbidity varies also with the season. More water is available during rainy season but it is usually very turbid. The water pH ranges from 6.5 to 8, temperature from 18^{o}C to 28^{o}C and dissolved oxygen from 3.5 to 7 ppm.

Common carp known locally as Majalaya strain is commonly used in these areas. In addition, another strain found in Tasikmalaya (as claimed by the farmers) is also used in that area. The average size of seed used for stocking ranges from 50 to 100 g. The stocking rate used varies from farm to farm depending on the amount of water flow and the size of fish (1 kg to 12 kg/m^2). The most common stocking rate practiced by the farmers is 4 to 6 kg/m^2. A few farmers produced their own seeds for stocking while most of them purchased the fingerlings from dealers around Bandung area at the costs of Rp. 1500 to 1800/kg. Normally the fingerlings were delivered at the farm sites

112

A few commercial fish feeds (pellet) available under various trade names were used. Fish were fed seven days per week at a daily rate of 3 to 5% (air dry weight) of their biomass. They were usually fed 3 times per day although a few farmers fed as many as 6 times per day. Feeding was done by the use of demand feeder or broadcasting. The latter feeding method is the most common and was found by some farmers to improve the feed efficiency.

In addition to the artificial pellet, a few farmers in Tasikmalaya also supplemented their fish with fresh leaves. The quantity given was not determined but depended on the availability.

The frequency of adjustment of feed allowances varied. Some farmers changed the allowances weekly, some at every 10 days and others at monthly interval. The new feed allowances were complUted based either on an estimated growth rate of 75% to 100% per month or by weighing the fish at monthly interval. The latter method was practiced in Tasikmalaya where the farmers drained and cleaned the ponds monthly. The culture period lasted for about 3 months. Usually 3 crops of fish were produced per year. The size of fish at harvest ranged from 250 to 600 g. The average net production varied from 10 to 60 kg/m^2/year. The surval rate could not be determined since the fish were stocked by weight basis. However, it was estimated to be more than 95%. The feed conversion ranged from 2.5 to 3.5 depending on the feed, feeding rate and method of feeding used. A feed conversion of 1.6 was obtained by farmers who supplemented their fish with fresh leaves

Lack of fund for the operation is one of the major problems faced by fish farmers. The constant increase in price of fish feeds coupled with the low market price of the produce are the other contraints which limit the operation, development and expansion of the common carp industry. Insufficient and poor quality water supply also affect fish production.

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APPENDIX I. F7

TRIP REPORT *

TRIP TO P.T. BINA SATWA FEED MILL

November 28, 1983

Chhorn Lim

A trip was made with Mrs. Ningrum Suhenda to P.T. BINA SATWA Animal Feed Manufacturing, Jl. Suci Susukan, Pasar Rebo, Jakarta Timur. The purpose of this visit was to gather the information on fish feeds manufactured by P.T. BINA SATWA, feed materials used and other information related to fish feeds.

During this visit, a discussion was made with the General Manager, Ir. Idris P. Siregar. A tour of the facilities was made after the discussion.

P.T. BINA SATWA Animal Feed Manufacturing is a joint venture between Mitsui and Co. Ltd. of Japan and Indonesian counterparts. The original intension of the mill was to produce feed for poultry, swine and catlle. This company possesses equipment necessary to produce sinking pellet but the capacity is small. In addition to the standard equipment for making pellet, P.T. BINA SATWA has additional grinder capable of grinding the ingredients to a fine particle size.

The production of fish feeds by P.T. BINA SATWA was started in 1980. Two types of feeds are available for common carp, the starter (for fish smaller than 15 g) and the finisher (for fish larger than 15 g). Both feeds are available only

* This report does not mean to endorse or discount the value of the products of P.T. BINA SATWA.

in meal or mash form. According to Ir. Idris, meal form feeds are produced because :

- The pelleting machine is small and is used mainly for the fabrication of poultry feeds.
- The farmers can used these feeds to mix with other locally available feedstuff.
- The farmers prefer to have different sizes of pellet for different sizes of fish. Thus, this meal form feeds allows the farmers to make their own pellets.

The total quantity of fish feeds produced is only about 10 tons per month.

Fish feeds are formulated based on the specification and recommendations given by a Japanese consultant. The feed ingredients used are :

Fish meal

Meat and bone meal

Defatted soybean meal

Wheat pollard

Corn meal

Rice bran

Vitamins

Minerals

Additives such as antioxidants and antibiotics.

Almost all the ingredients used, except rice bran and corn meal, are imported. Previously white fish meal imported from Japan was used. At present it is being replaced by Thai fish meal. Fish meal, and meat and bone meal constituted the animal protein sources and were supplied about 50 and 40% of the total protein for the starter and finisher feeds, respectively. Corn meal and rice bran were used only in finisher feed. Prior to making feed, all feed materials were ground to pass through # 40 mesh sieve

The proximate nutrient contents of the feeds, based on the information provided by the company, are given below :

Type of feed	nutrient						M.E. (kcal/kg)
	C.P.	C. Fat	C. Fiber	Ash	Ca	P	
Starter	40,0	4.5	2.0	14.5	3.0	2.0	2655
Finisher	27.0	6.0	3.6	10.0	1.7	1.3	2645

The suggested retail prices of feeds are Rp. 475 and 600/kg for the finisher and starter, respectively.

During this visit, recommendations were made to Ir. Idris to pellet the finisher feed. Advantages and disadvantages of pellet over mash feed were explained. Recommendation was also made for him to increase the level of metabolizable energy for the starter feed to at least 3800 kcal/kg.

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Appendix II.

Report of Activities for the Specialist Team at Maros

THIRD QUARTER OF 1983/84: OCT-DEC 1983

Dr. Igmidio T. Corpuz, soil scientist

Dr. Corpuz reported and discussed three research papers co-authored by research staff of the Department of Soil and Soil Fertility during a regular weekly Saturday Seminar at the Institute (Appendices I, II, III in his detailed quarterly report for October, November and December).

He discussed with some research staff members in the Soil and Soil Fertility Department research designs, research data to be generated, interpretations of research results and possible experiments to be conducted.

He travelled with his counterparts to set up field fertilizer experiments, where he was able to demonstrate and discuss proper procedures in establishing field fertilizer experiments (Appendices A, B, C in his detailed report for the quarter).

He never missed attending one of the regular and special seminars in the Institute. Likewise he never missed a single working day during the quarter.

During the quarter Dr. Corpuz did not encounter any problem.

Dr. Corpuz is taking advantage of the Rest and Recuperation privilege from December 15, 1983 to January 3, 1984.

Dr. S. A. Rizvi, plant pathologist

1. Provided necessary training to counterparts on every aspect of conducting the following experriments:

a) Field screening of 400 breeding lines/cultivars resistant to rice tungro virus (RTV), using RTV infected plants of cv. TN1 as source of inoculum for the spread of RTV in the field by its vector, green leafhopper (GLH).

b) Screenhouse evaluation of 150 peanut cultivars/breeding lines for resistance to peanut mottle virus (PMV), using mechanical, hand and spray gun inoculation techniques.

c) Greenhouse screening of rice cultivars for resistance to rice blast using spray-bottle inoculation technique.

d) Greenhouse screening of 196 rice brreeding lines of IRRI's IRTN-1983 group for resistance to RTV, using plastic cages to inoculate each line individually.

2. Assisted in the identification of four fungi causing plant diseases and discussed various laboratorry procedures necessary for such work.

3. Starrted a series of lectures on selected topics of special interest in phytopathology.

4. Participated in all of the Institute's Saturday Seminars and other activities.

5. Wrote two papers and presented them during a Saturday Seminar at MORIF.

6. Developed new and adapted already available techniques to improve the efficiency of research rresults at MORIF, especially for work on rice blast and PMV. Furthermore, each technique was evaluated for its own efficiency in producing more reliable and effective results.

7. Assisted counterparts in research and writing of its

results.

8. Encouraged and assisted the Pathology staff members to improve their English proficiency.

9. Held many discussions with the Head of the Pathology Department and suggested various methods for an overall improvement of research activities of each and every staff member of this department.

10. Official trips were made to help in the phytopathological work in other parts of Sulawesi.

Dr. Fritz von Fleckenstein, Agricultural Economist

1. Continued to manage the office and the reporting of the AARP team at Maros with the able help of Nurdin Salam and the advice of his colleagues. During the quarter, the accounts were computerized in collaboration with Pak Nurdin, a new trip report form designed by Dr. Rizvi was adopted, and a new procedure for ordering repairs and parts for vehicles was instituted.

2. Continued the work on the intensive study of Baju Bodoa. During the quarter, the coding forms were continuously revised, entry of the weekly data into the computer began, and calibration of farmer measures was initiated.

3. Continued preparation of computer programmes for use, writing of applications for these programmes, and training of MORIF staff in computer use. Table 1 shows the situation at the end of the quarter:

Table 1. COMPUTER PROGRAMMES IN USE AT MAROS RESEARCH INSTITUTE

von Fleckenstein's Basis 108, 31 December 1983

Programme	Rec'd?	Prepared?	Applications	Trained, introduced
DBASE2*	yes	yes	Kecamatan agro-climate; FARMAP data entry	Hadijah
SUPERCALC	yes	yes	Farmer plot calc. Accounts (Principles)	Hadijah Nurdin Yusuf,Nurdin
WORDSTAR*	yes	yes	Texts	Haniah
ASTAT	yes	yes	Statistics	Lukman Ch. Momuat Yasin Hadijah
DATASTAR	yes	yes	FARMAP data entry tried.	No one
SUPERSORT*	yes	yes	None yet	No one
ABSTAT*	yes	no		
QUICK-CODE*	yes	no		
SCRATCH PAD	yes	no		

* These programmes have been ordered for use with the IBM PC

Now that many of the programmes ordered for use with the IBM PC have been acquired, computer applications and training in the future will be mostly for these programmes, to make the transition to the IBM computer as smooth as possible.

4. Did other economics work:

a) A MORIF position paper on the PATANAS (Panel Tani

121

Nasional) programme.

b) A sampling scheme and initial sample of villages for the South Sulawesi PATANAS (PATADA?) based on the agricultural population and agroclimatic zone by kecamatan.

c) The beginning of a map of indigenous farming systems based on information provided by Dr. Ashraf Ali of FAO.

d) The revision of a paper on Small Farmer Mechanization by Drs. Yusuf Ma'amun, M.Sc.

5. Prepared the computer order for the whole AARP.

6. Received visitors:

a) Dr. Bernardo Gabriel, entomologist and team leader of the Banjarmasin AARP team.

b) A five-man team from the AARP Mid-Term Evaluation Mission.

Note: THIS REPORT WAS PREPARED USING WORDSTAR.

APPENDIX I.D.

QUARTERLY REPORT

TUBER CROPS POSTHARVEST PROCESSING SPECIALIST

DIANE M. BARRETT

OCTOBER - DECEMBER, 1984

During the period from October - December 1983 the consultant spent 3-4 days/week at the Sub-Balai Penelitian Tanaman Pangan in Karawang and 2-3 days/week in Bogor, working with the Bogor Balai Penelitian Tanaman Pangan. In October, it was decided that the Sub-Balai in Karawang would be placed under SURIF, rather than BORIF. Therefore, the consultant's location of work was thought to be BORIF, where tuber crop research is going on. Plans for recruiting staff, ordering equipment, etc. were begun in October . However, in November it was decided, that all secondary crop research (including tuber crops) would be carried out in Malang (MARIF) in the future. With this change of events, it was finally determined (in late December) that the consultant should be located in Sukamandi, which already has a postharvest group under it. This would also enable the consultant to continue work with the Sub- Balai in Karawang. Activities included the following :

I. Organizational

a. Re-writing of a TOR for a "Postharvest Evaluation of Tuber and Fruit Crops" to coincide with the wishes of AARD policy makers.

b. Compilation of a team, consisting of Dr. H. Soetono, Dr. Soewarno T. Soekarto and Ms. Diane M. Barrett, to carry out the above-mentioned evaluation.

c. Meeting with Mr. Alan Hurdus, USAID, and AARD policy makers to gain approval of the above-mentioned evaluation.

d. Evaluation, with Dr. Roberto Soenarjo (BORIF Cassava Breeder) and Ir. Wargiono (BORIF Tuber Crop Agronomist), of postharvest tuber crop research needs in CRIFC, with reference to :

   1. research project titles
   2. budget
   3. manpower
   4. facilities
   5. equipment

e. Initiation of equipment list for postharvest tuber crop research at BORIF.

f. Contacting food technology department at IPB, in hope of recruiting one or two graduates to work on cassava postharvest research at BORIF.

2. <u>Training</u>

a. Training of scientific staff at Sub-BPTP-Karawang took the form of discussions/training on the following topics :

   1) physiological and microbiological deterioration of cassava roots.

2) use of salt as an anti-microbial agent during fresh cassava storage
3) influence of a high temperature/high humidity environemnt on "curing" or healing of cassava wounds
4) fresh cassava quality factors
5) starch breakdown and fiber increase during fresh cassava storage
6) principles of organoleptic (sensory) analysis of foods
7) rice quality factors and use of such factors in quality grading and standardization.

b. Training of technical staff at Sub-BPTP-Karawang included discussion/teaching of the following:
1) Department of Trade (R.I.) standards for various food products and methods of analysis
2) Starch analysis methodology
3) HCN qualitative analysis methodology
4) Viscosity measurement
5) Subjective (visual) analysis of cassava starch i.e. filth, whiteness, odor, purity.

3. Research

The consultant assisted in research on rice, corn, soybeans and cassava but put emphasis on cassava research. The following two projects were in progress from October-December 1983 :

a. Influence of Packaging Material on storage of Crude Cassava Starch at the Village Level (D. Barrett, Soeharmadi and Suismono)

1. Experiment was begun in September
2. Samples were tested after each month of storage (i.e. 3 times during this quarter)
3. The following were analyzed monthly :
   a. moisture content
   b. starch content
   c. fiber content
   d ash content
   e. acidity
   f. whiteness
   g. viscosity
   h. mesh size
   i. gross weight
   j. filth
   k. organoleptic analysis
4. Storage room temperature and % R.H. were measured 3 times daily
5. Internal package temperature was measured once a week

b. Storage of Fresh Cassava Roots in Bamboo Boxes with Moist Rice Husks (Soeharmadi and D. Barrett)

1). Experiment was begun in September

2). Samples were tested every 10 days.

3). The following were tested every 10 days :

a. moisture content

b. starch content

c. reducing sugar content

d. ash content

e. fiber content

f. organoleptic value

g. gross weight

4). Storage room temperature and % R.H. were tested 3 times/day

5). Internal package temperature was checked once a day.

4. Miscellaneous

a. Trips

1). Solar Drying Workshop and Survey of Cassava Processing in Yogyakarta (Appendices I and II) Ir. Soemardi, Sigit Nugroho, B.Sc., Parnomo October 24 - 29, 1983

2). Balai Penelitian Tanaman Pangan - Sukamandi (Appendix III). Dr. Djoko Darmadjati October 4, 1983

3). Sub-Balai Penelitian Tanaman Pangan (Appendix IV) Ir. Pudjo Tjiptono, M.S. November 23, 1983

b. Translation of results of all postharvest rice research at Sub-BPTP Karawang from 1975 - 1982 (Appendix V) (Indonesia to English)

127

c. Meetings with PERTANI employees to discuss plans for a cassava processing plant, to produce fructose syrup

d. Gathering of background information on cassava marketing in Indonesia, discussion with economists from IPB and PAE

e. Preparation of 4 questionnaires (Bahasa Indonesia) to be used for the Postharvest Evaluation of tuber and fruit crops. These questionnaires pertain to :

   1) farmers
   2) middlemen
   3) industry personnel
   4) research institutions

f. Preparation of an article on PELITA III postharvest cassava research at Sub-BPTP-Karawang for "AARD Highlights"

g. Assisted Dr. Djoko Damardjati (BPTP-Sukamandi) in preparation of a proposal on "Drying Systems for Farmer Groups and KUDs" for a collaborative project with ASEAN-EEC.

h. Participated in discussions between BPTP-Sukamandi, Sub-BPTP-Karawang and ASEAN/EEC project representatives on design and implementation of the drying systems project.

\22

5. Home Leave

The consultant took time off for home leave from December 14 - January 4, 1984.

DMB:is

TRIP REPORT
SOLAR DRYING WORKSHOP AND CASSAVA PROCESSING IN YOGYAKARTA
October 24 - 29, 1983

From October 24 - 29, 1983, I accompanied Ir. Soemadi and Ir. Sigit to Yogyakarta for the following purposes :

1. to attend a "National Workshop on Solar Drying" given by staff from UGM and BPTP - Karawang.
2. to meet food scientists working in the Faculty of Agricultural Technology at UGM.
3. to do a literature search of cassava-related research ongoing at UGM
4. to survey small-scale cassava processing techniques in nearby areas
5. to obtain data from Department of Agriculture offices.

I Solar Drying Workshop (October 24 - 29, 1983)

Dr. M.S.A. Sastroamidjojo and Dr. Yohannes from UGM were the principal instructors at the workshop, although others speakers from Agricultural Technology, Animal Husbandry and Industrial Agriculture were also included. The workshop consisted of both seminars and practical training. The following were seminars presented at the workshop :

a. New sources of energy
b. Production of charcoal from agricultural waste products
c. Drying animal feed products.

d. Measurement of sun intensity

e. Drying rendeng

f. Large scale construction of sun-drying apparatus'

g. Drying Virginia tobacco

h. Drying fruit

i. Drying rice

Following completion of on-going experiments with a large-scale solar drier at UGM, the apparatus will be installed at Sub BPTP-Karawang, therefore it was important to learn the theory and practical application of solar drying.

A small-scale solar drier, which was used in drying gaplek, was also demonstrated. Gaplek dried faster with the solar drier and was of better quality than that dried with the traditional method of drying on bamboo mats.

4. Food Scientists at UGM

Ir. Soemardi and I met with the Dean of the Faculty of Agricultural Technology, Dr. Mohammed Rusti, M.S. and also the chair persons of the Departments of Agricultural Mechanization (Ir. Soemangat) and Food Technology (Ir. Murdijati). These two departments are under the Faculty of Agricultural Technology.

Ir. Soemangat gave us a tour of his facility, which is basically a workshop, and demonstrated the use of some small-scale processing equipment that they are currently working on. These included "ferrocement" and "bamboocement" silos, a drier powered by a bicycle, a rotary drier turned by hand and a solar drier.

Ir. Murdijati also gave us a tour of the food technology facilities, which included sensory labs, a workshop, a processing lab, a microbiology lab and a chemistry lab. Six staff members of the department are involved in tuber crop research. Some of the topics already studied include:

a. drying of cassava chips, cubes and gelondong
b. quality factors
c. insect and mold damage
d. forced-air drying
e. solar drying
f. cassava as a source of ethanol and fructose
g. processing of cassava starch.

Other lecturers from the Department of Food Technology met during this time were Dr. Slamet (food chemist, PhD from Michigan State University) and Dr. Tranggono (food scientist, PhD from Michigan State University).

3. Literature Search - UGM

Past thesis' from the Faculty of Agricultural Technology were reviewed and the pertinent ones were photocopied for the BPTP library. In addition, lecture notes/syllabi from various classes were photocopied for the BPTP library.

4. Cassava Processing Techniques

Cassava producers/processors in the Kabupatens of Gunung Kidul and Bantul, and in Kotamadya Yogyakarta were interviewed regarding typical cassava processing techniques. Production of the following cassava products was discussed :

132

a. gaplek	dried, sliced cassava
b. tiwul	steamed gaplek flour
c. gogik	dried tiwul
d. gatot	fermented, steamed cassava
e. tape gaplek	fermented gaplek
f. lemet	grated, steamed cassava with brown sugar and coconut
g. balok	fried, salted cassava
h. getuk	steamed, pounded cassava with sugar, flavorings and colorings.
i. growol	fermented, steamed, pressed cassava
j. gemblong	fermented, steamed, pounded cassava
k. kripiting	fried, salted cassava.

Usually, when a small-scale farmer harvests his cassava, he will sell the majority as fresh cassava, but will also consume a certain proportion fresh and dry a certain proportion (gaplek) to be stored for subsequent family consumption. The consumption of tiwul is widespread in the Yogyakarta area, most frequently as a 3 : 1 combination with rice.

Overall production of cassava products appeared inefficient and attention was rarely paid to quality factors. Drying of cassava(to gaplek) usually took place directly on the ground, without use of a mat. Gaplek was most often stored in bamboo, wood or clay boxes in the farmer's home. Insect infestation was common, however preventative measures were rarely taken. In addition, spoiled/fermented products such as gatot are likely to contain mycotoxins and other dangerous by-products.

Cassava postharvest treatments definitely require greater supervision and attention as fas as sanitation and efficiency are concerned. It is hoped that this brief survey will stimulate research efforts.

5. <u>Department of Agriculture</u>

Department of Agriculture offices in Yogyakarta (D.I.Y.) and Gunung Kidul were visited in order to obtain the following information :

a. production of cassava and other crops in D.I.Y. and the various kabupatens

b. price of cassava in the fresh, dried and starch forms in D.I.Y.

c. labor needs in cassava production and processing

d. cost per Ha to produce cassava, compared with income

e. cassava processing industries in D.I.Y.

In addition to obtaining the above information, Department of Agriculture personnel assisted in surveying farmers and processors in the area and offered information based on their own experiences.

DMB:is

TRIP REPORT

SMALL - SCALE CASSAVA PROCESSING
IN YOGYAKARTA

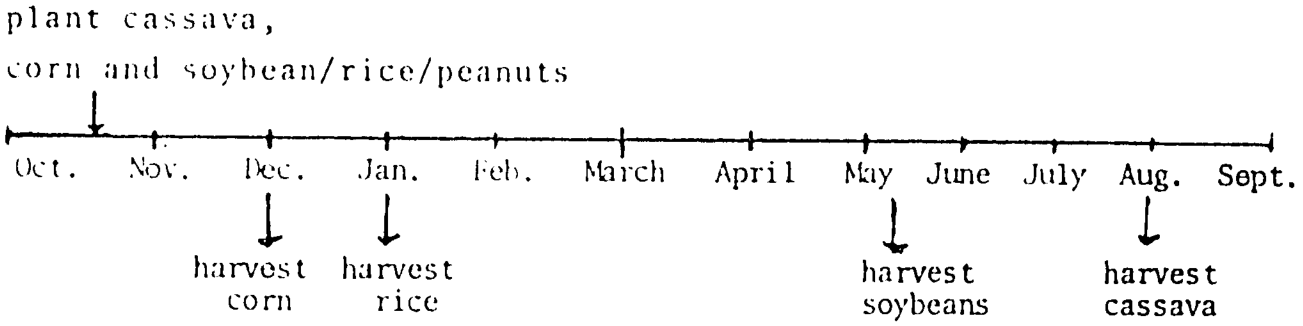
Survey, October 24 - 29, 1983

Diane M. Barrett

A. GENERAL

1. Planting Cycle - Gunung Kidul

According to Ir. Zainal Arifin (Dinas Pertanian, D.I.Y.) and Ir. Imam Yubuguo (Dinas Pertanian, Kabupaten Gunung Kidul) the planting cycle is as follows :

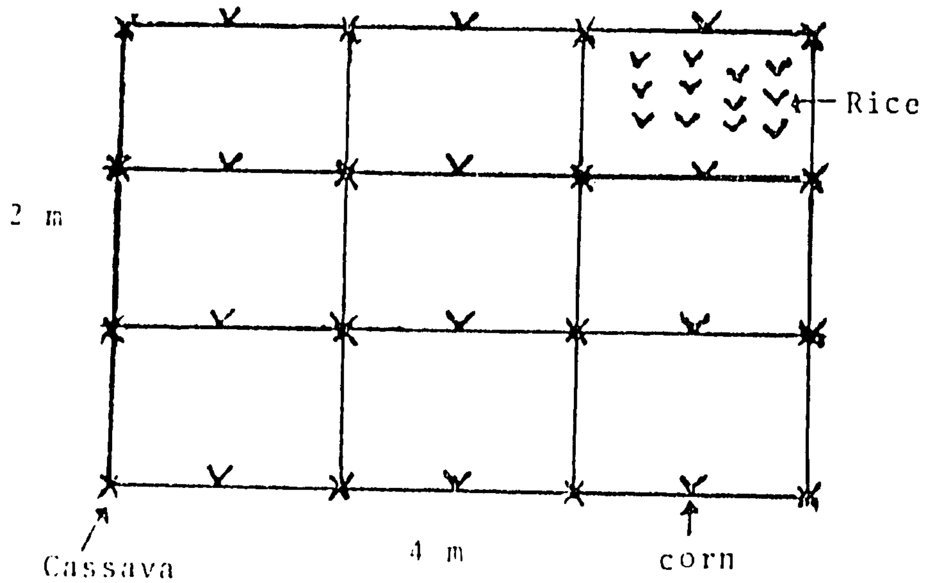


In Gunung Kidul, crops are only planted once a year (simultaneously

2. Planting system

Dinas Pertanian is sponsoring an "operasi khusus" in which they are teaching farmers in Gunung Kidul how to plant cassava, corn and rice simultaneously :

2 m x 4 m



After the rice is harvested, a secondary crop such as peanuts or soybeans is planted.

3. Cassava Products

The following products were mentioned as those common in the D.I.Y. area :

a. gaplek	f. getuk	k. misro
b. tiwul	g. belok	l. roket
c. gogik	h. combro	m. lemet
d. gatot	i. growol	n. gemblong
e. tape	j. cemblon	O. kripiting

4. Villages Visited

Two villages were visited :

a) Desa Karangrajek
Kecamatan Wonosari
Kabupaten Gunung Kidul

b) Desa Depok (getuk, growol, kripiting)
Kecamatan Bantul
Kabupaten Bantul

B. FRESH CASSAVA PRODUCTS

1. Gaplek

Fresh cassava
roots
↓
peeled
↓
washed
↓
sun-dried
5-7 days
(turned every 2-3 days)
↓
Gaplek

a) Drying

Cassava is dried either directly on the soil or on a bamboo mat. Most of the farmers we saw dried cassava directly on the soil. Cassava is only turned every 2-3 days because otherwise there is a lot of breakage and loss. "Dryness" is determined by the ability to break the root in half easily and hear a certain hollow sound. Whole roots were dried, but these were extremely thin, perhaps 4 - 6 cm in diameter.

b) Consumption

Farmers reportedly kept 100% of their cassava produce for their own family's consumption. If they needed additional gaplek or fresh cassava, they bought it from the market.

c) Storage

Gaplek was stored, at one home, in a 2.5 quintal capacity bamboo box ("bodag"), covered with a gunny sack. Gaplek could, reportedly, be stored up to 6 months with "no quality problems". However, when the gaplek (which had been stored 2 months) was investigated, insect infestation and mold growth were already obvious. When asked about the "flour" in the bottom of the storage container, villagers said that it smelled bad, but was always processed as tiwul and eaten.

d) Yield

Yield of gaplek from 1.0 quintal of fresh cassava is usually about 0.35 quintals of gaplek (i.e. 35%). One farmer in this area owned 2 Ha of land, 25% of which was planted to cassava. From this amount of land (i.e. 25% of 2 Ha = 0.5 Ha) he said 5 quintals of gaplek are typically produced per year, i.e. :

1).	Total land	2 Ha
2)	% Cassava	25%
3)	Total land planted to cassava	0.5 Ha

4) Total gaplek produced per year 5 quintals

5) Conversion (cassava gaplek) 35%

6) Total cassava produced per year (5 quintals/0.35) 14.29 quintals

7) Total Cassava produced per hectare per year 28.57 quintals

The above calculation does not seem logical. This implies that 28.57 quintals, or only 0.286 tons are produced per hectare. Either there is a high percentage of losses or/and the farmer does not actually own 2 Ha of land. If his actual land total was actually o.2 Ha, the total cassava per hectare per year would be :
x = (14.29 quintals)/ (0.2 Ha) (0.25 percent) = 285.8 quintals.

2. Lemet

Fresh cassava roots
↓
peeled
↓
washed
↓
grated
↓
mixed with gula merah, colorings and coconut.
↓
Steamed
↓
L e m e t

3. <u>Balok</u>

Fresh cassava roots
↓
peeled
↓
washed
↓
Cut in pieces, 5 cm long
↓
Soak briefly (5 minutes) in
solution of salt and pounded garlic
↓
drain
↓
fry (10 mn.)
↓
Balok.

4. Getuk lindri (Pak Suwarti, Desa Depok, Bantul)

Fresh cassava roots
↓
peeled
↓
washed
↓
Soaked overnight
(12 - 15 hours)
↓
steamed
↓
pounded (hot)
↓
cool
↓
pounded
↓
add saccharin, vanilla,
sugar, salt, colorings, flavorings
↓
pounded
↓
formed into balls
↓
ground/extruded
↓
cut into 5 cm pieces
↓
top with coconut
↓
Getuk lindri

a) Processing

Usually, cassava is peeled the afternoon or evening prior to getuk production. It is usually peeled and washed about 7:00 or 8:00 p.m., then soaked in a large barrel (same one used for steaming) until perhaps 3:00 am the next morning. According to the processors, there is no problem with soaking up to 12 - 15 hours. Roots typically fall to the bottom of the barrel as soon as transferred.

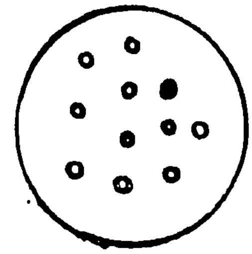
The next morning (3 a.m.), roots (up to 30 kg) are steamed whole in the barrel for 1- 1 1/2 hours. Roots sit on a perforate plate inside the barrel. Directly following steaming, the hot roots are placed in a rectangular wooden box and pounded with a wooden stick.

The pounded roots are then spread on a Blue Band greased table to cool. When cool, they are returned to the same wooden box and colorings are added. These Include :

1) sari gula (saccharin)............................ 0.5 OZ
2) vanilla .... 3 - 5 grams
3) sugar .... 1 kg
4) salt .... 1 teaspoon
5) frambos .... 25 ml
6) colorings .... 3 packets

The sari gula (saccharin) was said to be 10x sweeter than sucrose, but bitter if too much was added. "Frambos" is a flavoring like vanilla, but the English name was not known. The bottle had a picture of bananas on it! The colorings were small paper-wrapped packages purchased in the market, the sources of which were unknown.

The flavorings and colorings were mixed with the approximately 20 - 25 kg (from 30 kg original) of cassava on a table, then were returned to the wooden box and pounded for the third time. Following pounding, the vari-colored mixtures were formed into balls and extruded through a meat grinder with a perforated plate as such : The long pieces were cut further into slices 5 cm long and approximately 1 - 2 cm wide.



b) Economics

Processing, which begins with steaming at 3:00 a.m., is completed at about 8 a.m., after which the husband (a husband-wife team did all the work) sells his product in a "grubak" (grobak dorong) or cart. This sales usually takes from 8 a.m. to 6 p.m. Meanwhile, the wife is at the market buying raw materials.

1) Expenditures*

(a) Raw materials

(1) Cassava Rp. 70/kg x 30 kg	Rp. 2,100,-
(2) Sari gula Rp. 500/OZ x 0.5 OZ	Rp. 250,-
(3) Vanilla	Rp. 100,-
(4) Sugar Rp.600/kg x 1 kg	Rp. 600,-
(5) Salt	Rp. 20,-
(6) Frambos	Rp. 110,-
(7) Colorings Rp. 10/packet x 3 packets	Rp. 30,-

(b) Laborers

(1) Man 3 a.m. - 8 a.m. - 6 p.m. = 15 hours typical wage, Yogka,8 hrs = Rp. 1000,- Rp. 1000/ 8 hrs. x 15 hrs	Rp. 1,750,-
(2) Woman 3 a.m. - 8 a.m. - 11 a.m, (marketing) 7 p.m. - 8 p.m. (peeling) = 9 hours typical wage, Yogka,6 hours = Rp. 750,- Rp. 750/6 hrs. x 9 hrs.	Rp 1,125,-

(c) Kerosene for steaming cassava

Rp. 125/1 x 2 1	Rp. 250,-
Total expenditures	Rp. 6,335,-

2. Income

Income approximately Rp. 7,500 - 10.000,-/day
(Rp. 25 per piece) Average Rp. 8,750,-

3. Profit

Rp. 8,750 - Rp. 6,335 Rp. 2,415,-

*Does not include cost of steamer, table, wooden box or grinder.

5. <u>Growol</u>

Fresh cassava roots
↓
peeled
↓
washed
↓
soaked 4-5 days until spoiled
(until, if touched, roots break apart)
↓
steam (afternoon)
↓
pile up in "tanggok"
↓
press, expel water
↓
line and cover with banana leaves
↓
sit overnight (6-10 hours)
↓
cut into slices
↓
growol

142

A "tanggok" (tenggok in Javanese) is a bamboo/rattan container, which is available in various sizes. Water is expelled from the spoiled, steamed cassava through the holes in the tanggok, then it is lined with banana leaves and the cassava (typically 5 - 10 kg), is placed inside overnight. Meanwhile, fermentation continues. Growol is typically consumed for breakfast. It appears as a heavy, off-white doughy substance, with lots of holes (CO_2 produced during fermentation). Growols smells bad - a bit on the sour side - but the taste is said to be "ok". I found the taste acidic. Growol is commonly eaten with tempe (to kill the taste !).

b. Gemblong

(Sundanese "ulen")

Fresh cassava roots
↓
peeled
↓
washed
↓
soaked overnight
(approx. 5 pm to 3 am)
↓
steamed
↓
pounded
↓
pressed (in banana leaf - lined "tanggok")
↓
cut into slices
↓
gemblong

7. Kripiting

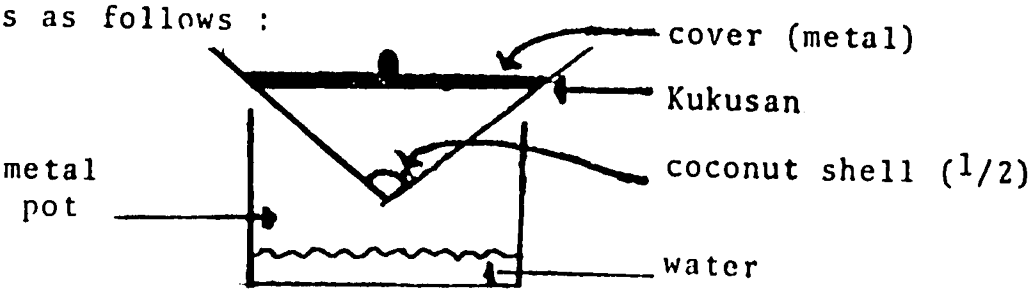
Fresh cassava roots
↓
peeled
↓
washed
↓
soaked in salt water
(short time)
↓
sliced thin
↓
fried

C. DRIED CASSAVA PRODUCTS

1. Tiwul

Gaplek
↓
pound
(gaplek flour)
↓
add water
↓
mix/swirl in flat bamboo basket
(until forms small "grains")
↓
steam (15 - 30 minutes)
↓
tiwul

Water is added to the gaplek flour in a nyiru and then mixed with the fingers. The product is then swirled and continually seperated by hand until small grains about the size of rice grains are formed. The wet product is then steamed in a bamboo "kukusan" for 15 - 30 minutes. Steaming does not begin until water is already boiling. Steaming device is as follows :



Tiwul is usually eaten in a 3 : 1 combination, tiwul : rice.

2. Gogik (Oyek)

If there is tiwul left over, gogik is made as follows :

Leftover tiwul
↓
sun-dry
↓
gogik

Gogik tastes the same as tiwul and can be stored up to one year. If gogik is to be eaten, the method of cooking is :

Gogik
↓
wash/soak (6 hours)
↓
drain
↓
steam

3. Gatot

Gaplek

↓

soak (12-24 hours)

↓

Put in a covered "tanggok"
approximately one week (until spoiled/black)

↓

soak (12 hours)

↓

cut into small pieces
(2 - 3 cm long, 1 cm wide)

↓

wash

↓

steam

↓

add cooked solution of
gula merah and vanilla, top
with grated coconut

↓

gatot

Gatot purchased in the marker appeared black inside, but yellow outside, however the dried, already-spoiled tubers seen at the village appeared black throughout. After cutting the spoiled tubers into small pieces, they are washed to remove acid. It is possible to dry and store the spoiled tubers also (like gaplek).

146

4. Tape gaplek

Gaplek
↓
Pounded
↓
until small pieces (1-2 cm^2) → Flour for tiwul
↓
soak in lime water
(12 hours)
↓
wash
↓
steam (kukusan)
↓
cool
↓
add starter culture (ragi)
↓
package (daun pisang/jati)
↓
fermentation
(48 hours)
↓
tape gaplek

The pounded gaplek is soaked in lime water (air kapur/ kapur sirih) 1 teaspoonful per bucket of water - in order to clarify the water and so that the gaplek pieces will not be sticky. Eight ragi pieces (NKL from Solo) are used per 6 kg pf gaplek. Usually the gaplek is fermented in a bamboo basket, "tanggok".

APPENDIX III

TRIP REPORT

BPTP - SUKAMANDI

October 4, 1983

Diane M. Barrett

On October 4, 1983, I visited the Sukamandi Research Institute for Food Crops and met with the research group involved in chemistry and quality control The following observations were made :

1. Staff

The research staff in the chemistry and quality control research group consists of :

a) Dr. Djoko Damardjati	Ph.D Food Chemistry (IPB)
b) Ir. Robertus Mudjisihono, M.S.	M.S. Food Technology (UGM)
c) Ir Udin, M S	M.S. Seed Technology (IPB)
d) Ir. Juniarso	Ir. Food Technology (IPB)
e) Ir. Ayuk Wahyu	Ir. Chemistry

in addition to six technicians. There are 5 BPTP - Karawang staff currently studying for either MS or PhD degrees at IPB and UGM who may eventually work at BPTP - Sukamandi

2. Activities

The chemistry and food quality research group has a yearly budget of Rp 15 million for the following activities :

a. Routine analysis - rice chemistry

1) amylose content

2) gelatinization temperature

148

3) gel consistency

4) protein content

b. Routine analysis - rice quality control

1) milling quality

2) brown rice yield

3) milled rice yield

4) brokens

5) head rice yield

6) immature grains

7) empty grains

8) red grains

9) yellow grains

10) bulk density

11) hardness

c. Research

1) physical/chemical characteristics of rice and influence on cooking and eating quality

2) structure of rice starch granules

3) digestibility of rice protein

4) optimization of rice physical/chemical characteristics others.

3 Equipment

Currently, the following equipment is available in the chemistry and quality control labs :

a. Chemistry Lab

1) Analytical and rough balances
2) Spectrophotometer
3) Gel electrophoresis equipment
4) Kjeldahl apparatus
5) Rice mills

b Quality Control Lab

1) Rice separator
2) Husker
3) Rice sieve
4) Hardness tester
5) Boerner dividers

Dr. Djoko has recently received a Rp. 2.5 million budget for equipment and has ordered the following equipment (projected arrived 4/84) :

1) HPLC - Waters
2) UV spectrophotometer
3) Soil Determination-Chem Lab
4) Atomic Absorption Spectrophotometer
5) Flame photometer
6) Gas chromotograph
7) Visco Amylograph
8) Warburg Apparatus
9) Polarimeter
10) Viscometer, Brookfield
11) Refractometer

12) Food Testing - Instron

13) Turbidimeter

14) Ubbelonde Viscometer

15) Basic Protein Apparatus - Kjeldahl - Tacator(Sweden)

16) Seed Counter

17) Spectrophotometer (single beam)

18) Scanning microscope (SEM)

19) High vacuum evaporator - for SEM

20) Critical Point Dryer - for SEM

21) Ion coater - for SEM

22) Constant temp. refrigerated recirculating heat exhanger - for SEM

23) Voltage regulator

24) Gel scanner.

It is hoped that the consultant may be able to assist with initial set-up of the new equipment.

DMB · is

INSTITUT	:	Sub-Balai Penelitian Tanaman Pangan Pasar Minggu
RESPONDEN	:	Pudjo Tjiptono, M.Sc.
TANGGAL WAWANCARA	:	Nopember 23, 1983

A. STAF

1. Jumlah : 83
2. Bagian-bagian : 18 Staf Peneliti (sarjana dan diatas)
   18 Pembantu Peneliti (SAKMA -2, SMTA-14, SKKA-2) SLTA di lab.
   62 Administasi, Kebun, Supir dll .
3. Staf sedang belajar :

a) Mohammad Sudibyo, M.Sc.	Ph.D	1984 (Feb)	Postharvest Horticulture	UPLB Los Banos
b) Rooswani, M.Sc.	Ph.D	1984 (Sept.)	Postharvest Horticulture	UPLB Los Banos
c) Iman Muhadjir, M.Sc.	Ph.D	1985/86	Postharvest Horticulture	UPLB Los Banos
d) Ir. Sabari	M.S.	1984 (Sept.)	Food Science	IPB

4. Staf Peneliti :

1) Dr. Syaifulloh	Horticulture
2) Pudjo Tjiptono, M.S.	Food Science
3) Moh. Sudibyo, M.Sc.	Food Science
4) Rooswani, M.Sc.	Food Science
5) Iman Muhadjir	Food Science
6) Ir. S a b a r i	Food Science
7) Laksmi, B.Sc.	Food Science
8) Ir. Heriyati	T H P
9) Ir. Wisnu Broto	T H P
10) Ir. Sulusi Prabawati	T H P
11) Ir. Sunarwati	T H P
12) Ir P o e r n o m o	Food Science
13) Dudung Muhidin, B.Sc.	A K A

14. Murtiningsih, B.Sc. T H P
15. Dewi Utami, B.Sc. T H P
16 S u y a n t i, B.Sc T H P
17 Elizabeth Sitorus, B.Sc.x) A K A
18. Ir. Setiyadjit x) T H P

5 Tambahan Staf :

a) Tenaga Honorer yang akan diangkat dalam waktu dekat

Sarjana muda 1

Sarjana 1

b) Tambahan tenaga honorer baru, direncanakan sekitar 10 sarjana.

B <u>KOMODITI YANG DITELITI</u>

1. Buah-buahan (semua)
2. Sayur-sayuran (semua)

Dapat diminta di BPHP (Machyuddin)

<u>Risalah Lokakarya Pasca Panen Hortikultura</u> (Feb. 1982)

(informasi tentang penelitian, sampai 1982).

3 Kegiatan Penelitian Teknologi Hasil Hortikultura dalam bidang :

a) Fisiologi Lepas Panen

b) Perlakuan segar

(pengepakan, pengangkutan, dan penyimpanan)

c) Pengawetan

(fermentasi, pengeringan, pembotolan, pengalengan dll.)

d) Pengolahan

e) Pembakuan (standardisasi) dan Pengawetan Mutu.

4 Produk-produk

a) Saus pepaya	i) kimche (sauerkraut)
b) bumbu nasi goreng	j) kubis asam
c) kecap kecipir	k) rambutan dalam sirop
d) keripik pisang	l) rambutan + nanas/sirop
e) sambal	m) kelapa muda/sirop
f) keripik kentang	n) nanas sirop
g) saus cabe	o) tepung pisang
h) pati kentang	p) tepung pisang nangka

x) Tenaga Honorer

q) jelly jambu biji

r) jelly nanas

s) jelly jeruk

t) kecap kacang jogo

u) manisan mangga

v) kue kering (tepung pisang)

w) sari mangga

x) sari pisang

y) pickles (ketimun, jambu biji, pare belut).

C. FASILITAS

1. Jumlah lab : 5, + dapur

2. Macam lab :

Lab mikrobiologi makan	~	40 - 50 m^2
Lab Kimia	~	160 m^2
Lab fisiologi	~	10 - 15 m^2
Lab pengolahan	~	250 m^2
Lab uji organoleptik	~	50 - 60 m^2
Dapur	~	50 - 60 m^2

3. "Overall impression"
   a) Lab-lab tua, tapi bersih
   b) ada pipa air dan "steam" di lab pengolahan
   c) ventilasi cukup baik
   d) sering digunakan.

D. PERALATAN

I Lab Pengolahan

a) Filter press

b) Centrifuge

c) Carbonator (add CO_2)

d) Cooker/steamer

e) Double jacketed pans (6)

f) Retorts (3)

g) Blanching equipment

h) Boiler

i) Refrigerator

j) Hydrolic press

k) Vacuum evaporator

l) Solar drier

m) Sprayer/Washer

n) Shelf drier (forced air)

o) press

p) mill

q) can sealer

r) rasper/disintegrator

s) bolting machine

2. Lab Fisiologi

   a) Gas chromatographs (2)
   b) Spectrophotometer
   c) Respirometer
   d) Tintometer

3. Lab Kimia

   a) analytical balances (2)
   b) ovens
   c) muffle furnace
   d) fume hood
   e) % RH meter
   f) Texturometer

4. Lab Mikrobiologi

   a) incubator (2)
   b) autoclave
   c) oven
   d) TDT retort
   e) UV room
   f) microscope
   g) refractometer

5. Lab Organoleptik

   a) table
   b) chairs

6. Dapur

   a) ovens
   b) gross balances

7. Akan datang bantuan alat-alat lab dari kerjasama

   a) ASEAN - Australia
   b) ACIAR

E BUDGET

*	1980/1981	Rp. 12.500.000,-
**	1981/1982	Rp. 75.000.000,-
**	1982/1983	Rp.115.000.000,-
**	1983/1984	Rp. 92.000.000,-

* Masih digabung dengan Proyek Penelitian Hortikultura

** Proyek Penelitian Pasca Panen Tanaman Pangan Pasar Minggu

F. KERJASAMA

1. ASEAN - Australia	1977	1985
2. ACIAR	1984	1987

DMB:is.-

156

APPENDIX V

RICE POSTHARVEST RESEARCH

SUB - BPTP - KARAWANG

1975 - 1982

No.	Year	Title and Researcher(s)	Summary of Results
1.	1975/1976	Survey of paddy and milled rice storage in East Java and South Sulawesi Soemardi R. Soetoyo	1. Samples of rice stored in BULOG warehouseswere of better quality than those stored in BUUD, farmer's, or miller's warehouses. 2. It was not too difficult to store rice with a moisture content below 14%. 3. Fumigation of warehouses was common in all except those owned by the farmer. 4. Rice was rarely graded for quality prior to storage. 5. Sanitation was inadequate, usually rice was stored in the same room that milling took place.
2.	1975/1976	Survey of paddy and milled rice storage in West Java, Central Java and Yogyakarta Soemardi, Rodiah S., Susilo Santoso	1. After 9 months of storage, rice stored in West and Central Java exhibited only external paddy breakage. A significant loss was not observed. 2. Total yields and yields of head rice in West Java were 60-65% and 40-50%, and in Central Java 61-68% and 35-59% 3. Imported rice stored better than domestically produced rice in West Java. 4. It was obvious that initially high quality rice stored longer than low quality, and paddy stored better then milled rice. 5. Rice with a moisture content below 14% was easily stored. 6. Fumigation was used by BULOG. 7. After 9 months of storage in BULOG warehouses, maximum losses observed totalled only 5%.
3.	1975/1976	Storage of paddy, milled rice, off-white and polished (white rice) in various types of packages.	1. Throughout storage all rice forms exhibited losses in the form of increasein broken rice, decrease of head rice and decrease in total weight. 2. Observations of spoilage of the outer surface of the grain indicated that the milled rice was the least well stored,

<table>
<tr><td></td><td></td><td>Soemardi,
Susilo Santoso</td><td>especially when the storage container was an open bamboo basket.
3. In addition, it was observed from outer surface spoilage that white polished rice stored best, especially when the storage container was a gunny sack.
4. Spoilage of all forms of rice took place faster when stored in an open bamboo basket than when stored in gunny sacks and plastic bags.</td></tr>
<tr><td>4.</td><td>1976</td><td>Influence of harvest age on quality of harvested rice

Soemardi,
Yetty Setiawati</td><td>1. Immature paddy and empty paddy decrease as moisture content decreases.
2. For the bulu variety of rice, the highest percentage of head rice (i.e. 28.47%) was found when the paddy was of 24-26% moisture. For IR-34 variety rice, the highest head rice yield (i.e. 35.56%) was found at a moisture content of 28 - 30%
3. The highest percentage of broken rice for varieties (i.e. 17.33% for bulu variety and 23.26% for IR-34 variety) was found in 20 - 22% moisture content rice.
4. For both varieties, percentage of chalky grains decreased with decreasing moisture content.
5. Drying time for varieties (i.e. to "kering giling" or 20 - 22% moisture) was longer with higher initial moisture content paddy and with greater amounts of material. For example :
<table>
<tr><td rowspan="2">bulu variety</td><td>2 kg</td><td rowspan="2">28-30% to 20-22% moisture</td><td>4.75 hours</td></tr>
<tr><td>250 kg</td><td>4.75 - 7.25 hours</td></tr>
<tr><td rowspan="2">IR - 34</td><td>2 kg</td><td rowspan="2">28-30% to 20-22% moisture</td><td>2.5 - 10.0 hours</td></tr>
<tr><td>250 kg</td><td>4.5-14.0 hours</td></tr>
</table></td></tr>
</table>

158

5.	1976 / 1977	Use of a drying mat in the drying of paddy and milled rice and effects on drying time and rice quality Ridwan Thahir, Susilo Santoso	1. Bundles (3-4 cm diameter stalk) of unthreshed paddy took longer to dry than loose, threshed paddy. 2. Drying both IR-36 paddy and milled rice was faster on cement drying floors than on gunny sacking or plastic sheets. 3. Dehulling of paddy occurred most when drying took place on cement floors, and cracking of paddy took place most on cement and plastic surfaces. 4. There was more tendency for milled rice harvested in the wet season to break rather than that harvested in dry season.
6.	1976 / 1977	Observation of the influence of initiation of paddy drying time on subsequent quality of milled rice. Soeharmadi, Soemardi.	1. Paddy drying resulted in the highest yield of head rice when sun drying took place from 8:00 - 10:00 am and the lowest yield when dried from 12:00 - 2:00 pm to a constant moisture content, during both wet and dry seasons. 2. Total amount of time required to dry paddy to 14% moisture was lowest when drying occurred from 12:00 - 2:00 pm and highest from 8:00 - 10:00 am.
7.	1976 / 1977	Survey of rice processing and storage in East Java. Rodiah Sujastani	1. Harvesting, threshing and drying methods are still traditional and in need of improvement. 2. Paddy drying is usually done by solar drying. Some artificial driers are available at BUUDs and KUDs, but they are not used for technical and economic reasons. 3. Milling of rice by manual beating was not being used anymore in the area surveyed. Most processors, from small to large, used mechanical mills. 4. Only a small percentage of the well-to-do farmers stored rice in a lumbung or gudang, and those used very simple methods. 5. Long term storage (6 - 8 months) was only carried out by BULOG, who used adequate storage procedures. 6. BUUDs and KUDs do not store rice, they only collect and process paddy/rice.

8.	1976/1977	Influence of tempering time after drying on quality and yield of rice. Soetoyo	1. The higher the amount of paddy dried, the longer the tempering time required following drying. For example, with the Pelita I/1 variety, percentage of rice obtained following drying of 5 kg of paddy and tempering 2½ hours was 40.55%, however after drying of 400 kg of rice, 4 hours of tempering was required to produce a 47.55% yield of head rice. For the IR-26 variety, 5 kg of rice required 2 hours of tempering following drying to produce a yield of 51.59% head rice and 400 kg required 4 hours of tempering to yield 56.18% head rice. 2. For the same amount of tempering time, the higher the percentage of head rice, the smaller the percentage of brokens, immature grains etc. and vice versa. 3. It was found that most of the rice milled following tempering did not meet Directorate of Agricultural Economics standards.
9.	1976/1978	Influenced of bulk quantity of paddy/milled rice stored on quality and yield Susilo Santoso.	1. The greater the bulk quantity of paddy/rice stored, the greter the percentage spoilage. 2. Stacks greater of 2, 4, 6,8 and 10 sacks in height showed low losses during storage for one year. 3. After storage for one year, there was no difference in percentage of head rice obtained from stacks containing 0 (i.e. unstacked), 2, 4, 6, 8 and 10 layers of sacks. 4. During storage, milled rice moisture content was always higher than paddy moisture content.
10.	1977	Survey of paddy and milled rice storage in Central Java and Yogyakarta (D.I.Y.) Susilo Santoso	1. In general, farmers that store paddy/rice do not use serious environmental or safety measures. 2. Most warehouses do not meet physical construction requirements. Dolog warehouses are not free of birds and rats and farm level warehouses are even

160

			more inadequate. 3. Minimum capacity of warehouses in Central Java and D.I.Y. are 175,000 tons and 14,000 tons respectively. 4. Problems arising for the farmer include : a) The new high-yielding, resistant varieties are easily broken and contain many chalky grains, therefore the price is decreased. b) The farmer is not yet using serious environmental and safety measures in the storage of his rice. Steps should be taken in order to solve the above problems and thereby decrease losses and spoilage of rice. Safety measures, among others, should include use of a storage container or sack as packaging and use of fumigants, sanitation, ventilation etc. in the warehouse. 5. Storage warehouses which can accept the yield of a sudden peak harvest should be prepared. After harvest, most of the losses and spoilage are caused by insect attack, especially at the farm level. 6. Results from experiments dealing with storage of imported rice reveal that rice from Burma, stored in gunny sacks, showed the highest breakage (25.65%), followed by rice from Pakistan stored in gunny sacks (15.54%) and finally rice from America, stored in plastic bags (12.77%).
11.	1977	Observation of the influence of drying time on the quality of IR-30 paddy and milled rice. Rumiati	1. A difference was noted in air temperature, drying floor temperature, paddy temperature and % R.H. during drying from 8:00 am to 4:00 pm. In this experiment it was found that average drying temperatures at mid-day (i.e. 11:00 am to 3:00 pm) were higher than those during the morning (8:00 am to 12:00) or morning and afternoon combined (8:00 am to 4:00 pm). 2. It was found that during dry season conditions in October in Karawang the cement drying floor temperature was higher than that of the air. The rough rice temperature was intermediate between the two. 3. Reduction of rough rice moisture content during the

161

			dry season occurred more rapidly from 11:00 am to 3:00 pm than from 8:00 am to 4:00 pm. 4. Differences in drying temperature and speed of drying did not result in observable differences in rough rice quality.
12.	1977 / 1978	The effect of rice layer thickness during sun-drying on subsequent rice milling quality. Soetoyo, Rumiati	1. Rice layer thicknesses of 5 and 7 cm during sun-drying gave better milled rice quality than layers of 1 cm, 3 cm, 9 cm or 11 cm. 2. Reduction of rough rice moisture content to 14% was slower with thick rice layers than with thin, however more rough rice could be dried if layers were thicker.
13.	1977 / 1978	The influence of initial moisture content on quality of paddy/ milled rice during storage Rodiah, Susila, Soemardi	1. Storage of rough rice in 10 kg aerated sacks with initial moisture contents of 11.59%, 14.21 % and 16.59% did not result in an observable quality difference between the three treatments. 2. Spoilage or quality reduction is more drastically affected by length of storage than by initial moisture content of rough rice. 3. The low yield of head rice following milling of stored rice with an initial moisture content of 11.59% resulted due to "sun cracking" due to the intensity of sunshine during extended drying. Drying to such a low moisture content was not deemed efficient. 4. Yields of head rice and total yield of milled rice increased after several months of storage. 5. Rough rice stored 1 year was still of good quality.
14.	1978	Yield and milling quality of ten promising rice varieties from Bogor Soemardi, Rumiati	1. Of eleven promising varieties tested, i.e. Galur 1919, 1933, 1950, 1955, GH 28, GH 43, GH 67, GH 68, GH 69, GH 70, and IR 26, the most promosing varieties, as far as yield and quality, were GH 67 and GH 43. These two had high percentages of head rice and low percentages of broken and immature rice. 2. The order of performance (from best to worst) for the other varieties was as follows : GH 70, GH 28, 1950, 1955, 1919, 1933, GH 69 and GH 68.

162

15.	1978	Research on the yield of paddy in domestic food expenses in West Java Soemardi, Soetoyo, Rodiah	1. The average yield of rice used in this experiment was 65.80%, with 9.05% bran. 2. Rice quality was poor due to presence of chalky grains and brokens. 3. The best method of determining quality is the visual (comparative) method, and by calculating the percentage of bran produced, The best amount of bran is thought to be 8-9%. 4. In connection with determination of milling quality, the manufacturer, age and series number must be noted. 5. In addition, during the milling quality test, analisis of waste product and "tempering time" after drying until storage must be noted.
16.	1978 / 1979	Influence of harvest age on production and quality of milled rice. Rodiah	1. The moisture content of rough rice at the first harvest, i.e. 20 days after 50% flowered, was between 27.13 - 29.49%. The optimal harvest time for Citarum rice during the rainy season was between 19.81 - 23.33% moisture content and during the dry season at 15.12-20.62% moisture content. Optimal harvest time for the PB-38 variety during the rainy season was 21.63-23.12% moisture content. 2. Harvest time had a large influence on production of the PB-38 variety. The first harvest exhibited low production, but later harvest produced more, until an optimal time, after which production decreased. "Production" was determined by yield of brokens, milled rice, head rice and weight of 1000 grains of rice. The highest production reached for Citarum was 4.[illegible] tons dry rough rice/hectare and for PB-38 4.57 tons/hectare. Average yield of denulled rice harvested at the optimal time for Citarum was 75.32% during the rainy season and 74.[illegible]% during the dry season; for PB-38 the percentage was 75.09% during the dry season. Average yields of milled rice were: Citarum-rainy season= 65.40%, PB-38-rainy season= 66.75% and dry season = 67.04%.

			3. Chalky and immature grains decreased with age. Citarum variety rice harvested 26 days after flowering had less than 5% chalky and immature grains while PB-38 was still high. 4. Harvest losses increased with age. Losses with the Citarum variety, 20 days after flowering, averaged 3.78%, at optimal harvest, 4.74% and 38 days after flowering, 6.89%. With the PB-38 variety losses were 3.97%, 20 days after flowering, 4.45% at optimal harvest and 5.17%, 38 days after harvest. 5. Optimal harvest time for the Citarum variety was 26-30 days after flowering during the rainy season, and 26-33 days after flowering during the dry season. For the PB-38 variety, peak harvests were 28-30 days after flowering during the rainy season. This was true for normal rice. For PB-38 rice infested with insects, it was found that optimal harvest was 32-36 days after harvest.
17.	1978/1979	The effect of foreign matter concentration on quality of grain during storage. Soemardi	1. Statistically, there was no significant difference between the effect of 3% foreign matter and 6% foreign matter on the quality of stored rice. 2. There was no significant difference in milling recovery of rough rice stored with 3% and 6% foreign matter.
18.	1978/1979	The effect of moisture content on the quality of paddy stored in bamboo baskets and polypropylene bags. Sudaryono, Soetoyo	1. Stored paddy with a low initial moist content has different qualities than paddy stored with a high initial moisture content. Dried paddy tended to reach a lower equilibium moisture content than wet paddy. 2. There was no effect of initial moisture content level (between 12 - 16%) of paddy on total milling recovery following storage, whether the paddy was stored in open bamboo baskets or polypropylene bags.
19.	1978/1979	A modified "lumbung" for rice storage at the farm level.	1. Rice stored with a initial moisture content of 15.10% and initial foreign matter content of 5% in bulk quantities of 3000 kg was still in good condition after one year.

		Soemardi, Rumiati, Soeharmadi	2. The percentage of rice spoiled during the one year of storage was still within limits set by the Indonesian government. 3. A modified lumbung, with improved aeration, may decrease spoilage and improve milling recovery.
20.	1978/1979	Influence of initial moisture content on subsequent degree of breakage and quality of paddy stored in gunny sacks. Yetty Setiawati, Ridwan Thahir	1. Initial moisture content of rice stored in 75 kg gunny sacks for one year influenced amount of head rice, brokens and rice dust while length of storage time affected all quality factors. 2. Insect population and spoiled rice content were both below 1%, which is below the quality classification standards used by BULOG. Head rice, broken rice and rice dust contents were all influenced by initial moisture content. 3. As initial moisture content increased, percentages of brokens and rice dust increased. 4. Yields were not affected by initial moisture content and the highest yield was found after 9 months of storage (as opposed to 0, 3, 6 and 12 months).
21.	1979/1980	Relationship between quality of paddy/milled rice and planting and postharvest handling conditions. Soemardi, Rumiati.	1. Quality of harvested paddy in Indonesia varies widely, but in general is lower than that required by the Domestic Food group. This low quality is due to low milling yields, high contents of empty grains, filth, immature grains, spoiled grains and yellow grains. 2. In order to improve the quality of harvested products in Indonesia, the problems occurring preharvest, and postharvest must be handled in a coordinated effort. 3. In order to stop the problem of chalky grains, symptoms resulting in this condition should be handled by developing new varieties. 4. In order to stop the problems of low milling recovery, empty and immature grains, a method of planting that fits with the existing climatic conditions should be determined.

165

			5. In order to arrest the problem of broken grains, other than improving handling after harvest, a variety of rice which has a tough endosperm should be developed. 6. To solve the problems of yellow grains, filth and foreign matter, in addition to moisture content, postharvest handling must be improved.
22.	1979	Yield and quality of IR-36 paddy/milled rice under various planting conditions. Rumiati.	1. Rice planted at 3 different elevations (i.e. 0 m, 250 m, and 500 m), with 3 different plot sizes (i.e. 10 x 20 cm, 20 x 20 cm and 30 x 30 cm) and 3 different amounts of fertilizer (i.e. 45N-0P_2O_5 - 0 K_2O; 90 N - 45 P_2O_5- 45 K_2O; 135 N - 90 P_2O_5- 90 K_2O) showed no significant difference in yield of rice. 2. The percentage of chalky grains varied with elevation, i.e. at 0 m there was an average of 15.47%, at 250 m, 9.37% and at 500 m, 4.31%. 3. The highest amount of immature grains were seen at the 250 m elevation (9.47% average), followed by 0m (2,63% average) and 500 m (2.11% average). 4. There was a significant difference between percentage of immature grains in the different sized plots, with immature grains increasing as plot sizes increase.
23.	1979/1980	Influence of initial moisture content on degree of breakage and subsequent quality of paddy stored in wooden boxes. Soetoyo	1. Initial moisture content of rough rice stored in 600 kg wooden boxes for one year affected only the total yield and percentage of head rice and did not affect the percentage of spoiled rice, brokens, filth, foreign matter, milling recovery or fat content. 2. Length of storage influenced quality of paddy and milled rice. Effects were evident after 8 months of storage. 3. Percentage of paddy infested with insects was below 1%, except for one treatment with an initial moisture content of 14% which was stored 9 months or more. 4. At higher initial moisture contents, percentages of broken rice and rice dust increased and head rice decreased. 5. Fat content was not affected by initial moisture content of paddy

166

24.	1980	Influence of milling IR-36 rice on storage quality. Soemardi	1. Storage of milled rice with ≤ 10% brokens produced a better quality product than storage of milled rice with ≥ 50% brokens. As the percentage of initial broken rice was increased, the amount of later spoilage increased. 2. Storage infestation by rats was more serious than that by insects, especially in the case of ≥50% initial brokens. 3. Additional spoilage was due to mold growth, however this did not seem to affect quality characteristics.
25.	1980	Yield and quality of promising new rice varieties . Rumiati, Soemardi	1. Four types of rice were studied : irrigated, unirrigated (dry field), upland and lowland (swamp). 2. For irrigated rice, the best variety was No. Galur 192, Galur IR 15795-199-3-3. 3. None of the upland rice varieties tested were notably good. 4. No. Galur 194, Galur C-22 was the best unirrigated variety tested. 5. None of the lowland varieties tested were outstanding, however some were classified as "good"
26.	1980	Time of nitrogen fertilizer application, optimal harvest age and quality of IR-36 rice. Rumiati	1. The highest yield of paddy and milled rice was obtained when IR-36 was harvested in January, 33-36 days after flowering. 2. The lowest percentage of broken rice following milling was obtained when rice was harvested in January, 27-30 days after flowering. 3. Yields of rice with less than 5% immature grains were obtained when rice was harvested in January, 36 days after flowering. 4. Fertilization of rice with N½ - ½ during the rainy season gave higher yields than fertilization with 1/3 - 1/3 - 1/3.
27.	1980	Study of the yield and production quality of rice from the INSUS (Special Intensification) Program Soemardi	1. Production of rice through the INSUS program has been greater than the previous INMUM, BIMAS or INMAS programs. The average yield during the INMAS program was 5.23 tons/Ha. Production increased 10.9% with the BIMAS program and 21.4%(average) with the INSUS program. The highest

167

			increase in production from one individual group of farmers was 118.5% through INSUS and 43.8% through BIMAS. 2. The quality of rice produced during the INSUS, BIMAS and INMAS programs did not reach that required by national standards. On average, there were 4 - 7% empty grains, 7 - 8% chalky/immature grains and 4-5% spoiled grains. The quality of rice produced through INSUS was almost the same as that produced through BIMAS, but higher than that produced through INMAS. 3. Average production yields through INSUS (63.70%) were almost the same as BIMAS (63.24%) but higher than INMAS (61.62%). These are all lower than the standard (65.0%). 4. In operation, production will be lower than observed at the laboratory scale due to handling losses.
28.	1980	Influence of processing of rice on quality and yield. Sutrisno	1. The Rubber Roll Huller produced a better yield of hulled (brown) rice than the Under Runner Disc Huller Model. 2. The Cone and Friction (Engelberg) types of rice whitener produced about the same yield of milled rice. 3. The quality of rice produced with the Cone type machine, with reference to percentage of head rice, was better than that produced by the Friction or Engelberg type machine. 4. The Cone type whitener produced a higher degree of whiteness than the Friction type. 5. Although milled rice produced by the Friction type machine had a lower degree of whiteness, it was more homogenous than that produced by the Cone type. 6. As a whitener, the Friction type machine is not compatible with long or medium rice, and quite a bit is broken as a result.
29.	1980/1981	Relationship between harvesting (Sickle) and manual threshing methods and quality and quantity of IR-38 paddy and milled rice. Soetoyo	1. Cutting rice stalks at half their height instead of at the total height (i.e. near the ground) saved time and losses were only 1.41%, as compared with [illegible].30%. 2. Threshing by pedal thresher and throwing paddy down resulted in the greatest cracking (18-19.[illegible]) the lowest percentage of whole grains (31-34%) and the highest percentage of brokens (23.10%), as compared to foot threshing (cracking-15.09

168

			whole grains-36.48%, broken grains-21.66%). 3. Threshing by beating also resulted in destruction (cracking-16.09-16.33%, whole grains-35.50%) and was almost the same as threshing by foot, but was faster. 4. The pedal thresher must be improved, as far as the gears are concerned. This will probaby increase threshing time by 30 minutes but will decrease paddy remaining on the stalk to 0.10%.
30.	1981/1982	Production, yield and quality of paddy and milled rice harvested by the farmer. Soemardi	1. Average rice production through INSUS was higher than through BIMAS are INMAS . Average production through INSUS in Karawang during the 1980/1981 season (6.49 tons/Ha) was higher than during the 1980 season (6.35 tons/Ha). 2. On average, paddy harvested by the farmer rarely meets the quality requirements set. Precentages of immature and chalky grains were 5.4 - 9.0% (combined), while spoiled grains reached 4.3 - 8.7%. The quality of rice produced during the 1980 season was better than that produced during the 1980/1981 season. 3. Average yield of rice from paddy was a low 56.23-63.70% due to poor quality paddy. 4. Because immature grains, chalky grains and spoiled grain characteristics are not used in the refraction table used to pay farmers, true quality is hard to assess.
31.	1982	Study of immature grain and chalky grains as quality characteristics of paddy and milled rice. [illegible], Soemardi.	1. A survey of rice-producing areas in Java determined that percentages of yellow rice and spoiled rice in every area were higher than nationals standards, i.e. maximums of 5% and 3% respectively. 2. Empty grains + filth + foreign matter percentages ranged from 4.9 - 8.3%. 3. Immature grain + chalky grain percentages ranged from 8.0 - 13.3%. 4. Broken grain percentages ranged from 25.4 to 37.2%. 5. Percentages of immature + chalky grains could be decreased by harvesting with the ani-ani, by determining the optimal harvest time and by fertilizing with N [illegible].

32.	1982	Yield and quality of paddy and milled rice in West Java, Central Java, East Java and Yogyakarta Rumiati, Soemardi, Lubis, Soetoyo.	1. Quality of paddy samples taken from various parts of Java was low, due to high percentages of immature+ chalky grains (8-13.8%), yellow + spoiled grains (6.0 - 17.5%) and empty grains + filth (4.9 - 8.3%). 2. Percentages of immature + chalky grains were lower in the Sleman district (4.6-8.0%) than any of the other 6 areas studied (> 9.4%), probably due to the different variety of rice planted. In Sleman the Cisadane variety was planted, as opposed to IR-36 in the other areas. 3. Yield of rice from paddy was low (62.4 - 65.1%). 4. Quantity of milled rice was low, especially as related to chalky grains (3.8 - 11.8%), spoiled grains (2.1 - 5.9%),broken grains (25.4 - 37.2%) and rice dust (1.0 - 2.9%).

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170

Quartlery Activity Report OCT-DEC 1983

Dr. Fritz von Fleckenstein

Past Activities and Accomplishments

In <u>October</u>, I attended a technical meeting on PATANAS in Bogor with MORIF staff members, prepared a position paper outlining MORIF's ideas on participation in PATANAS, and later used BPS data, Oldeman's map and the computer programme DBASE2 to determine the agricultural population in each agroclimatic zone and to draw a pre-inspection sample of PATANAS villages for South Sulawesi. I also began compiling information on Farming Systems in Sulawesi by interviewing Dr. Ashraf Ali. I continued helping MORIF staff members to enter data into the computer; by the end of the month, I had added DBASE2 to the programmes which have been used for practical applications at MORIF, and had begun a preliminary examination of the programme ASTAT 76.C in order to be able to help MORIF staff members use the multiple regression and analysis of variance routines.

In <u>November</u>, I helped Drs. Yusuf Ma'amun, M.Sc. prepare the final draft of a paper concerning the economic efficiency of tractor use in South Sulawesi; Yusuf will present this paper at the Second International Conference on Mechanization in Amsterdam from 23-26 January. I also continued discussions with Ir. Hadijah on the on-going intensive record-keeping study at Baju Bodoa, finished the first draft of the Animal coding sheet for the study, and investigated the possibilities of using the DataStar programme for entering this data.

I helped Ir. Hadijah run linear regression analysis on the computer using the ASTAT programme, and extended an invitation to other MORIF and RMI staff to learn how to use this programme to do regression analysis and analysis of variance. I studied the WordStar programme and began teaching it to Dra. Hanyah, the RMI secretary, so that she could later help teach it to the Institute secretarial staff for use in typing reports and letters. I worked with Nurdin Salam to put the Maros RMI petty cash accounts onto the microcomputer, using the SuperCalc programme; the results look identical to the earlier hand-drawn accounts, but include more detailed analyses of expenses which are useful for the Maros office. In addition, we expect that keeping the accounts will be much quicker and easier in coming months.

I tried to combat the natural initial reluctance of people to try using the computer by luring them into my study to see how genial it really is. In November, I showed Ir. Hadijah how easy it is to run a regression, and helped her concentrate on the interpretation of the regression and not on its calculation. On another level, I demonstrated to Yusuf, who has used CalcStar at IRRI, how similar SuperCalc and all of the other spreadsheet programmes are to that programme. I had the greatest success with the RMI staff in November, simply because they are a captive audience, but they will be of use in the future in training other people. I was also able to take advantage of the revision of Yusuf Ma'amun's mechanization paper to help Yusuf redesign his tables to make them much clearer. This is the first practical follow-up to the seminar on making good tables, and we hope that there will be many more.

172

In December, my records show that I spent about 40% of my time on administrative matters and reports, 40% of my time on computer training and preparation, and 20% of my time on field work, research training other than computer, seminars and procurement of equipment:

Administrative matters: Much of the time spent on administrative matters was devoted to teaching Nurdin Salam how to use the computerized accounting system, and to making it more automatic. The next largest amount of time was taken up by visitors. Dr. Bernardo Gabriel visited us from the AARP team in Banjarmasin, and I spent a whole day in discussions with him. We were also visited by a team of people from the AARP Evaluation Mission, who stayed with us for two days. I also initiated a new system for vehicle repairs, after consulting with Dr. Rizvi, which involves order forms for work containing specific indication of the work to be done, estimates of cost, countersigned by driver and expert, and, if over 75,000 rupiah, also by me. The workshop will sign when the work is done, return the old parts, and put the order number against each item on its monthly bill. We hope that this system will give us more control over vehicle repairs and maintenance.

Computer Training and Preparation: In December, demand for computer training finally became effective. Aside from continuing work with Hadijah, who by the end of the month was regularly entering the week's record-keeping data into the computer (now that she has gotten into her stride, this takes about 3 hours), the following people received training:

173

Ir. Lukman Gunarto, M.Sc., soil scientist , who learned to enter data and run regressions using ASTAT, and who perservered until he finished a production run of 16 data sets for a planned publication. Although Ir. Lukman had no previous experience with computers, he now feels quite comfortable entering his data, making transformations and running regressions using the ASTAT programme.

Ir. Christine Momuat, soil sciantist, who had one session with analysis of variance routines on ASTAT.

Ir. Yasin, M.Sc., statistician, who had one session with me concerning the operating system CP/M, and general microcomputer familiarization. Ir. Yasin has already studied computer programming in Basic on mainframes, and will be doing a number of sessions with me. He has been identified by Dr. Farid as the man to look after the computer and to screen projects for their statistical correctness. In the beginning, he will be doing statistical routines for other people. He plans to begin running production runs on my computer in the near future. I also hope to be able to take him with me to Jakarta to test the machines when we take delivery.

Computer preparation involves a number of activities, such as preparing new programmes for running, studying programmes for applications which can be useful at MORIF, and writing applications routines. During December, I wrote aaplications routines for inputting data from Baju Bodoa forms and transforming it into data suitable for FARMAP. I studied the programme ASTAT in order to teach it to MORIF staff members, and I learned about it while teaching them, as they demanded capabilities which we had to seek for and use. I also received a copy of ABSTAT, one of the statistics programmes which we will be using with the IBM PC, as well as QUICK-CODE, another programme which we will be using. I am now preparing these programmes for use with my computer. Thus, at present, I have available the following programmes which will be used with the IBM PC:

QUICK-CODE -----	DBASE2 -----	ABSTAT----	WORDSTAR
makes forms for quick data entry	manipulates and sorts data	stats package	word processing

These programmes can be used in a variety of combinations. QUICKCODE is the best way of inputting data and preparing data files. Once these files have been made, they can be used by DBASE2 to make reports, with simple manipulations or sorting, or they can be used directly by ABSTAT (which can select the records to be analyzed by any consistent criteria), or even put directly into a text file for a report being written using Wordstar. Similarly, tables made by DBASE2 or the results of statistical analyses made by ABSTAT can be put directly into WordStar text files as parts of a report.

I have also received a copy of SUPERSORT, which will also be used with the IBM PC, and which is an extremely versatile sorting utility, which can also change files of one format into files of another format; this facility will make it possible to use files created by a Basic Programme such as QuickCode in a Fortran Programme such as FARMAP.

Finally, I have been using a spreadsheet programme called Supercalc for much of the work which I have been doing at Maros. Although this is not being ordered for the IBM PC, it is similar to Lotus-1-2-3, and there should be no trouble transferring concepts from one to the other, and , perhaps, even files, as Lotus-1-2-3 is very versatile.

Field work, Research Training, Seminars and Procurement: Hadijah and I have continued our work in Baju Bodoa . In December we finally readied the routines for entering the data from the weekly coding forms (made in the field from the farmers' daily records), and by the end of the month, Hadijah was able to enter the data from one week in about 3 hours. We also tackled the problem of the calibration of farmer measures. I bought a number of scales and measures, and Hadijah has been calibrating all of the measures which the farmers use to record their use of inputs and their yields of crops and animal products. It is, as always, a fascinating experience. One measure, for example, is an empty 1/2 Kilo soap container, which the farmers use as a heaping measure for bran fed to animals, but as a level measure for rice . Since the farmers are in the habit of referring to this measure as a "liter", some confusion could arise if one merely visited the farmers with a questionnaire. We will be able to use our computer programmes to automatically make the calculations of amounts in terms of liters or kilogrammes , since we have a code for measure in our form.

I attended two regular departmental seminars in December, one in Pathology and one in Plant Breeding. The Pathology seminar was very interesting, with reports of the new techniques being used for innnoculation of plants and the new tungro screening experiments at Maros. The Plant Breeding Seminar was easier to follow than it had been in the past, possibly due to a better understanding of Indonesian on my part, but largely because of the excellent transparencies prepared by Ir. Sjuaib, who, in addition to his qualifications in plant breeding, also holds a degree in Agricultural Economics.

Trips Made:

1. Bogor and Jakarta: FATANAS meeting 2-7 October (Trip Report- Appendix A)

2. Bogor and Jakarta: to prepare AARP computer order 25-30 October (Trip Report -- Appendix B)

3. Baju Bodoa field visit with Evaluation Mission (Handout given during this visit -- Appendix C)

Problems and Solutions: The spirit is willing, but the flesh is weak. The one soars up, the other pulls back.

Plans for the coming Quarter: In the coming quarter, I would like to finish the design of computer routines for the transformation of data from Baju Bodoa forms into FARMAP format data, particularly since I will now receive some of the FARMAP programmes during January. I would also like to initiate a price study in the local market to get data to use in the Baju Bodoa study and to round out the development of techniques to be used in Farm surveys and studies using FARMAP. Finally, I would like to make at least one of the comparisons we contemplated in our Baju Bodoa proposal: I would like to compare the results of the daily record keeping with a weekly interview. Previous studies have already shown the superiority of daily to monthly data gathering for labour usage, but we have no evidence on the difference between weekly and daily data gathering.

As for other matters, I expect to be accepting delivery of computers for all of the balais in AARP within the next quarter, and to be testing them in Bogor, probably with the help of Ir. Yasin, who has been identified by Dr. Farid as the man who will look after the computers at MORIF. There is a possibility that I will also be visiting some sites in NTT, Central Sulawesi and North Sulawesi with Ir. Yusuf Ma'amun for preliminary assessment of those areas prior to the establishment of field trials by agronomists and others in dryland dry climate areas. We may be accompanied by people in other disciplines as well, which could be quite exciting.

NOTE: THIS REPORT WAS PREPARED USING WORDSTAR .

178

Appendix II.A.1.

AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT
MAROS RESEARCH INSTITUTE FOR FOOD CROPS
APPLIED AGRICULTURAL RESEARCH PROJECT/RI - USAID

PO Box 38 Ujung Pandang
South Sulawesi INDONESIA

Cable AARPRMI
Telex 71513 UP AARPRMI

TRIP REPORT

To: Bogor and Jakarta

Purpose: To attend meeting concerning choice of PATANAS sample for South Sulawesi

To acquire publications from Biro Pusat Statistik

To attempt to solve problem with Microcomputer printer

(To rewrite specifications for micrpcomputers to be purchased)

Dates: 2 to 7 October 1983

Staff member: Fritz von Fleckenstein

with Ir. Hasanuddin M.Sc, Acting Director, MORIF

Drs. Yusuf Maamun, M.Sc., Head, Agro-Economics, MORIF

Patanas

1. The impetus for this trip was the sudden summons to Bogor by the Centre for Agro-Economic Research (CAER) to attend a meeting deciding the PATANAS sample for South Sulawesi. Since the Agro-Economic department at MORIF had already done work on this problem, following a proposal for sampling which was submitted at the end of May (see attachment), it was considered essential that we attend this meeting. The director of MORIF had been invited, and one member from the Kelompok Agro-Ekonomi, but Drs. Yusuf particularly asked me to attend, since I had been dealing with PATANAS matters before he returned from his studies in late June.

2. During the meeting, we discovered that CAER had already chosen the sample for West Java, West Sumatra and South Sulawesi, without, however, consulting the concerned Research Institutes for Food Crops. In response to this action, the MORIF team produced a position paper (see attachment) in which it affirmed the desire of MORIF to manage the PATANAS work in Sulawesi, with guidance and advice from CAER, but with day-to-day and overall control in the hands of the station. It proposed a memorandum af agreement be drawn between MORIF and CAER, clearly stating the responsibilities of each party, and it suggested a specific division of responsibilities (see attachment).

(Cont.............p.2)

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3. This paper of MORIF was very well received by the meeting. The representatives of the other Research Institutes for Food Crops generally stated that they agreed with its premises, and also wished to sign memoranda of agreement with CAER. Surprisingly, the reaction from CAER was also quite positive, and at the last session, a draft memorandum of agreement was circulated for study and action by the Institutes.

Other business

4. Drs. Yusuf and I also took the opportunity to visit the Biro Pusat Statistik in Jakarta to acquire publications for the Agricultural Economics Library at MORIF, which we hope to install in my office. Actually, there are already a few books there, and I notice that one of them was withdrawn and then returned in the proper manner, by signing the book, so I am encouraged. We were able to find a number of interesting publications, which we acquired, and we were made aware of others that would be coming out in the near future. We want to make a practice of visiting BPS whenever we are in Jakarta area, as this seems to be the best way to acquire publications.

5. When I arrived in Bogor, I was shown the comments which had been made by a visiting consultant who had reviewed the equipment order, and who had had some thoughts about the computer or wordprocessor order. He questioned the choice of TRS-80, and suggested either an Apple II Plus or an IBM PC. I was also told that it might be possible to get a waiver from USAID to allow us to purchase the computer or wordprocessor locally.

6. Since I had never been comfortable with the idea of buying a computer through a procurement agent in the United States, in such a way that I would not be able to make necessary checks before taking delivery, and also in such a way that the guarantees and maintenance contracts could not be made or would have little effect, I was delighted to hear that we might, after all, be able to purchase the computer locally.

7. I concurred with the idea that the IBM PC is definitely a better machine than the TRS-80, although I would be less sure of the APPLE II Plus. The only problem which bothered me, and which still does, is the problem

of compatability, particularly with the ability to read programmes and data produced by IRRI for the TRS-80. However, I knew that IRRI was using the reformaTTer programme to read disks from its IBM main-frame, and to write disks which it could use, and that they had had no problem with this programme.

8. For this reason, I decided to visit IBM in Jakarta to see what they could offer us. I spent four hours there, from 2.30 to 6.30 one after-noon, and learned enough to convince me that we would be wise to change our order, if we are able to buy directly. If we could buy from IBM, we could get our computers in a few months, instead of one year, in fact, many items were presently in stock, and others expected to arrive within the next two months. We could get hard disk capacity of 20 MB per machine, which is necessary for efficient use of FARMAP, which pro-duces large files. Finally, we could get a 5-year maintenance contract, if we wished, and the maintenance was arranged in a very useful fashion for outstations: a diagnostic diskette is provided with the machine. When you insert it, if there is a problem, you are told what part of the machine is faulty. You remove that part (say, the keyboard), and take it to IBM in Jakarta. They replace the part, giving you a new one immediately, which you can take back and hook up to your machine. In this way, we could keep our IBM PCs in repair most of the time, with at most a week or two with the computer down. Of course, we have ordered two of everything, so that even if one computer is not running, the other one will be. In some cases, as for the hard disk drives, if one of them breaks down, the computer can still be used by using the floppy disk drives. My principle has been redundancy.

9. I also visited COMPUTERLAND, which the IBM people advised me to do, since a lot of the software and hardware which is usable with the IBM PC is being produced by people other then IBM, and thus is not sold by IBM. At COMPUTERLAND, I discovered that they have much better printers then the ones sold by IBM, and I decided to order one fast dot-matrix printer (160cps) and one daisy wheel printer (slow, but with beautiful output) for producing reports and important letters for each station.

10. One of the comments made by the consultant was a query: why two computers for each station? This question should be answered:

(Cont............p.4)

a. One reason is redundancy: if we have two of everything, we will never have to stop operations completely. The importance of this maxim is well-understood by anyone who has tried to run machinery in outstations.

b. Another reason is that microcomputers are not quite the same animals as mainframes or minis. Most microcomputers have one keyboard and one screen. If the computer is to used as I know it will be used, it will not be long before even two computers is not enough: the waiting time in queue will be so long as to discourage potentia' users. For this reason, I am recommending that the second equipment order include 3 additional computers for each station, but very simple configurations without hard disks, and with the cheapest printer. The full amount of 5 computers per station will probably be sufficient. The total cost of these computers will be about 60,000 dollars per station.

11. When the above configuration of 5 computers is suggested, some people ask if a mini-computer would not be a viable option. A mini-computer, however, actually costs more than $100,000 , and there are a number of extra costs involved in running it. I note, for example, that CAER expects to spend $164,00 for generator, stabilizer, rental of software, furniture and improvement of the computer room for their new IBM minicomputer. Furthermore, a mini-computer must have an operator, who must be trained, all in all, it takes about one year before a mini-computer is operational and actually being used by scientists. Microcomputers, however, can be used within a week or two for meaningful exercises.

12. What I hope to do, if we are able to buy locally, is to come to Jakarta when the various parts of the computer are available (both IBM and COMPUTERLAND state that hye can deliver the goods within 2 months of receiving a firm order), put the configurations together, test them to see that everything is working, and then hand-carry them (with some help from colleagues, of course) directly on to the plane as carry-on luggage, and from the plane to the station, and set them up in the room which has been prepared beforehand. If we can do this, we should have the computers running almost immediately after arrival.

(Cont.............p.5)

13. In the case of Banjarmasin, I propose that I stay a week in order to orient the staff, including the RMI experts, to the machines and software, and to handle any problem that arise. By that time, I hope to have worked out some standard operating procedures for using the machines which will minimize less of data and discouragement.

Follow-up

14. As a follow-up to this trip, I am writing to various software and hardware manufacturers concerning the problems of data transfer between machines of different types. The IBM PC has become the market standard, and there are doubtless efforts going on in many quarters to produce links between it and the older machines. I am trying to find out as much as I can about these links. Some of them are mentioned in my new computer order.

15. New software comes onto the market all of the time. I have just read of a word processing program called THE LAST WORD which sounds like it might be superior to WORDSTAR. It preserves the text even if the computer is turned off (or cut off, as is likely in Sulawesi!), and it provides options for footnoting and indexing which Wordstar does not have.

As a result, I am thinking that it would be good to allocate a given amount of order money to software, without specifiying the exact programme, to give us time to fully explore the software situation, and to give us the option of buying the latest available software at the time of making our definite order to the dealers here.

Proposed Plan for Selecting the PATANAS Sample for South Sulawesi

OBJECTIVE: Ten villages (desa) will be randomly selected representing the five agro-climatic zones of South Sulawesi in approximate proportion to the population of each zone. The sample will only include villages that are primarily agricultural. At a later stage, a sample of 50 farmers, stratified by size of landholding, will be drawn from each village.

METHOD: 1. Decide the number of villages to be drawn from each agro-climatic zone. For this it will be necessary to determine the approximate agricultural population of each zone. Then the proportion of that zone to the total agricultural population of South Sulawesi can be calculated. Since only ten villages are to be chosen, a differenc as great as 3 or 4% would make very little difference to the decision of how many villages to choose from a particular zone. Therefore, extreme accuracy in securing these population data is not necessary. At the present time, McRIF has information sufficient to determine the approximate population of each agro-c imatic zone from the following sources:

a. An agroclimatic map of Sulawesi by L. R. Oldeman and Darmiyati Sjafifuddin, Contr. Centr. Res. Inst. Agric. Bogor No. 33.

b. Sulawesi Regional Development Study Prepared by the University of British Columbia, 1979.

c. Various published and unpublished information from the Kantor Statistik Propinsi Sulawesi Selatan.

d. Information from Dr. Ashar Ali and his colleagues in the FAO soil mapping project for the outer islands (INS/78/006).

2. Draw a random sample of villages from all of South Sulawesi sufficiently large to ensure the inclusion of at least the desired number of villages from each agro-climatic zone. The number of villages needed can be determined by a mathematical formula* once the proportion of the population in each zone is known, but it is expected to be between 50 and 200. The order in which the villages are drawn must be preserved (The first village drawn is numbered 1, etc.).

3. Gather information about the villages in the sample, giving first priority to those high on the list. The information needed for each village is:

a. The agroclimatic zone

b. Is it rural, and not urban or semi-urban?

c. Is it possible and permissible for enumerators to work there?

4. Moving strictly down the list, choose acceptable villages until the quota for each agro-climatic zone is filled:

For example, assume that the quota for each of the agro-climatic

* See Annex 1 for a discussion of this formula.

zones is as follows:

A	0 villages
B	1 village
C	3 villages
D	5 villages
E	1 village

and the information about the villages in the random sample is as follows:

Village No. (order in which it was drawn)	Agro-climatic zone	Rural?	Possible?	CHOSEN or NOT CHOSEN
1	A	Yes	Yes	NOT CHOSEN
2	B	Yes	Yes	CHOSEN
3	B	Yes	Yes	NOT CHOSEN
4	D	Yes	No	NOT CHOSEN
5	D	No	Yes	NOT CHOSEN
6	D	Yes	Yes	CHOSEN
7	C	Yes	Yes	CHOSEN
8	C	Yes	Yes	CHOSEN
9	C	Yes	Yes	CHOSEN
10	C	Yes	Yes	NOT CHOSEN
11	[illegible]	Yes	Yes	CHOSEN
12	[illegible]	Yes	Yes	CHOSEN
13	E	Yes	Yes	NOT CHOSEN
14	D	Yes	Yes	CHOSEN
15	?	YES	Yes	NOT CHOSEN
16	[illegible]	Yes	Yes	CHOSEN
17	B	Yes	Yes	NOT CHOSEN
18	D	Yes	Yes	CHOSEN

In this example, the 10 villages are chosen after running through 18 villages in the list, but if there were more urban or impossible villages, it would take longer.

The first village is not chosen because it is in Agro-climatic zone A, which has a quota of zero villages. This is likeley to happen in South Sulawesi, since there is a very small area of agroclimatic zone A, and it is very sparsely populated.

The second village is in agroclimatic zone B and is rural and possible, so it is accepted. The third village is exactly like the second village in these respects, but the quota for B is filled, so it is not chosen.

Village 4 is not chosen because it is not possible for enumerators to work there. Village 5 is not chosen because it is not rural.

Village 6 is chosen because it is rural and possible and it is in Agroclimatic zone D, which still has 5 villages in its quota.

Villages 7,8 and 9 are chosen because they are rural and possible and are in agroclimatic zone C, which needs 3 villages. Village 10 is not chosen, even though it is like the other three villages in this respect, because the quota for agroclimatic zone C is now filled.

Village 11 is chosen because it is rural and possible , and because it is in Agroclimatic zone E, which still has a quota of 1 village to fill. Village 12 is chosen because it is rural and possible and in agroclimatic zone D, which still has 4 villages in its quota.

Village 13 is not chosen, because it is in agroclimatic zone E, which is now filled.

In fact, the only agroclimatic zone whose quota is not filled is now agroclimatic zone D, which needs three villages. These are villages 14, 16 and 18. Villages 15 and 17 are not chosen, because they are in other agroclimatic zones.

With the choice of village 18, all of the quotas have been filled, and the villages chosen to represent the agroclimatic zones are:

A	no village
B	Village No. 2
C	Villages 8,9
D	Villages 6, 12,14,16,18
E	Village 11

5. The result is a sample which has exactly the same probability of being chosen as if all of the villages of South Sulawesi had been divided into 5 groups according to the agroclimatic zone in which each belonged, and random samples had been taken of each of those groups.

It is, however, much easier and much cheaper to choose the sample in the way we have described.

Fritz von Fleckenstein
IGP Sarasutha
MORIF
24 May 1983

Annex 1. Sample size required to have a 99% probability of including at least one unit of the least populous zone, when the proportion of units in that zone is known

The probability of at least one favorable outcome in n trials is given by the formula:

$$P = 1 - u^n$$

Where u = the probability of an unfavorable outcome on a single trial.

In order to know the number of trials needed to assure at least one favorable outcome, P may be set equal to the desired level of certainty of obtaining at least one favorable outcome and the equation solved for n.

Example: If 10% of the villages in South Sulawesi are in Agro-climatic zone A, then the Probability of getting a village in that zone if a village is drawn at random is .1 (one trial). In order to be 99% certain that we will get at least one village from zone A, we solve the following equation:

$$.99 = 1 - .9^n$$ (The answer lies between 43 and 44.)

Logical justification: If u is the probability of a particular outcome on a particular trial, the probability of that outcome on n trials is

$$u^n$$

In a situation with only two choices, the probability of the other outcome is

$$1 - u^n$$

R. von Fleckenstein

Appendix II.A.2.

AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT
MAROS RESEARCH INSTITUTE FOR FOOD CROPS
APPLIED AGRICULTURAL RESEARCH PROJECT RI - USAID

P.O. Box [illegible] Ujung Pandang
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Status of PATANAS in South Sulawesi

To date, staff at MORIF have :

1) Tested data collection and coding forms, particularly for crop input/output data. 3 months of data have been collected, and the experiment is continuing. Coding is for the FARMAP system. Still to be constructed are coding forms for livestock (almost finished) and cottage industries/ and other nonagricultural farm activities.

   Farmers have been keeping daily records.

2) Gathered secondary preparatory to choosing the sample of locations. We now have information on rural population by kecamatan, important farming systems, and agroclimate. Once we have coordinated this material, we will be able to use our scheme for assigning weights to the various farming systems/agroclimates. We also have a complete list of villages and have access and have access to printouts with quite complete information on each village.

Proposal for Division of Responsibilities for PATANAS work in South Sulawesi

1) The distance between Bogor and South Sulawesi, and the slowness of communication, makes it essential that MORIF staff assume control of all PATANAS work in the province, from choice of the sample through initial data preparation.

2) Choice of sample locations : Sampling is already preceding according to the proposal of v Fleckenstein and Sarasutha. It should be noted that the DIPERTA classifications, as noted in the PATANAS proposal, do not coincide exactly with the AGROCLIMATIC zones described by Oldeman and Darmayati. Farming systems should also be considered. The question of compatability with East Java should be weighed in the light of the actual sample of locations, which is described by C. van Santen as to deviate from the proposed sample in two-thirds of the cases. To that extent, the East Java sample is not a statistically representative sample, but rather a purposively chosen sample which contains all farming systems. Our method permits us to choose a statistically representative sample of all farming systems and climatic regions. We assume that analysis will be disaggregated by these farming systems and regions in any case. As we will have information on population of each of these regions, such a procedure is sensible. In any case, we would prefer to continue our own sampling of locations.

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Home Teleph. Dr. Fritz von Fleckenstein (041. [illegible]) Dr. I.T. Corpuz (0411) 81242 [illegible] Anwar [illegible] (411) [illegible] Mr. Nurdin Saleh (041 [illegible]

3. Choice of sample size in each location : MORIF would prefer to choose the sample size in each location on the basis of the results of the initial census of familities in the Desa. The size of the sample would depend on :

   a) The variability of the familities in the desa. If there is little variability, the sample size can be smaller.

   b) The intensity of data collection. If labour data is required it needs to be gathered intensively, probably from daily record-keeping, as our preliminary study in Baju Bodoa village is showing. This record-keeping requires weekly visits by interviewers to code from the books and ask supplementary questions. Each visit takes approximately one to two hours For this reason, labour data should be collected only from a sub-sample of the village families. Experience has shown us that one interviewer can confortably handle 5 families.

   c) The distance which needs to be traveled to visit the sample families. In Java, villages are small in area, but in Sulawesi, they are generally quite large. A random sample of villages could be spread over an area of as much as 100 km^2.

4. Choice of Sample Households : The composition, as well as the size, of the sample should be determined by the results of the census. While stratification by size of landholding, and owned and operated area, is useful, it should be remembered that data on land areas gathered from secondary data or from asking the farmer is usually very inaccurate. This data, then, can only be used for a very rough grouping. Also, certain classes, such as landless landles labourers, may prove to be so small as to not warrant inclusion in the sample of households.

5. Types and Timing of Questionnaires

   We propose a change in the timing of questionnaires. Instead of the sequence followed in East Java, namely,

   1. Choice of location
   2. Inspection of location, and change of may unsuitable sites
   3. Census
   4. Choice of households, a predetermined 50 for each location.
   5. Inventory Questionnaire
   6. Income and Employment Questionnaire

   We propose the following :

   1. Determination of weightings to be given to each Agroclimatic/ Farming Systems zone.
   2. Random sample of Sulawesi Selatan villages.
   3. Inspection of villages and choice of locations (see separately attached sampling proposal)
   4. Census of chosen villages.

5. Inventory Questionnaire
6. Income and Employment Questionnaire

we propose the following :

1. Determination of weightings to be given to each Agroclimatic/ Farming Systems zone.
2. Random sample of Sulawesi Selatan villages.
3. Inspection of villages and choice of locations (see separately attached sampling proposal)
4. Census of chosen villages.
5. Determination of sample sizes in each village
6. Choosing of sample in each village.
7. Begin monitoring inputs and output: 2 samples

   a) Material inputs and outputs and income/major expenditure
   b) Sub-sample for daily recording of labour use and material inputs and outputs (weekly visits)

8. Inventory questionnaire
   (to be administered gradually, as time allows. Since land areas owned, used, planted to specific crops should be measured, this is an on-going activity. Also, farmers are reluctant to give such information on a first visit, so it is best to do it later).

6. Questionnaire design

The questionnaires used should be designed with primary tabulation programme in mind. The MORIF team assumes that this will be FARMAP, and our work to date has followed this assumption. We have been designing questionnaires for use with FARMAP and testing them in a pilot study in Baju Bodoa village near Maros. Data from this pilot study will be entered onto diskettes with the help of the programme DBASE2.

Morif staff would prefer to design the PATANAS questionnaires for South Sulawesi on the basis of these pilot questionnaires, which are pre-coded and which can readily be entered into FARMAP format.

7. Computer Checking and Preliminary Tabulation

Ideally, MORIF staff would prefer to do this as well, for the following reasons :

a) Data should be entered and checked as soon after gathering as possible, in order to permit correction by the original enumerators or even by the farmers themselves.

b) Data entered at MORIF would remain at MORIF, and copies of the diskettes could be sent to Bogor. In this way, MORIF would retain access to the data, and could do micro-analyses with it while CAER concentrates on macro-analyses.

APPENDIX A, EXIT.
13

c) Tabulation at MORIF should speed up the tabulation of data, which has apparently been very slow for East Java.

Unfortunately, the computers for MORIF do not seem likely to arrive for many months. The important question which must be asked is :

What provisions are to made for data processing if MORIF begins PATANAS data collection now ?

Present computer situation at MORIF :

We have the personal computer of Dr. F. von Flekecnstein, a BASIS 108 with 128K, 2 single-sided, single-density floppy disk drivers for 5¼" 16-sector, 35-track diskettes and no hard disk drive. This computer is probably capable of analysing a SIMPLE census.

We will have, by September 1984, 2 TRS-80 Model 16's with slightly over 300K, two double-sided, double-density 8" diskette driver for each computer, and a hard disk of 12 MB for each computer. These computer would be capable of handling files big enough to process FARMAP analyses for numbers of farms. It may be, however, that they would not be enough in number to permit data entry to proceed smoothly.

We will also have the PATANS IBM PC's and PCXT, but just when is not yet certain.

If we do not have computers before September 1984, Patanas data will begin to pile up, as it apparently already has in East Java. Some viable proposal has got to be made to solve this problem BEFORE it occurs.

APPENDIX A (FRITZ)
14

AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT
MAROS RESEARCH INSTITUTE FOR FOOD CROPS
APPLIED AGRICULTURAL RESEARCH PROJECT/RI · USAID

P.O. Box 18 Ujung Pandang
South Sulawesi INDONESIA

Cable AARP[illegible]
Telex 71503 UP AARPSMI

Proposed Responsibilities of
2 parties for South Sulawesi PATANAS study

<u>MORIF</u> :

1. Choose sample locations.
2. Hire enumerators.
3. Design, conduct and analyze census.
4. Choose samples of households.
5. Design, conduct, enter and tabulate monitoring exercise(input/output)
6. Design, conduct, enter tabulate Inventory questionnaire
7. Provide diskettes with raw, <u>clean</u> data to CAER
8. Manage the budget for these activities.

<u>CAER</u>

0. Provide ADVICE about sample and questionnaire design.
1. Specify information desired.
2. Provide budget for enumerators, honoraria for farmers, travel of supervisors, per diem. (Precise proportions to be negotiated).
3. Provide budget for printing of questionnaires.
4. Provide budget for data entry.
5. Provide microcomputers for data entry and tabulation.

To Facilitate the MORIF staff in managing this activity.

1. Meeting should be hed at <u>regular intervals</u> with CAER staff.
2. These meetings should usually be held in MAROS.
3. A definite <u>MEMORANDUM OF UNDERSTANDING</u> should be drawn up between MORIF and CAER specifying the precise responsibilities of each party.

Home Telephone. " " von Fleckenstein (0411) 5007 Dr. I. T. Corpuz (0411) 81242 Dr. Anwar Rizv (0411) 28572 Mr. Nurdin Saar (0411) 84 81

Appendix II.A.3.

AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT
MAROS RESEARCH INSTITUTE FOR FOOD CROPS
APPLIED AGRICULTURAL RESEARCH PROJECT/RI – USAID

PO Box 38 Ujung Pandang
South Sulawesi, INDONESIA

Cable AARPRMI
Telex 71513 UP AARPRMI

24 October 1983
APPENDIX A(FRITZ)
-15

PATANAS SAMPLE FOR
SOUTH SULAWESI

Pre-inspection list

The steps to be followed in drawing the sample of villages are as follows:

1. Determine the agricultural population of each Kecamatan.
2. Determine the agro-ecological zone in which each kecamatan lies (Most kecamatans can be easily characterized as lying within one zone). Oldeman's definitions are used (see Table 1.)
3. Determine the agricultural population of each agro-ecological zone. (See Table 2)
4. Determine the proportion of total agricultural population in each agro-ecological zone (See Table 2)
5. Determine the quota of villages to be filled for each agro-ecological zone (See Table 2.)
6. Draw a simple random sample of villages in South Sulawesi. The list should be quite long, to allow for rejections based on the following criteria. (See Table 3.
7. Determine the Agro-Ecological zone of each village. This can be done tentatively in the beginning, based on the dominant agro-ecological zone in each kecamatan, but SHOULD BE CHECKED in the field. Any village in which the quota for its Agro-ecological zone has been exceeded should be rejected. (See Table 3.)
8. Determine the percentage of village population which is agricultural (note that the BPS definition of agricultural includes fishing and forestry). This can be done by consulting the printout DAFTAR NAMA DAN FASILITAS SOSIAL DESA at the Kantor Statistik. Any village with less than 50% of its population in agriculture should be rejected. (Enter in Table 3.)
9. Inspection should be continued until a suitable 10 villages has been selected. The villages MUST be taken IN ORDER of their original drawing. Information may be gathered about them beforehand, but should be verified in the field. See detailed explanation of the drawing procedure in the proposal for sampling, July 1983. (Record on Table 3.)

Present State of the Sample

The sample is now ready for inspection. Steps 1 through 7 have been taken, although the information in step 7 should be checked in the field. Step 8 can be taken before going to the field, and will enable some villages to be skipped without a visit. The rest of this report presents the data already gathered.

193

Table 1. AGRO-CLIMATIC ZONES
South Sulawesi

Zone	Definition
A	More than 9 months of rainfall greater than 200mm/month
B	7 to 9 months of rainfall greater than 200mm/month; 2 to 4 dry months of rainfall less than 100mm/month
C	5 to 6 months of rainfall greater than 200mm/month; 2 to 5 dry months of rainfall less than 100mm/month
D	3 to 4 months of rainfall greater than 200mm/month; 2 to 5 dry months of rainfall less than 100mm/month
E	Less than 3 months of rainfall greater than 200mm/month; 2 to 5 dry months of rainfall less than 100mm/month
F	Bi-modal rainfall distribution: two rainy seasons of 3 months each, in which rainfall is greater than 200mm/month; 2 to 3 dry months of rainfall less than 100mm/month

SOURCE: Oldeman, L.R. and S. Darmiyati, Agro-Climatic Map of Sulawesi, prepared for the Central Research Institute for Agriculture, Bogor, Indonesia in June 1977. (We have combined Oldeman's categories: B = B1 and B2; C=C1,C2 and C3; D= D1,D2,D3 and D4; E= E1,E2 and E3; F = the two bimodal distributions: $C+D_1$ and $C+D_2$)

Table 2 shows the agricultural population in each of these zones in South Sulawesi, the proportion of population, and the resulting quota of villages in each zone:

Table 2. AGRICULTURAL POPULATION BY AGRO-CLIMATIC ZONE
South Sulawesi, 1980

Zone	Agricultural Population	Percentage of agricultural population	Quota of PATANAS villages
A	29,017	Less than 1	0
B	699,975	15	1
C	1,260,504	27	3
D	1,667,603	36	4
E	863,495	18	2
F	100,959	2	0

SOURCE: Penduduk Sulawesi Selatan, Kantor Statistik Propinsi Sul-Sel, Ujung Pandang, 19 1982, and unpublished statistics from K.S.P.S-S; matched to Oldeman's map.

Zones A and F have too small a population to be included in a sample of 10 villages. In fact, only if a sample of 50 villages were to be chosen would Zone F be included, and only if a sample of over 100 villages were to be chosen would Zone A be included. Zone B deserves 1½ villages, but that is not possible, so its quota is 1 village.

Table 3 shows the first 27 villages of the 54 x drawn in the random sample of villages in South Sulawesi, together with TENTATIVE information and comments about those villages. Remember that the villages MUST be taken IN ORDER.

Table 3. PATANAS VILLAGES IN SOUTH SULAWESI
Pre-inspection list, 24 October 1983

No.	Frame No.[a]	Village, Kecamatan, Kabupaten	Zone	Initial Comments
1.	1026	Botto, Tikkalulla, WAJO	D	Choose if ag.pop > 50%
2.	657	Ko'mara, Polombangkeng Utara, TAKALAR	C/D	" " " " " "
3.	600	Rampi, Masamba, LUWU	B/A	" " " " " "
4.	420	Karossa, Budong-Budong, MAMUJU	B	Reject if Rampi accepted and if Rampi = B QUOTA FILLED
5.	193	Nosu, Pana, POLMAS	B	Reject: Quota filled
6.	333	Bulutana, Tinggimocong, GOWA	B	Reject: Quota filled
7.	520	Marinding, Bajo, LUWU	D	Choose if ag.pop > 50%
8.	892	Biru, Kahu, BONE	D	Choose if ag.pop > 50%
9.	896	Ulaweng Cinnong, Ulaweng, BONE	D	Choose if ag.pop > 50%
10.	701	Tukamasea, Bantimurung, MAROS	C/B	Choose if C and if ag.pop > 50%. Reject if B: QUOTA FILLED.
11.	536	Puty, Buaponra, LUWU	D/C	Reject if D: Quota filled (unless one or more D's above rejected). ~~Axxx~~ Choose if C and if agr. pop > 50%
12.	210	Siparappe, Watang Sawitto, PINRANG	C/F	Choose if C and if ag.pop > 50%. Reject if F.
13.	242	Bungi, Duampanua, PINRANG	C/B	Choose if C and if ag. pop > 50%. Reject if B: Quota fil...
14.	889	Nusa, Kahu, BONE	D	Reject: Quota filled
15.	237	Paria, Duampanua, PINRANG	C/B	Reject: Quotas filled
16.	891	Cenrena, Kahu, BONE	D	Reject; Quota filled
17.	1146	Kunjung Mae, Mariso, U.Pandang	D	Reject: Quota filled (also, ag pop too small probably)
18.	364	Masanda, Saluputti, TANA TORAJA	B	Reject: Quota filled
19.	122	Sumberjo, Wonomulyo, POLMAS	E/F	Choose if E and if ag.pop > 50% (reject if F
20.	438	Belokka		
20.	438	Belokka, Panca Lautan, SIDRAP	E	Choose if ag. pop > 50%
21.	146	Baru, Campalagian, POLMAS	E/F	Reject if both Sumberjo and Belokka chosen: Quota filled
22.	569	Pongkendokang, Limbong, LUWU	B	Reject: quota filled
23.	647	Sanrobone, Mappakasunggu, TAKALAR	D	Reject: Quota filled
24.	730	Sapanang, Bungoro, PANGKEP	C	Reject: Quota filled
25.	318	Sapaya, Tompobulu, GOWA	D/C	Reject: Quotas filled
26.	588	Marampa, Limbong, LUWU	B	Reject: Quota Filled
27.	1045	Tanah Kongkong, Ujungbulu, BULUKUMBA	D/E	Reject: Quota filled

Tot Households	Ag Households	% Ag pop	Final Decision

Maros Research Institute for Food Crops
Applied Agricultrural Research Project : (MORIF)

TRIP REPORT
LAPORAN PERJALANAN

This report must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name: Dr. Fritz von Fleckenstein
Nama

Department: SosEk.
Kelompok

Date of Departure: 23 October 1983
Tanggal berangkat

Return: 30 October 1983
Tanggal kembali

Principal Locations Visited: Jakarta/Bogor
Tempat-tempat yang dikundjungi

Accompanied by: No one
Pengikut

Purpose of trip: To produce final order local procurement of computer hardware, software and accessories for all AARP locations.
Maksud perjalanan

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (faktor-faktor yang memerlukan penanganan, hal-hal baru, dll.)

1. Hardware needed was defintely identified, and sources of local supply, including prices and cost of maintenance contracts, determined.
2. Software was also identified, although some more information has been requested by AID regarding the merits of certain of the software packages, particularly statistical packages. I am writing letters.
3. Power protection for the computers has not been specifically identified yet, but Mr. Harwood is following up on this particular item.
4. Further information on systems software, particularly communications programmes allowing the IBM PC (the chosen model) to receive and send information to APPLE computers and TRS-80 computers, was received after this trip, and this software was added to the order.

*Original: to Mr. Carl R. Fritz, RMI-JKT.
Asli kepada

*Copy to Director MORIF and AARP personnel.
Tembusan

197

- 2 -

3. Follow-up:

a. I will send letters to various software manufacturers, particularly those of statistical packages, for clarification of those packages. Copies of these letters, and of the answer, will be relayed to Dr. W. Collier, who is taking responsibility for local ordering.

b. Answers to previous letters I have sent will also be provided to Dr. Collier.

c. When the computers are to be received, I will go to Jakarta to test them together with their accessories, peripherals and software, to make sure that evrything is working. I will then arrange to hand-carry (with some help) to the various stations (Banjarmasin and Ujung Pandang) where the computers will be located. Hand carrying to Pasar Minggu and Bogor will not a problem.

d. Training programmes will be set up to train people to use the computer. Some of these will be arranged by me, others by people familiar with the other software, particular the accounting software to be used for inventory control, accounts payable, salaries and the like. It is expected that there may be a consultant advising AARP on monotoring who would use this software in constructing a system for the whole of AARP. This consultant would be able to train AARP people the use of this software for this particular application.

Appendix II.B.

Quarterly Report of Activities
for October, November and December

Igmidio T. Corpuz

A. Activities:

1. Wrote a paper (Appendix I) on the results of a simple study conducted at Kampung Tambua about two kilometers from the Maros Research Institute for Food Crops. The simple study was conducted to solve a problem presented by farmer to the Head, Department of Soil and Soil Fertility, MORIF.

   The problem was diagnosed to be sulfur deficiency and indeed it was definitely sulfur deficiency. The problem could be attributed to the continuous use of urea as N source and intensive cropping. Despite the inclusion of the application of 50 Kilograms of ammonium sulfate in the BIMAS Package for South Sulawesi, farmers in the area where the problem was observed had not been following the BIMAS recommendation. The reasons why they do not follow maybe interesting to know. The area is rainfed however two rice crops could be grown easily. The first a dry seeded crop and the second transplanted. It was the transplanted crop where the sulfur deficiency problem was observed.

   Even before any quantitative data were generated the farmers started fertilizing their rice crops with ammonium sulfate. Three days after the application of ammonium sulfate the rice plants were observed to be distinctly darker green in color and more tillers compared with the urea treatment. The urea plus elemental sulfur treated plants showed greening of the leaves seven days after fertilizer application.

2. Discussed with Ir. Christine J.S. Momuat the conclusion that sulfate from ammonium sulfate increased the availability of phosphorus. She based the conclusion from the results of her study comparing the efficiency of urea and ammonium sulfate on lowland rice deficient in phosphorus. The ammonium sulfate fertilized plants showed consistently higher phosphorus uptake

than the urea + elemental sulfur fertilized plants. From the statistical analysis however the results are not significantly different at 5% level. I impressed on her that a trend can not be used as a basis in arriving at a conclusion otherwise the use of statistical analysis is of no value. Thus there was the need to have another trial.

3. Discussed with Ir. A.M. Dg. Mattiro the parameters that should be gathered from his sweet potato fertilizer trial.

Because of the seriousness of sweet potato weevil damage, there was the need to seperate the affected tubers from the free weevil damage tubers and weigh separately. The sweet potato affected tubers are generally hollow so they weigh very much less than the tubers of similar size not damage by weevils. A correction factors was suggested by talking the ratio of the weights of the good and the bad tubers of similar size. The ratio is used in correcting the "true" weight of the affected tubers. Selective harvesting in the case of sweet potato can not be followed because it is not physically possible to determine which plant hills are infested with the weevils.

4. Discussed with Ir. Mochtar Andi Nawir, research staff, Agronomy/Physiology Department what method to use in correcting yields of rice with 100% rat damage. He understand the procedure I suggested in correcting yields where the damage is partial even as high as 80%.

If there is only one plot with 100% damage declare the data as missing data and compute for it. If there is one plot in each treatment with 100% damage and there are 4 replications discard one replication and consider the experiment with 3 replications.

If the entire experiment is with 100% damage so that the standing crop is actually second generation tillers consider the experiment a failure. This situation actually happened at Mariri substation at Bone-Bone. This was what Ir. Muchtar had referred to when he asked the question what method to use in correcting yields of rice with 100% rat damage.

5. Discussed with Ir. Singgih A. about the Azolla Experiment who had to discuss it with the Heads of Kecamatan during their visit to the Institute.

6. Assisted in harvesting the Azolla Experiment, Long Term Soil Fertility Trial and the Long Term Organic and Inorganic Fertilizer Trials at the Maros Experimental Farm.

7. Reported and discussed the following papers during the regular Saturday Seminar on November 19, 1983 at the Maros Research Institute for Food Crops.

   a. Response of IR50 to Source of Sulfur Application. Maros 1983 WS. Christine J.S. Momuat and I.T. Corpuz (Appendix I).

   b. Azolla as Nitrogen Source for Rice at Maros, South Sulawesi. Christine J.S. Momuat and I.T. Corpuz (Appendix II).

   c. Residual Effect of Three Nitrogen Sources at Four Rates of Application. Lanrang 1983 WS. Agustina Buntan, Christine J.S. Momuat and I.T. Corpuz (Appendix III).

8. Assisted in setting up the following experiments at Lanrang substation.

   a. Nitrogen Fertilizer Efficiency under Irrigated Wetland (INSFFER).

   b. Long Term Soil Fertility Experiment (INSFFER).

   c. Long Term Effect of Organic and Inorganic Fertilizer.

9. Assisted in selecting and characterizing sites for sweet potato and cassava fertilizer experiments.

10. Discussed with Ir. Reginald le Cerff, Incharge of Fertilizer Cropping System, his design on Fertilizer Cropping System Experiment. Ir. le Cerff recognized that he has to start designing his own experiment. So far Ir. le Cerff had been implementing experiments designed by other people. I am indeed very happy because this is the attitude I had been telling them from the beginning. To become a full pledge researcher one has to design his/her own experiment and not merely implementing

201

research projects formulated by other people. Likewise he is contaminated by my approach of having a simple design rather than a complex one despite the availability of computer.

11. Discussed with Ir. Christine J.S. Momuat, Head Soil and Soil Fertility Department the explanations of the results she obtained from a cooperative research project with P.T. Gresik.

12. Assisted in setting up a pot experiment to determine the influence of $SO_4^=$ on the availability of phosphorus under wetland condition.

13. Discussed with Ir. Heribertus Supadmo MSc., involved in the fertilization studies of horticultural crops the need to include density as one of the parameters to be gathered in cabbage fertilizer trials. He personally observed that cabbage heads that were of the same sizes were different in weights. He is not however aware of what method to use.

    I pointed out that water displacement is a fairly accurate method. To prevent water from entering the interior part of the cabbage head especially the hollow ones is to wrap them with plastic.

14. Discussed with Ir. Lukman Gunarto MSc, palawija research coordinator. Some possible fertilization experiments on cass[illegible] PT3MT supported projects. These are:

    a. Rate of potassium with or without phosph[illegible] and [illegible].
    b. Time of potassium application.

    Also discussed with Ir. Lukman, the poss[illegible] why increasing [illegible] of ammonium sulfate depressed [illegible] of rice when grown in a soil collected from the swampy area in Kabupaten Luwu. The depressing effect of increasing nitrogen rate was not observed using ammonium nitrate as the source of nitrogen. This is observed in a pot experiment.

    The depressing effect is due to the reduction of sulfate to hydrogen sulfide which is toxic to rice plants. This is especially the case when the level of iron is low.. The transferability of the result of the trial is not possible because of the lack of commercially available ammonium nitrate fertilizer materials. He recognized that treatments using urea should have been including. He asked me to design an experiment as a follow up of his experiment. This is essentially comparing ammonium sulfate and urea at 3 rates of nitrogen application. To prevent the toxic effect of hydrogen sulfide a treatment will be included applying iron combined with the highest rate of ammonium sulfate application.

15. Trips made:

    a. Lanrang substation (Trip Report - Appendix A)
    b. Mariri substation (Trip Report - Appendix B)
    c. Bone and Lanrang substation (Trip Report - Appendix C)
    d. Lanrang substation (Trip Report - Appendix C).

16. Participated in all seminars.

17. Had R and R from December 15, 1983 to January 3, 1984.

B. Problems and Their Solutions:

No problems encountered during the quarter except some misunderstanding with RMI-Jakarta on money matters.

C. Plans for the next quarter (January, February and March):

1. Assist in setting up Soil Fertility Experiments.
2. Assist in designing experiments to be conducted in the dry land and dry climate areas.
3. Assist in preparing research reports.

Appendix II.B.1.

Trip Report

Where : Lanrang substation

When : October 4, 1983

With : Ir. Christine J.S. Momuat, Head Soil and Soil Fertility Department.

Ir. Singgih A. MSc., Incharge INSFFER Trial.

Ir. Nur Richana, Research Staff, Agronomy/Physiology Department.

W h y : 1. To locate a site for a new trial on Nitrogen Fertilizer Efficiency (INSFFER).

2. To evaluate on-going experiments on palawija (corn, soybean, peanut, sweet potato).

Observations:

The site for the new Nitrogen Fertilizer Efficiency Trial (INSFFER) will be established at the experimental farm of substation. It is new Nitrogen Fertilizer Efficiency Trial, the NH_4-N, pH and temperature of the standing water will be monitored for six days after fertilizer application. These parameters will be determined right in the field using field chemical Kit. The paddy identified for the site has been used for the past years for seed production. The fertilization practiced was the continuous application of urea and TSP at the rates of 200 Kg and 100 Kg per ha respectively. The field is adjacent to the main road so that any visitor who is interested to see the experiment will have no problem in observing.

The Head of the Lanrang substation scheduled the sowing of the seedbeds on October 20, 1983. This means that transplanting will be done on Nov. 9 using a 20-day old seedlings.

There is serious problem in the soybean fertilization trial. The percent germination is extremely very low, 1%. It was reported that there was a heavy rain just after planting. The field was flooded. It was water-logged for few days. The site was formerly cultivated as lowland. There is a plow sole layer which made drainage very poor. The presence of standing water seriously affected the germination of soybean. There was no replanting done because there were no more seeds available. The other experiments on sweet potato, mungbean and peanut had very good germination. However there were already signs o rat damage attack especially the peanut. They had already started baiting the rate using poison.

TRIP REPORT

Where : Mariri Experimental Farm, Bone-Bone.

When : October 26 to 28, 1983

With : Ir. Singgih A. MSc.

Ir. Reginald le Cerff.

Why : To harvest two Fertilizer Experiments:

Soil Fertility Evaluation: Minus One Test Technique

and Sulfur Fertilizer Experiment.

Observation and Comments:

If only there is a fast communication system between Maros and Mariri substation, the trip should not have been made.

A decision was made not to harvest the experiments scheduled to be harvested. The standing crop was actually second generation tillers. Both experiments were seriously damaged by rats. Unfortunately no provision was installed to protect the crop from rat damage. The man in-charge of the farm is heavily banking on the theory that when the crop is planted at the proper time no rat infestation is expected.

A question was raised by Ir. Muchtar, is there no method that could be used to correct the yield. He is convinced that it is possible to get yield from partially damaged plots. How about in plots where rat damage is 100%? After all there are panicles. The panicles that could be harvested are from the second generation tiller.

It is better to repeat the experiments than have data in ones file that are meaningless, data that can not be used to answer the objectives of the experiment.

Appendix C (CORPUZ)

Trip Report for November, 1983

Igmidio T. Corpuz

Where - Lanrang substation

When - November 8 & 9, 1983

With - Ir. Singgih Andyantoro, Incharge INSFFER Trials

Why - 1. To assist in setting up the following field fertilizer experiments.

a. Nitrogen Fertilizer Efficiency in Irrigated Wetland (INSFFER)

b. Long Term Soil Fertility Experiment (INSFFER)

c. Long Term Effect of Organic and Inorganic Fertilizers.

2. To take observations on the field experiments on peanut and sweet potato.

Observations: Since the site for the Nitrogen Fertilizer Efficiency was transferred to another field new plots had to be established. Again there was the opportunity to discuss the necessity and essentiality of leveling the plots before fertilizer application and before planting. There was the attempt to apply the fertilizers before any leveling was made.

The unevenness of the soil surface was created because in constructing the nuds the soil inside the plots were used. Leveling the soil surface is necessary for uniform distribution of water in the plots. Water tends to accumulate in the lower portion of an area. Moisture condition affect soil chemical processes.

In the case of the Long Term Experiments there was no problem on the level of the soil surface because no bunds were constructed. The bunds are already established. The problem was in tilling the soil. Because the plots are small (4m by 4m) the only way to till the soil was with the use of grub hoe. The depth of cultivation was rather shallow. This factor may affect the growth and development of the rice plants.

The field fertilizer experiments on peanut and sweet potato are a complete failure. All the plants for both peanut and sweet potato were destroyed by rats. Poison baits were used but no effect.

Appendix D (CORPUZ)

TRIP REPORT

When . December 12, 1983

Where : Lanrang substation

With : Member of the USAID Midterm Evaluation Team

Why : To show and discussed with them on going experiments related to fertilizer efficiency on Rice under Irrigated Wetland condition.

Observations: The trial on Nitrogen Fertilizer Efficiency was observed. The plants were 33 days old from transplanting. The soil in the experimental site is definitely nitrogen deficient as reflected by the growth, development and color of the check and zero-treatment plots. The check plot received phosphorus and potassium in the form of TSP and KCl respectively but no nitrogen. The zero plot did not receive any fertilizer. The zero plot treatment was included to measure the native soil fertility.

There is definite superiority of the urea supergranules (USG) and sulfur coated urea (SCU) treatments over the commercial (prilled urea) at the same rate of application. This is reflected by the general appearance of the plants in terms of the color of the leaves tiller density and height based on visual observations. A question on the availability of USG and SCU was raised. At the present time these materials are not yet commercially produced. When USG and SCU will be made commercially available is still anybody's guess. The reason for this is because the results obtained among the cooperating countries is not consistent.

207

Appendix II.C

Quarterly Activity Report
October - December 1983

by

Dr. Syed Anwar Rizvi - Plant Pathologist (MORIF)

1. Past Activities and Accomplishments:

1.1. Training of Personnel:

1.1.1. Assisted and supervised Ir. Samuel Pakan and Ir. Amran of the Pathology Department in organising and planting of rice tungro virus (RTV) nursery experiment in the field, for the first time, at Maros. These staff members were further advised and assisted in the collection of data from RTV field experiment.

1.1.2. Demonstrated and practically trained 4 staff members (Ir. Samuel Pakan, Ir. Amran Muis, Ir. Yulis and Ir. Syaharuddin) of the MORIF Pathology Department and one student/trainee from Irian Jaya on how to prepare the inoculum for the peanut mottle virus (PMV) and how to do the inoculation, on the peanut seedlings using 3 different mechanical hand inoculation methods.

1.1.3. Assisted Ir. Samuel Pakan to design and organise a screen-house experiment, for the first time at Maros, to evaluate 150 peanut breeding lines for their resistance to PMV. The first group of 80 peanut lines was mechanically hand inoculated when seedlings were at 2-3 leaf stage of growth.

1.1.4. For the purpose of the transfer of technology, 2 luckily available and appropriate models of spray guns were purchased from the local market and used to inoculate the second group of 70 peanut lines with PMV. Adaptation and application of the spray gun inoculation technique at MORIF, also for the first time, in the Institute's research experiments on certain mechanically transmissible viruses of food crops will not only improve the work efficiency but also the reliability of our experimental results. Assisted Mr. Pakan in the collection data from PMV screenhouse experiment.

(Cont. .... p.2)

1.1.5. Provided necessary training to the Pathology staff members on the principles, procedures and how to perform the spray gun inoculation technique to screen breeding lines for their resistance to plant viruses using PMV as a model. Spray gun inoculation technique is less time consuming, simple to use, labor saving and gives more reliable results.

1.1.6. Initiated a new training activity to identify fungi causing diseases in plants. Assisted Ir. Syaharuddin in the identification of fungi:

I) *Curvularia lunata*, causal organism for the discoloration of rice grain and "Black Kernel" disease of rice and

ii) *Diplodia natalensis* causing dieback of citrus twigs.

Assisted Ir. Pakan and Ir. Amran in the identification of:

iii) *Puccinia arachidis* - peanut rust and

iv) *Cerospora arachidicola* - cercospora or brown leaf spot of peanuts.

The staff members were also helped and taught on how to:

a) prepare slides from fungi cultures for observations under a microscope,

b) prepare samples for isolation of disease causing fungi and

c) maintain a culture collection of fungi identified at MORIF.

1.1.7. Necessary instructions were given to the greenhouse workers on how to record daily temperature (maximum and minimum) and relative humidity (RH) in the pathology greenhouse.

1.2. Development of New and Adaptation of Available Technologies at MORIF:

1.2.1. Spray bottle inoculation for rice blast Screening:

Greenhouse experiments, in collaboration with Ir. Syaharuddin, on rice blast (*Pyricularia oryzae*) using a spray bottle to inoculate test materials have shown that this new technique can be used successfully to screen cultivars/breeding lines for resistance to blast.

(Cont. .... p.3)

209

The technique and results of our experiments were reported during Saturday Seminar at MORIF on December 10, 1983 (Appendix II.C.A).

1.2.2. <u>Inoculations in Plastic Cages for RTV Screening</u>: Construction of the plastic cages was completed. IRRI's nursery 1983 IRTN consisting of 196 rice breeding lines was selected as the first group of materials to be screened for RTV resistance and to evaluate the ability of this adapted greenhouse screening technique in identifying the RTV resistant materials with greater reliability by inoculating each test line individually in plastic cages with viruliferous green leafhoppers (GLH)-*Nephotettix virescens*. Ir. Pakan will work as my counterpart for the experiment.

1.3. <u>Special topic Lectures Series</u>: To improve the back-ground knowledge of the Pathology staff members for their better understanding of pathological problems, a series of lectures was started using my office as a class room. Lectures were conducted on the following topics:

1.3.1. <u>Physical properties of plant viruses</u>:

a) Dilution end point (DEP)
b) Longevity in vitro (LIV)
c) Thermal inactivation point (TIP)

1.3.2. <u>Transmission of plant viruses through</u>:

a) Insects
b) Contacts-mechanical means
c) Seed, roots, tubers etc.

1.3.3. <u>Groups of fungi based on pathogenicity</u>:

a) Obligate parasites
b) Facultative saprophytes
c) Facultative parasites
d) Obligate saprophytes

(Cont. .... p.4)

1.3.4. Organisms responsible causing diseases/disorders in plants and their main characteristics:

a) Fungi

b) Bacteria

c) Nemadoes

d) Viruses

e) Mycoplasma like organisms and

f) Parasitic plants and their life cycles

1.3.5. Necessary steps in the preparation of fungal (rice blast) and viral (PMV) inoculum and various inoculation methods.

The staff members who participated in these lectures individually or as a group were: Ir. Suamel Pakan, Ir. Amran Muis and Ir. Syahaiuddin Rahamma. Photocopies of a Glossary of the Phytopathological terms were distributed among the participants.

1.4. Research Papers and Weekly Seminar: Two papers with the following titles were written and presented at the Weekly Seminar of MORIF:

1.4.1. Evaluation of a New Greenhouse Sc ening Technique for Blast Resistance in Rice.

1.4.2. Transmission of rice tungro virus (RTV) by the green leaf-hopper (GLH)-Nephotettix virescens using light and dark screened cages.

1.5. Miscellaneous Activities:

1.5.1. Work and discussions continued with Ir. Hasanuddin on the on the procedures of a greenhouse experiment on RTV using 3 different host sources to obtain RTV i.e. RTV infected TN 1, IR42 and IR54 and using colonies of RTV vector GLH well adapted to each

(Cont. .... p.5)

of these cultivars, for inoculations to determine the differences, if any, in the behaviour (infectivity) of RTV acquired from each of the 3 cultivars. Each of these cultivar is different genetically for its resistance to GLH.

1.5.2. Meetings were held with Ir. Hasanuddin, acting Director of MORIF and Head of the Pathology Department to discuss:

a. the possibility of sending one of the Pathology staff member (Ir. Syaharuddin) to IRRI for training in mycological work with special emphasis on rice blast screening methods.

b. inviting of Ir. Mukelar of BORIF to visit MORIF's Pathology Department to observe our work on rice blast, give an overview of his experience with blast and to discuss ways to adapt new techniques in order to improve the blast program at MORIF.

c. the preparation of a list of the departmental virus research activities for the year 1984/1985 which later on was presented during a MORIF staff meeting for general discussions.

d. the status of RTV nursery experiment at MORIF and the methodology to be used to collect data from the field.

1.5.3. Assisted Ir. Hasanuddin in the design preparation of a survey form and specimen collection label to be used to monitor the incidence and prevalence of diseases of food crops in the various parts of Sulawesi.

1.5.4. Provided necessary assistance to Ir. Syaharuddin in his blast research program under laboratory conditions i.e. culturing the pathogen for identification of isolates, preparing slides for microscopic studies, etc. The rice blast samples collected from Kendari were also given to Syaharuddin for including in his work.

(Cont. .... p.6)

1.5.5. Prepared a form for RMI/MORIF personnel for writing their official trip reports.

1.5.6. Attended all of the Saturday Seminars regarding the research projects completed by various departments of the Institute.

1.5.7. Participated in a meeting at Maros called by Dr. W. Collier, Chief-of-Party, RMI-AARP for all RMI-MORIF staff and Dr. Farid Bahar.

1.5.8. Helped the USAID personnel in making necessary arrangements in the test room to conduct the ALIGU test at MORIF.

1.5.9. Letter communications were started with Dr. Kevit Brown, RMI personnel at BARIF to exchange ideas and information on blast research at MORIF.

1.5.10. Participated in the discussion with the visiting USAID/RMI/AARP review team and selected MORIF staff members at Maros and Lanrang.

1.5.11. Provided to Mr. Ronald Harwood of RMI with the copy of a tentative list of equipment, supplies and chemicals for the Department of Pathology to be included in the first AARP purchase order.

1.5.12. Dr. Bernardo Gabriel, RMI/BARIF team leader, visited MORIF. Dr. Rizvi introduced him to the Heads of the Pathology and Entomology Department and various other staff members of MORIF, showed him the Institute's laboratories, greenhouses and other research facilities. They discussed areas of research of mutual interest for possible future collaboration between the staff of BARIF and MORIF. Later, Dr. Gabriel visited the following research experiments of Dr. Rizvi in the field and screen or greenhouses:

(Cont. .... p.7)

i) Field screening of rice breeding lines/cultivars for resistance to RTV, using RTV infected plants of cv. TN1 as source of inoculum for the spread of RTV in the field by its vector GLH.

ii) Screenhouse evaluation of peanut lines/cultivars for resistance to PMV, using hand and spray gun inoculation techniques.

iii) Greenhouse testing of selected IRRI rice breeding lines for resistance to RTV, using plastic cages to inoculate each test line individually.

iv) Greenhouse screening of rice varieties for resistance to rice blast, using spray-bottle inoculation technique.

1.5.13. Mailed request forms to the IRRI's Liaison Officer, Mr. Walter Tappan stationed in Jakarta, Indonesia to receive the seed for two sets each of 1984 RTV and Rice Blast International nursery trials to be conducted by MORIF.

1.5.14. Assisted Ir. Syaharuddin in scoring the reaction of 57 rice cultivars/advanced breeding lines to the natural infection of rice blast in a field cultivated by Gogo Rancah irrigation system at Maros.

1.5.15. English Language Course:
Necessary arrangements were made for three staff members of the Pathology Department to participate in an English language course held at the Ujung Pnadang School of English Conversation during October-December 1983. At the end of the semester, Ir. Samuel Pakan and Ir. Yulis were being promoted from their starting level 1A to join levels 2A and 1B, respectively, during the next school semester. Ir. Amran Muis who started at the level 2A will join

(Cont. ....p.8)

214

the level 2B of English Language Course. I am quite happy with this improvement in the proficiency of English language of these Pathology staff members. However, they shall continue further to improve their English proficiency in order to avail the advanced training opportunities now available for the Indonesian nationals.

1.6. Travel made: The following official travels were made during this quarter:

1.6.1. October 7-8, 1983: Kendari and Wawotobi (Appendix II.C.B)

1.6.2. December 7-9, 1983: Jakarta and Bogor (Appendix II.C.C)

1.6.3. December 12, 1983: Lanrang (Appendix II.C.D.)

1.6.4. December 13, 1983: Baju Bodoa (Appendix II.C.E.)

2. Problems and Proposed Solutions:

No significant problems were encountered in this quarter.

3. Plans for the Following Quarter:

3.1. Provide assistance where and when it is needed by MORIF and its staff members.

3.2. Write research papers on RTV field, RTV greenhouse and PMV screenhouse experiments for publication and their presentation during the Weekly Seminars at MORIF.

3.3. Assist and encourage the Pathology staff members to write papers for seminars / conferences and publication regarding their research already completed.

3.4. Make necessary preparations to conduct 1984 RTV nursery experiment at Lanrang.

(Cont. ....p.9)

215

3.5. Assist in the selection of suitable MORIF staff members for the special short term training courses being offered in the United States during 1984.

3.6. Contact the Director of the Language Center at the University of Hasanuddin, Ujung Pandang to make necessary arrangements for a special English language course to be held during the evening hours for a group of 10-15 selected staff members of MORIF.

3.7. Finalize the arrangements at MORIF to send one of the Pathology staff member to BORIF for training in the virological laboratory techniques.

Dr. Syed Anwar Rizvi
Plant Pathologist - MORIF

2\17

Evaluation of a New Greenhouse Screening Technique for Blast Resistance in Rice

S. Anwar Rizvi and Rahamma, S.[1]

In all rice growing areas of the world, rice blast is one of the most devastating fungal disease of rice causing heavy yield losses worth millions of dollars every year. The fungus is capable of producing new more virulent races in a short period of time can break down the resistance of once resistant varieties and make them susceptible to blast infection. It is a very time consuming and continuous battle for the pathologists and breeders to stay ahead of the fungus (Pyricularia oryzae) by developing new rice varieties with higher level of resistance to the blast. Use of fungicides can not only cause an increase in the cost of rice production but also a reduction in the farmers's income. Resistant varieties can help farmers to increase their production and income without depending on the use of fungicides. Sometimes needed fungicides are not even available, not to speak of their high cost, hazards attached with their use and damaging effects on the environment.

The development of a simple and reliable technique to screen and identify blast resistant materials with greater efficiency is of utmost importance for the success of any research program on blast. Field tests can be laborious, time consuming and dependent on the natural spread of infection which may not be possible if the climatic conditions are not optimal at the time of an experiment. Therefore, a strong need was felt to develop and evaluate at MORIF a simple, less time consuming and more reliable screening technique to identify and select rice breeding lines and varieties with higher level of resistance to rice blast.

Materials and Methods:

Source and preparation of inoculum. Blast infected leaves of a susceptible cultivar IR50 were collected from MORIF blast nursery. The leaves

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1) Plant Pathology/Virologist, AARP-RMI Program and Research Staff member, Pathology Department, MORIF.

217

were cut into many small pieces and homogenized in a Waring Blender with distilled water @ 10 grams of infected leaves and 100 ml of distilled water (1:10-W/V). The homogenized preparation was then sieved through four layers of cheese cloth to obtain a suspension of blast spores and mycelia without large debris of leaves in it.

Spray-bottle. A commonly available plastic bottle of 500 or 1000 ml capacity with an attachment of fine mist spray nozzle was purchased from the local market. Final inoculum suspension was poured into the spray-bottle for inoculation of test materials.

Test materials. A group of 4 IRRI-cultivars and 2 advanced MORIF breeding lines was selected to evaluate the effectiveness of spray-bottle-inoculation technique in identifying the resistance to blast present in these test materials.

Test cultivars/lines based on their reaction to blast were of 3 distinct categories as follows:

1. Cultivars reported as susceptible to blast i.e IR36 and IR50.

2. Cultivars reported as resistant to blast i.e IR54 and IR56.

3. Cultivars with their reaction to blast not yet fully determined i.e HM28 and HM31. Both of these cultivars are the advanced MORIF lines with a prospect to be released as new rice cultivars by MORIF, in the near future.

Preparation of Materials for Inoculation. Two experiments each with a row of 15 seedlings per test cultivar/line were planted in wooden trays. Every tray consisted of 3 rows of seedlings which were inoculated with the freshly prepared suspension of rice blast inoculum using the spray botlle inoculation technique. Seedlings were 2-3 weeks old at the time of spray inoculation. The inoculum mist settled

218

on the leaves of the seedlings as water droplets. The trays of inoculated seedlings were kept in an area of high relative humidity for 48 hours. Later these trays were moved into the green/screenhouse for symptom development and observation.

Results and Discussion:

Under ideal climatic conditions of moderate temperature, high relative humidity and low light intensity, the infection (blast) symptoms started to appear in 3-4 days after the spray inoculation in the case of susceptible lines. Symptom development was delayed under the harsh weather conditions of high temperature and low relative humidity and in moderately resistant materials.

Spray-bottle inoculation technique clearly separated cultivars/lines susceptible or resistant to rice blast infection among the test materials used in this experiment (Table 1).

The new IRRI cultivar IR56 and MORIF advance line HM28 showed a higher degree of resistance to the blast race present at Maros and used in this test. The leaves of IR54 were completely destroyed with the blast infection as were those of IR50 and HM31 also. IR36 showed severe infection of both leaf and neck blast.

It seems, a more virulent race of blast is present at Maros which is capable of breaking down the previously reported blast resistance in IR54. It is, therefore, suggested that planting of IR54 and HM31 should be avoided in the areas of high incidence of blast as has been suggested for IR50 and IR36, previously. The spray-bottle-inoculation technique is simple to use with reliable results and can easily be adapted at the institutes even with very limited resources and with very little technical know-how.

Following are the few of the advantages of this technique:

1. Materials required to make use of this technique are commonly available either in most of the laboratories or can be purchased locally in the most parts of the world.

2. Preparation of the inoculum does not require any sophisticated equipment or complicated procedures.

3. Actual operation of the inoculation is very simple and easy to perform and can be taught to any untrained person in a matter of few minutes.

4. The technique can clearly screen and separate materials resistant or susceptible to rice blast in much less time than field tests.

5. The technique is labor saving and less time consuming, simple and easy to adapt, efficient and can give reliable results.

It is, therefore, recommended that the spray-bottle blast inoculation technique should routinely be used at MORIF in our screenhouse evaluation of all the cultivars/breeding lines for their resistance to rice blast as the first step in the screening of various materials. However, field tests should be conducted on the symptomless survivors of the screenhouse tests.

This system shall significantly reduce the number of test line entering into the field for screening and thus also reduce the amount of test materials which need to be handled. This system could also help improve the efficiency of research workers by producing more reliable results.

Table 1. Reaction of rice cultivars/lines to Blast inoculation by spray-bottle-inoculation technique.

Cultivar/Line	Blast Reaction Experiment No. I	Blast Reaction Experiment No. II
IR 36	S [a)]	S
IR 50	S	S
IR 54	S	S
IR 56	R [b)]	R
HM 28	R	R
HM 31	S	S

a) S = plants with > 50-90% of leaves infected with many and large size blast lesions causing eventual death of most leaves, susceptible reaction.

b) R = plants with < 5% of leaves infected with few and extremely small size blast lesions, resistant reaction.

221

Maros Research Institute for Food Crops : (MORIF)
Applied Agricultural Research Project

Appendix II.C.B.

TRIP REPORT
LAPORAN PERJALANAN

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc). If necessary, use additional sheet(s) to complete the report.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.) Jika perlu, gunakan lembaran tambahan untuk melengkapi laporan ini.

Name : Dr. Syed Anwar Rizvi
Nama

Department : Plant Pathology
Kelompok

Date of Departure : October 07, 1983
Tanggal berangkat

Return : October 08, 1983
Tanggal kembali

Principal Locations Visited : MORIF sub-station at Wawotobi, Kendari - Southeast Sulawesi.
Tempat-tempat yang dikundjungi

Accompanied by : Mr. Shagir Sama.
Pengikut

Purpose of trip : To make an assesment of the severity of the incidence of the rice
Maksud perjalanan blast and rice tungro virus (RTV) in the various parts of the Province.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (faktor-faktor yang memerlukan penanganan, hal-hal baru, dll.)

A sever attack of rice blast and rice tungro virus (RTV) was observed at many locations on the IRRI rice cultivars IR36 and IR54, respectively, during our visit to the Province.
The appropriate control measures were suggested to the Head of the Agricultural Extension and his staff members during a specially arranged staff meeting for this purpose.

*Original: to
Asli kepada

Mr. Carl R. Fritz,
RMI-JKT.

*Copy: to
Tembusan

Director MORIF and AARP personnel.

222

Maros Research Institute for Food Crops : (MORIF)
Applied Agricultural Research Project

Appendic II.C.C.

TRIP REPORT
LAPORAN PERJALANAN

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Name : Dr. Syed Anwar Rizvi
Nama

Department : Plant Pathologist
Kelompok

Date of Departure : December 07, 1983
Tanggal berangkat

Return : December 09, 1983
Tanggal kembali

Principal Locations Visited : BORIF, Bogor/Jakarta.
Tempat-tempat yang dikundjungi

Accompanied by : Mr. Shagir Sama.
Pengikut

Purpose of trip : To attend a special seminar given by JICA expert in Bogor.
Maksud perjalanan

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (faktor-faktor yang memerlukan penanganan, hal-hal baru, dll.)

Attended the seminar given by Dr. Kazushige Sogawa on the topic:

"Genetic diversity in the brown planthopper (BPH) and its biotype problems".

Participated in the discussion held after the seminar to plan future strategies to control brown planthopper (BPH) in Indonesia.

Participated in a meeting with Dr. Tantera of BORIF for finalizing the neccessary arrangements to send one of the MORIF staff member of the Pathology Department to BORIF for learning the virological laboratory techniques especially, how to purify plant viruses and prepare their antisera. Dr. Tantera suggested that January/ February 1984 can be good time to receive the trainee at BORIF.

*Original: to Mr. Carl R. Fritz, RMI-JKT.
Asli kepada

*Copy: to Director MORIF and AARP personnel.
Tembusan

Maros Research Institute for Food Crops
Applied Agricultural Research Project : (MORIF)

Appendix II.C.D.

TRIP REPORT
LAPORAN PERJALANAN

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Name : Dr. Syed Anwar Rizvi
Nama

Department ; Plant Pathology
Kelompok

Date of Departure : December 12, 1983
Tanggal berangkat

Return : December 12, 1983
Tanggal kembali

Principal Locations Visited : MORIF sub-station at Lanrang.
Tempat-tempat yang dikundjungi

Accompanied by : Members of the AARP/USAID/RMI review team , selected MORIF staff members and Dr. Corpuz - a member of RMI team at MORIF.
Pengikut

Purpose of trip : Visit field experiments of the sub-station and discuss future construction plans.
Maksud perjalanan

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (faktor-faktor yang memerlukan penanganan, hal-hal baru, dll.)

A visit was made to the site where the future laboratory and housing facilities will be constructed at Lanrang.

Dr. Corpuz explained the salient features of his on going field experiments to study the effects of various Nitrogen dosages application on rice production at Lanrang.

*Original: to Mr. Carl R. Fritz, RMI-JKT.
Asli kepada

*Copy: to Director MORIF and AARP personnel.
Tembusan

TRIP REPORT
LAPORAN PERJALANAN

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Laporan* ini harus diketik atau ditulis tangan denyan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.) Jika perlu, gunakan lembaran tambahan untuk melengkapi laporan ini.

Name : Dr. Syed Anwar Rizvi
Nama

Department : Plant Pathologist
Kelompok

Date of Departure : December 13, 1983
Tanggal berangkat

Return : December 13, 1983
Tanggal kembali

Principal Locations Visited : Baju Bodoa.
Tempat-tempat yang dikundjungi

Accompanied by : Members of the AARP/USAID/RMI review team, selected MORIF staff members and RMI staff members at MORIF.
Pengikut

Purpose of trip : To visit farmers with whom Dr. Fritz von Fleckenstein is conducting an economic study.
Maksud perjalanan

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (faktor-faktor yang memerlukan penanganan, hal-hal baru, dll.)

Dr. Fritz von Fleckenstein explained the objectives of and the progress made in his economic study with a group of selected five farmers in the village of Baju Bodoa.

*Original: to Mr. Carl R. Fritz, RMI-JKT.
Asli kepada

*Copy: to Director MORIF and AARP personnel.
Tembusan

Appendix III

Quarterly Activity Report
for the AARP/BARIF Specialist Team Located in Banjarmasin
October 1 - December 31, 1983

A. Summary of Group Activities

1. Group Consultations : (other consultations included in individual reports)

11-13	December	AARP-GOI Evaluation Team : Dr. Paul J. Stangel; Dr. Prabowo; Dr. William L. Collier; Dr. Hargono Singgih and other participants.
3	November	BAPPEDA Interinstitutional Meeting on Deepwater Rice Research in Lebak Areas. Mr. Farkinsyah Arsuah and Mr. Asmuni, BAPPEDA; Dr. Ismet Achmad, University of Lambung Mangkurat; Mr. Bahaiddin Nasyabandy, Center for Plant Protection; Mr. Hanafiah, Dinas Pertanian; Mr. Simanungkali, P_4S and others.

2. Review and Planning of BARIF Research : BARIF in consultation with AARP-RMI consultants have developed a preliminary plan for BARIF research for all disciplines for the 5 research years 1984-1990.

3. Training : The BARIF researcher seminar series has continued successfully for the last 3 months. Rice breeding and secondary crops meetings are irregular but beneficial. Two new seminar series on writing for publication and organizing research have begun.

   Ms. Yanti Rina completed training in agroeconomics at IRRI.
   Ms. Mahrita Willis completed training in pests and diseases at IRRI.
   Mr. Farid Nocktah began training in communications/administration at IRRI
   Mr. Eddy Purwanto completed upgrading in agroeconomics methodology at Lambung Mangkurat University.

4. Trips : Consultants continued field observation and recarding at BARIF experiment station sites and contributed to tidal swamp village surveys. Dr. Brown travelled to Jakarta and to Gadjah Mada University in Yogyakarta to consult on breeding and tidal swmap research. Ms. Watson attended and presented papers at two conferences : one on Women in Rice Farming Systems, IRRI, Philippines, and the other a FAO-GOI working group on Stable Plant Resistance. Dr. Gabriel traveled to Ujung Pandang, Sulawesi, to consult with MARIF researchers and consultants.

24

5. Administration : AARP-RMI office administration has been running smoothly. Most staff are taking vacation or on home leave during this December and January.

B. Activities of Kevitt Brown (Appendix III A)

Mr. Brown spent much of this quarter consulting and supervising the establishment of wet season nurseries and trials. This included intensive work on deepwater rice sites in Alabio and Sungai Buluh and development of plans for deepwater rice expansion to 1,000 ha. He has begun an extensive catalogue of selected rice varieties. He completed final research of dry season nurseries and has begun their analysis. These activities are complemented by his consultations with breeding expert in Java. Cooperative work in blast research and a new seed storage system at BARIF are future goals.

C. Activities of Greta A. Watson (Appendix III B)

Ms. Watson organized two seminar series and conducted infield research training for BARIF researchers. She participated in two agroeconomics village surveys. The trip to the Philippines enabled her to gather many journal and book references for AARP-BARIF use, and consult with specialists of different disciplines on tidal swamp research. She and Mr. Farid Nocktah have worked on drafts for the proposed BARIF Research Bulletin (1984). The FAO conference. Provided new insight on farmer participation in food crops technologies.

D. Activities of Bernardo Gabriel (Appendix III C)

Mr. Gabriel is heading the review of and 5 year planning for Balittan research activities. He has begun collecting insect pests and predators of the South Kalimantan province. This first BARIF collection now includes over 100 specimens and will be used for reference by the staff. He visited MARIF station and observed research in crop protection and administrative operations there. He is continuing a compilation of an annotated bibliography which includes unpublished as well as published data on pest control. Seven in-Kalimantan trips were conducted.

E. Activities of Thomas Gula (Appendix III D)

Mr. Gula has begun to intensively investigate methods and means of rat control. He consulted with rat control specialists and taxonomists in Jakarta and Kalimantan, and has begun the collection and preparation of rat specimens for BARIF. Specimens were captured on five field trips. He has collected a preliminary bibliography of rat literature.

F. Problems and Solutions

Lack of laboratory equipment and space and field research tools continues to make fine-tuned research problematic.

Researcher and administrative problems vary within and among disciplines. In general there is a need to encourage BARIF interest and participation and increased delegation of responsibility.

Appendix III.A

Quarterly Activity Report by Dr. Kevitt D. Brown
Deepwater Rice Breeder
October 1 - December 31, 1983

A. Activities

1. Consultations

3 - 5 October	Dr. Harahap and Dr. Machmud, Balittan Bogor
	Dr. Retzlaff, IADS
	Dr. Walter Tappan, IRRI
	IPB Agriculture Professor staff
11 - 12 October	UGM Agriculture Professor staff.

Other consultations included in general report.

2. Field Trips

1 - 12 October	Bogor and Yogyakarta
22 October	Sungai Buluh and Alabio
25 October	Unit Tatas Research Station
26 October	Belandean Research Station
29 October	Handil Manarap Research Station
1 November	Binuang and Barabai Research Stations
3 November	BAPPEDA
15 November	Belandean Research Station
16 November	Handil Manarap Research Station
21 - 22 November	Alabio and Sungai Buluh
26 November	Binuang Research Station
3 December	Belandean Research Station
6 - 7 December	Sungai Buluh and Alabio
10 December	Pleihari Research Station
12 December	Unit Tatas and Handil Manarap Research Stations
15 December	R & R

3. Finished the dry season nurseries and began analysis of results.

4. Began catalogue of selected rice varieties

5. Consulted with Dr. Harahap to organize and coordinate swamp rice breeding program and with Dr. Machmud for cooperative work in rice blast research. Held discussions with IPB and UGM scientists about tidal swamp research and with Dr. Retzlaff to discuss possibility of PhD training for my counterpart.

6. Prepared wet season nurseries and took data on experiments.

7. Participated in USAID program review of our project.

8. Began intensive work in Deepwater rice for plans to develop 1,000 ha.

9. R & R from Dec. 16 to Jan. 16, 1984.

B. Plans for First Quarter, 1984

1. Continue visiting experimental sites and data taking in the wet season.
2. Visit experimental sites with Dr. D. HilleRisLambers from IRRI.
3. Attend GEU meeting in Bogor to discuss the cooperative swamp rice breeding program of Indonesia.
4. Help publish thesis articles of Ir. Suhaimi, Msc, and Ir. Sutami, Msc.
5. Set up new seed storage system at Balittan.

C. Problems and Proposed Solutions

1. This season my counterpart and I have noticed several research problems at most of the BARIF experiment stations. These problems which include use of incorrect plot sizes and plot spacings, poor seedbed management and plot layout, are routine and in most cases instructions were given to farm managers and technicians before the activities were carried out. Apparently the research station personnel are not interested to follow the suggestions of senior researchers and consultants on these simple matters. After much careful discussion with my counterpart, farm managers, and researchers, I propose the following procedures :

229

a) Give higher priority to training of research station personnel.

b) To request to Dr. Anwarhan that the researchers and particularly the heads of research departments and farm managers be given more authority to manage experiments. In particular it may be advisable to establish separate department budgets which can be controlled by department heads with overall supervision by the Project Leader. This differs from the current system which is centralized budgetary control by non-researchers. Currently, department heads and farm managers find it difficult to plan ahead in their research, even within one season, because they do not know how much money is available for particular programs and experiments. When money is needed for farm or research activities, requests to the Project Leader may take a long time or may be turned down because the budget was used for other purposes. The net results are that (1) administrator may make decisions that the researchers are better qualified to make, (2) plans to develop the farm stations and improve research are not made, or cannot be followed, (3) researchers are given the responsibility to do the work but they do not have the authority to implement it. Thus, researchers and farm managers become easily discouraged and lazy because they cannot implement the improvements they suggest, nor do the farm workers fully respect them because they lack the authority.

No. : TR-033
To : AARP - GOI Project
From : Dr. Kevitt Brown & Sara Brown
Subject : Trip Report to Jakarta, Bogor and Yogyakarta
Date : 3 - 12 October, 1983

Jakarta

The purpose of this visit was to arrange details of the R + R of my wife and I, including passports, visas, and plane tickets.

Bogor

While in Bogor discussions were held with various people and two libraries were visited :

Walter Tappan - IRRI Indonesian Liason Scientist : We introduced each other and discussed the rice research situation in Kalimantan and Indonesia.

Woody Harwood - AARP / RMI : He suggested we change the nylon piston brakes on the front wheels of our CJ-7 to the $50-100/wheel Kelsey-Hays metal pistons. He also said the front end alignment should be done regularly on the CJ-7 especially if the tires are wearing unevenly. He added that oile presmelling is not needed unless there is a leak.

Dr. Z. Harahap - Rice breeder, Balittan Bogor : He gave his comments to a draft proposal for a cooperative swamp rice breeding program between Bogor, Sukarami, and Banjarmasin. Tentatively we discussed initiating the program at a GEU meeting held in December in Bogor. The decision is pending approval by Dr. Siwi and the other directors of institutes. Dr. Harahap gave several bulk, early generation tidal swamp populations for testing under Kalimantan conditions.

Dr. William Collier - AARP/RMI : He gave copies of the project proposal for Swamps II and for USAID. Our lack of manpower of BARIF should not be a problem because University and other consultants will be called in. BARIF local staff will receive an extra 50,000 Rp. per month according to the Swamps II proposal and Indonesian full-time consultants will be paid more and will come from a pool of new PhD and early retiree's. Dr. Collier also informed us that Dr. Manwan has money available for international travel of Indonesian staff. Requests should be channelled through institute directors.

Dr. Machmud - Plant Pathologist, Balittan Bogor : He was anxious to have some cooperation with Balittan Banjarmasin because he feels it is his roll to support the outer stations. We can request 2-6 week training with him for rice blast or other disease training. He also requested leaf specimens of rice blast and bacterial pathogens to do analysis for us. We may also request rice blast differential varieties for identifying the major groups which occur on Kalimantan.

BIOTROP Library : This an excellent reference library with many current journals. The specialty of this library which is of interest to BARIF is entomology, botany, and coastal ecosystems. They have a photocopy service.

Ralph Retzlaff - Training Coordinator, IADS : Dr. Retzlaff is in charge of long term, degree training under World Bank projects. He anwered questions about training of Ir. Mahrita and Ir. Suhaimi. The first step is to have a letter of nomination from the institute director to Dr. Manwan requesting degree training funded by NAR II. Candidates should at least a B average GPA. For the US, the TOEFL score should be 500 or more although in the UK they are often not as strict. Canada is another possibility but Australia is not usually a good choice because entrance is difficult. UPLB in the Philippines and India are always good choices as a fall back since standards are good and there are few restrictions.

TOEFL exams may be taken after the application is made but this must be explained in the application. There is a three month course held in Bogor to prepare for the TOEFL given by Annie Collier. We must request this 2 months before and may inquire to her directly. Formal application is through the institute director to Budoyo. Candidates who receive a score of 450 or more are often accepted by the granting agency. The exams are give on the 15th of each month in Jakarta and Surabaya. When applyihg to universities Dr. Retzlaff recommended listing at least four (1 outstanding, 2 middle range, and 1 fall back). Applicants are never admised to make formal application on their own because of miscommunication problems. They should prepare a statement of their research objectives, background, and a list of publications which will help the Universities to identify staff most suitable for their needs. If possible candidates should visit the IADS office for an interview. Also IADS handles visa and passports.

The details of international training stipend are generally quite favorable to the student. The stipend is excellent and provides for additional research funds (up to $3300) and money for professional meetings ($500). Unfortunately the wife and 2 children may come only after six months. The PhD research may be done in Indonesia in some cases with classwork abroad.

Sumatra Tidal Swamp Team, IPB : Five members of the team were present including the dean, Dr. Koswara, and Dr. Gomawas. They have divided the tidal swamp environments based on : 1) Depth of potential acid sulfates (less than 50 cm are considered unsuktable);

2) Thickness of peat (more than 1 meter or less than 0.1 meters in unreclaimed areas are unsuitable); 3) Saline influenced areas are considered unsuitable.

The aim of their program has soley been with rice development and they concentrated on soil and agronomy work. Their best variety is IR42, suggesting to me that the Kalimantan program is much more advanced in the area of plant breeding. Local varieties are sown in October and are harvested in June. IPB has not been successful with a rice double cropping program because of the long dry season and rats after June. Their particular pest problems which in bad years have caused up to 50% damage are rats, stemborer, stink bug, wild pig, and mole cricket.

They were concerned about my visit because they feel Indonesia should have a long term committment to swamp research and they feel somewhat left out after their project ended without further funding. They expressed uncertainty how they can cooperate in the future if they are not part of the team. They suggested that we pick up their annual reports at Public Works to better understand their past program. They did no work in the lebak areas.

Yogyakarta

We visited the Kalimantan Tidal Swamp Team at UGM : Three members were present including Mr. Soemantri and Dr. Soemartono. Their primary emphasis has been on irrigation systems research with secondary emphasis on crops and livestock. They classify swamp environments based on soil, properties rather than water fluctuation. Soil types include peats (histosol, more than 25 cm; inceptisol, less than 25 cm), saline, and acid sulfate. Research differs depending on each type of environment.

Rice research has centered around plant breeding and agronomy. More than twenty crosses were made in the UGM program and advanced breeding lines are being tested in multilocation trials. The most stable and high yielding local varieties were identified and crosses were made to the best available IRRI varieties. They selected for early maturity for double cropping (4 months) and for late maturity (5 months) for single rice cropping. Fertilizer trials were conducted with high yielding varieties. In inceptisols such as Barambai 125 kg/ha urea and 50 kg/ha triple phosphate were recommended. For histosols such as Tamban 50 kg urea and 30 triple phosphate were recommended. They found that use of inorganic fertilizers was inefficient because of tidal action. They also noted severe outbreaks of BPH in 1973 and 1976 which destroyed local varieties.

UGM scientists also have worked in the lebak areas near Alabio. Their primary emphasis has been on micro-polder or irrigation research. They have tested a few varieties when the waters receed but have not done work with deepwater or floating varieties.

UGM scientists were very cooperative and interested in future cooperation, but admitted that the likelihood of formal cooperation is poor. They still desire informal ties. The gave several annual reports of their findings.

No. : TR-045
To : AARP - GOI Project
From : Dr. Kevitt D. Brown
Subject : Trip Report to Sungai Buluh and Alabio
Date : 22 October, 1983

Ir. Suhaimi Sulaiman, Msc. and I visited our farmer cooperators in the deepwater or lebak areas of South Kalimantan to deliver more seed and check on the seedbeds for the wet season planting.

Sungai Buluh

The farmer was ready for direct seeding the varieties but was waiting for the arrival of Zain from Tilang to help with the layout. Meanwhile corn is growing in about a quarter of the experimental area.

Alabio

We travelled from Sungai Tapus by klotok for Rp 4000,- round trip. From Sungai Buluh the travel time was just under 2.5 hours round trip. The river trip is a savings in time and is more comfortable than the journey by car. The first set of seeds we delivered was sown in a seedbed. The farm suggested that we use their local variety Kencana as check variety. They will sow the remaining nursery soon.

Appendix III.A.3.

No.	:	TR-046
To	:	AARP - GOI Project
From	:	Dr. Kevitt D. Brown
Subject	:	Trip Report to Unit Tatas
Date	:	25 October, 1983

Thirteen members of the Balittan including Dr. Anwarhan went to Unit Tatas, Central Kalimantan to look at the newly acquired station.

The station is near Kuala Kapuas and took 1.5 hours by speedboat from Banjarmasin. There were eight technicians and laborers at the station and 3 buildings, one office and two dwellings. Workers have been at the station only 2 months. To date there are only two experiments, one testing liming with corn and one testing for multiple cropping. The total area of the station is 25 ha.

This is a newly reclaimed area which is rather sparsely populated. In adjacent land areas are stations run by the extension service, agricultural research service, industrial crops service, and animal husbandry service. The pH was recorded as 5.0 but the tertiary canals indicate considerable acidity because of their characteristic red color and lack of vegetation. Corn growing in the soil was quite variable, apparently from variations in ash where trees and other organic matter were burned while preparing the land. Typically the corn was severely stunted and showed interveinal chlorosis. There does not appear to be a layer of peat but a potential acid sulfate sublayer cannot be discounted. Rats are a big problem on the corn where they cut tassels, eat silks, and chew into ears and stalks.

Appendix III.A.4.

No.	:	TR-049
To	:	AARP - GOI Project
From	:	Dr. Kevitt D. Brown
Subject	:	Trip Report to Belandean
Date	:	26 October, 1983

Ir Suhaimi Sulaiman, Msc and Nurlaila, Bsc and I went to Belandean research substation to deliver seeds and discuss plant breeding experiments there for the coming wet season.

Sowing will begin 3 November using the traditional seedbed method. In previous years the seedbed was first plowed and furrows were made but this caused drought and acid burn of seedlings. The traditional method is superior because capillary action will keep the see's continously moist and reduce the acid effect. The method involves stamping shallow holes in the soil at regular intervals, placing the seed inside and covering with ashes or dried grasses to protect from rats and birds.

We also discussed the need for better management and construction of rat fences. The present plastic fence is virtually ineffective there. We may try a galvanized iron fence or better supervision of construction or both.

Farmers of Belandean have virtually finished sowing seeds of the native variety already. Most began one or two weeks ago.

No. : TR-051
To : AARP - GOI Project
From : Dr. Kevitt D. Brown
Subject : Trip report to Binuang and Tilang
Date : 1 November, 1983

Ir. Suhaimi Msc, Ir. Sutami Msc, and I went to Binuang and Tilang experiment stations to deliver seed and discuss the details of this season's plant breeding experiments with technicians there.

Binuang

There will be 3 rice breeding experiments there this year (2 upland and 1 rainfed). Station personnel gave us seed of one more local variety to add to our collection (Ketompeng) and promised 4 more later (Sabai, Sanggul, Katubung, and Duliman). They said Duyung is the most popular upland rice in that area. The rainfed location in Binuang is very large. During the rainy part of the year there is good irrigation to those fields. When we visited, the irrigation water was being diverted to nearby fish culture ponds.

Tilang

Zain informed us that the seedbeds of our deepwater experiment in Alabio had been flooded with 15 - 20 cm of water shortly after emergence (Oct. 27). He was not sure whether the lines would survive. We will have to re-seed as soon as possible, possibly in Banjarmasin.

There were no new upland rice varieties available at this location but if they acquire more later they will include them in their experiment and send a sample to Banjarmasin. There will be 2 rice breeding experiments in Tilang this season.

Appendix III.A.6.

No. : TR-052
To : AARP - GOI Project
From : Dr. Kevitt D. Brown
Subject : Trip Report to Belandean
Date : 15 November, 1983

The purpose of this trip was to check the quality of seedbeds for the wet season's experiments and deliver more seed. I was accompanied by Ir. Suhaimi, Msc, and Nurlaila Bsc.

The seedbeds this season were changed to the traditional method and this was quite successful. Only 4 of the more than 200 lines did not survive, presumably because of poor germination. We had heard that some F_3 generation material had not survived because of daily flooding of the seedbed but actually this only killed some of the seedlings and may have been useful for selection.

Belandean staff also sowed a large area of the breeding line IR13240-102-2-Mr-6 which came from experiment #958 and #1016. Sowing of seeds for the Belandean trials was 4 November.

We asked for some improvements this season. Seedbed entries were not labelled, which is imperitive. Also at harvest, special plot labels must be made which can be attached to the harvest carton and easily checked & double checked. This should relieve the problem we had last season when the yield of several plots were lost.

Station personnel said that the maximum water depth in the field occurs 2 days after full moon during the rainy season.

No. : TR-053
To : AARP - GOI Project
From : Dr. Kevitt D. Brown
Subject : Trip report to Handil Manarap
Date : 16 November, 1983

This trip was made with Ir. Suhaimi, Msc., Ir. Sutami, Msc. and Nurlaila Bsc, with the purpose of checking on the seedbeds and to give further instructions for the wet season's experiments.

Only 10 out of more than 500 lines sown did not germinate. The seedbeds were made in the traditional manner and plastic rat fences were constructed around them. The personnel did a very fine job this season. Next season we asked that the fewer seed be placed in each hole because we want stronger seedlings and with higher % survival.

We also gave instruction to use the screen house to plant valuable deepwater seed increase material because it will be secure from rats and birds. Mrs. Ida did not provide a seedlist with the seed increase materials she gave to the station so we will need to correct this.

Many farmers are planting the first crop all surrounding Handil Manarap this season. Most seedlings range from 5-20 days old already although there is no standing water.

Appendix. III.A.8.

No.	:	TR-055
To	:	AARP - GOI Project
From	:	Dr. Kevitt D. Brown
Subject	:	Trip Report to Sungai Buluh & Alabio
Date	:	21 - 22 November, 1983

This trip was made with Ir. Suhaimi, Msc, Ir. Sutami, Msc, Mr. Sanderi, Mr. Gula, and Mrs. Brown with the purpose of taking plant vigor scores in S. Buluh and to transplant the experiment in Alabio. Mr. Gula also collected rat species in Tilang station.

Sungai Buluh

The water depth in S. Buluh ranged from 20-45 cm. The irregularity in the field may be due to the mounding of secondary crops during the dry period. The experiment looked good but the replicated yield trials was heavily infected by mole cricket shortly after transplanting. Apparently the local variety Kencana had some resistance since it had much less damage than side by side entries.

Water depth information is as follows :

25 Oct. sowing	- 0 cm	
11 Nov.	- 5 cm	5 cm / day rise
17 Nov.	- 30 cm	
20 Nov.	- 41 cm	- 11 cm rise/1 day
21 Nov.	- 43 cm	

Most of the entries in the experiment had good seedling vigor and will probably survive flooding up to 2 meters. The farmer cooperator informed us that a better check variety than Kencana which is the local dry season crop and is not adapted to the wet season conditions would be Lankara. The latter variety is adapted locally to the Musim surung. Kencana was thriving in the postions of the field with less than 30 cm water but had nearly died at depths of 45 cm.

Alabio

We had expected to come for transplanting but the farmer had already completed this by himself because the water had begun to rise before our arrival. The original site for transplanting had nearly 1 meter of standing water when we arrived. The new location is very near the village. I expect maximum water depth could be as high as 1.5 meters. Water depths are given below :

22 Oct.	Sowing	- 0 cm	
5 Nov.	Transplanting	- 5 cm	
7 Nov.		- 20 cm	1-2 cm/day rise
22 Nov.		- 44 cm	

The range of water depths in the field when we arrived were 27 to 46 cm. Except for the few entries with poor germination, most entries were able to survive these conditions well. Two rows of each plot were grown instead of three. The reserve seedlings were left in the seedbed and the cooperator said he would plant them on high ground as seed increase. We will need to supply money for moving the old rat fence to the new site and constructing a plastic fence around the seed increase field. The farmer added one variety of his own, Siyam Danan, which he said is adapted for growing in the wet season and including the local Kencana check as well as the Kencana supplied by us.

13 of the 116 lines tested in both S. Buluh and Alabio showed good seedling vigor in both sites up to 45 cm water depth.

Tilang

Using 20 traps, 6 rats were caught overnight at Tilang station. At least 2 different rat species were represented. Specimens were preserved for identification.

APPENDIX

Banjarmasin Research Institute for Food Crops : (BARIF)
Applied Agricultural Research Project

TRIP REPORT
LAPORAN PERJALANAN

(TR-055)

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Name / Nama: Dr. Kevitt D. Brown

Department / Kelompok: Plant Breeding

Date of Departure / Tanggal berangkat: 26 November, 1983

Return / Tanggal kembali: 26 November, 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Binuang Expt. Station (BARIF)

Accompanied by / Pengikut: Ir. Suhaimi, Msc, Ir Syamsu Noor, Ir. R. Smith

Purpose of trip / Maksud perjalanan: To check on the sowing of two rainfed rice experiments and two upland rice experiments.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (Factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Several faults were observed on this trip : 1) No plot labels were added prior to sowing of seed which may cause an increase in errors. 2) Experiments were located in areas other than that decided on the last trip. 3) Plot sizes within one experiment were less than specified and also varied in numbers of rows creating unnecessary variation in experiments. 4) One seedbed was poorly sown because seed of different breeding lines were mixed. 5) The variation in number of seeds sown per hill in upland experiments was to high. 6) The farm manager was not present during the first few hours of field work on the day of our visit. Finally, the BARIF driver we used did not give an accurate accounting of gasoline money given to him. These matters will be brought to the attention of Dr. Anwarhan when he returns from Jakarta for his action.

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project :(BARIF)

TRIP REPORT
LAPORAN PERJALANAN

(TR-061)

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Name / Nama: Dr. Kevitt D. Brown

Department / Kelompok: Plant Breeding

Date of Departure / Tanggal berangkat: 30 November, 1983

Return / Tanggal kembali: 30 November, 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Handil Manarap experiment station (BARIF)

Accompanied by / Pengikut: Ir. Suhaimi, Msc; Ir. Sutami, Msc; Ir. Hadiatmi; Nurlaila Bsc; Ir. Syamsu Noor; Ir. Thamrin; Ir. Syaiful; Ir. Arif.

Purpose of trip / Maksud perjalanan: To supervise transplanting of experiments.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Water depth averaged 12 cm. Experiments were just starting to be transplanted. We suggested several ideas to overcome problems we saw. We will follow up on some of this ourselves and some will be brought to Dr. [illegible] :

1) Too many seeds were planted in each seedbed hole causing seedlings to be weak and few. We suggest more holes and fewer seed/hole in the future.

2) Experiments must be fully laid out first, approval of the station manager must follow, and then laborers may transplant. Management at these times is critical.

3) Seedlings should be transplanted with planting sticks (as the farmers' do) rather than by the hand because the soil is too hard and seedlings were floating away.

4) Transplanting and other field activities should be done by [illegible] rather than solitary laborers. This would make the work more efficient and easier to supervise. .... (cont...)

TRIP REPORT
LAPORAN PERJALANAN

(TR-061)

5) Researchers from Banjarmasin should come ahead of time and spend the the whole period helping to supervise their experiments. Until the researchers take a more intimate roll in their experiments we cannot expect progress.

6) The farm manager complained that funds to hire laborers was insufficient and slow in coming to his station so has been a constraint this season.

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project : (BARIF)

TRIP REPORT
LAPORAN PERJALANAN

(TR-163)

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Name / Nama: Dr. Kevitt D. Brown

Department / Kelompok: Plant Breeding

Date of Departure / Tanggal berangkat: 3 December, 1983

Return / Tanggal kembali: 3 December, 1983

Principal Locations Visited / Tempat-tempat yand dikunjungi: Belandean Expt. Station (BARIF).

Accompanied by / Pengikut: Ir. Suhaimi Sulaiman, Msc, Nurlaila, Bsc.

Purpose of trip / Maksud perjalanan: Supervise transplanting of rice breeding experiment.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

These were only 6 personnel for the operations required for pulling seedlings, making layout of plots, and transplanting. This is sufficient but only if these activities are done one by one rather than all at the same time. Layout must be done entirely prior to planting. This would have avoided some mistakes made in rows transplanted at odd angles. Also we pulled many large roots from the paddy. These are dangerous to workers and add to plot variability. A soil sample from 0-20 cm and and 20-50 cm was taken to send to IRRI.

246

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project :(BARIF)

TRIP REPORT
LAPORAN PERJALANAN

(TR-066)

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Name / Nama: Dr. Kevitt D. Brown

Department / Kelompok: Plant Breeding

Date of Departure / Tanggal berangkat: 6 Dec. 1983

Return / Tanggal kembali: 7 Dec. 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Sungai Buluh, Hambuku, and Binuang Expt. Station (BARIF).

Accompanied by / Pengikut: Ir. Suhaimi Sulaiman, Msc, Ir. Sutami Msc.

Purpose of trip / Maksud perjalanan: To take data on deepwater rice trials.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Water depths at both sites averaged one half meter. Approximately 40 of the lines under test appear suitable for Kalimantan conditions in the monotonous swamp so far. In Sungai Buluh the cooperator asked for Rp 25,000 for a bicycle to travel the 1 km to the field each day. This seems very worth while given that he must take daily water depth measurements and do all weeding and other field operations by himself. In Hambuku the rat fence needs to be installed as soon as possible because several lines are already damaged. Also the seed increase had not yet been transplanted in Hambuku and we had to weed the plots ourselves. The new technician should be installed immediately to do and supervise all this work. In Binuang, several upland variety did not germinate well. We may need a dry season seed increase of all upland, rainfed, and deepwater materials since they are presently only grown in the [illegible] season and [illegible] drying & storage procedures still have not improved.

APPENDIX

Banjarmasin Research Institute for Food Crops : (BARIF)
Applied Agricultural Research Project

TRIP REPORT
LAPORAN PERJALANAN

(TR-067)

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Name / Nama: Dr. Kevitt D. Brown

Department / Kelompok: Plant Breeding

Date of Departure / Tanggal berangkat: 10 Dec. 1983

Return / Tanggal kembali: 10 Dec. 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Pleihari Experiment Station (BARIF)

Accompanied by / Pengikut: Ir. Sutami, Msc. and Ir. Fatimah

Purpose of trip / Maksud perjalanan: To observe upland rice experiments and to organize and explain a rice blast screening nursery to be planted soon.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Technicians were irrigating by hose our observation yield trial for upland rice when we arrived. The farm manager explained that if they did not irrigate all the plants would die. Because the irrigation method is irregular it may add to variability of the experiment. Pleihari conditions are extremely poor for rice because of porous and infertile soils and irregular rainfall. We did not order replanting of lines despite the many missing hills resulting from a flash flood which occurred shortly after sowing. Three weeks had already elapsed and it would have added further plot variability to re-sow this late.

A 100 entry blast nursery was orgdnized for planting when the rains come again and allow preparation of the soil.

24

Appendix III.B

Quarterly Activity Report by Greta A. Watson
Social Scientist/Agroeconomist
October 1 - December 31, 1983

I. Activities during the last 3 months included the following

1. FAO International Working Group on Stable Plant Resistance 28 November - 3 December, 1983, Denpasar, Sanur, Bali, Indonesia.

   a. Presentation of paper entitled "Farmers' Knowledge of Plant Protection : A Theoretical and Practical Framework".*

   b. Preparation by working group of paper entitled "Cooperative Efforts Among Farmers, Researchers and Technicians in Environmental Evaluation for Agricultural Development".*

2. Library Search and Personal Interviews at IRRI with IRRI researchers 1-5 October, 1983.*

2. Field and Research Visits

   Field Surveys :

   1. Bumijaya Village, South Kalimantan, 23-26 October - upland transmigration site*.
   2. Barambai Village, South Kalimantan, 21-22 November - tidal swamp transmigration site*.
   3. Unit Tatas, Central Kalimantan and Handil Manarap, South Kalimantan, 13 December, 1983 - AARP evaluation survey*.

   Research Discussions :

   1. Consultation with Dr. Eugene Turner, Louisiana State University, 11 October, 1983
   2. Plant Protection Office, Banjarbaru, South Kalimantan, 24 November, 1983 - interview with Mr. Rais.
   3. Meeting with BAPPEDA, P_4S, Plant Protection and other agencies on development of integrated research in deepwater rice cultivation, 3 November, 1983.

4. BARIF Research Plan Preparation for 1984 - 90*.

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* Paper, report, or working paper included.

5. Presented Seminar on "Farmer's Knowledge of Plant Protection" at BARIF*.

6. Technology Transfer

   A. Seminar Series on 1)Preparing Papers for Publication and 2)Planning Research Methodology and Organizing Research (In Indonesian)*.

   B. Helped drafted research proposals and organize research surveys with BARIF agroeconomics staff.

   C. Trained agroeconomics staff in group farmer interviews.

   D. Continued to gather articles and books for BARIF-AARP use through AARP library.

   E. Attended and contributed to all monthly meetings.

   F. Ms. Yanti Rina returned from Agroeconomics training at IRRI. Mr. Eddy Purwanto attended a short course in agroeconomics methodology at Lambung Mangkurat University in South Kalimantan.

7. With Mr. Farid, BARIF communications, finished the draft of the editorial policy and notes to contributers for the BARIF Bulletin of Farm Research. We hope this bulletin will be published in 1984.

II. Constraints

1. Two of four agroeconomics surveys have been carried out. Three of the six remaining 1981-83 surveys have been written. This leaves two 1983-84 surveys to be conducted, and three pre-1983 surveys to be written. Budgetary problems and lack of interim authority for money allocation have retarded surveys. Absenteeism and low initiative is still problematic.

2. General planning for continuing AARP and SWAMPS II programs and ongoing BARIF expansion in general : plans must be clear and definite. See Working Report*.

Appendix III.B.1.

No.	:	WR-034
To	:	AARP - GOI Project
From	:	Greta A. Watson
Subject	:	Short Conversations with Dr. Marcos Vega Deputy Director, IRRI (Oct.4), Dr. SK. De Datta, Head, Agronomy Dept, IRRI (Oct.2), Dr. Ben Vergara, Head Plant Physiology, IRRI (Oct.3/4), Dr. Laurian Unnevehr, Agroeconomist, IRRI (Oct.1).
Date	:	October, 1-4, 1983

Purpose

To maintain communication and derive ideas from recent research and experiences of the above.

Summary

Dr. Marcos Vega. Dr. Vega is interested in having national agencies exploit IRRI to the fullest. He feels that this type of relationship with national agencies is the way IRRI can revise its research to fit national needs and supply these centers with IRRI's most recent research. The last decade of IRRI's existence has included focussing on regional rice problems in Africa and South America (Dr. DJ. Greenland), India, Pakistan and Sri Langka (Dr. Pathak) and South and Southeast Asia, China and Bangladesh (Dr. Vega himself). Director General Dr. Nyle Brady has been succeeded by Dr. MS. Swaminathan, and trends are toward secondary regions and poorer farmers including women in agriculture.

Dr. Vega is actively soliciting opinions of national centers.

Dr. SK De Datta. Dr. De Datta pointed out that for soils of greater and lesser fertility, may problems of essential macronutrients are the same, verying only in degree. For problem soils such as peat swamps, additional constraints also obtain. Some areas where he suggested agroeconomic and physiological research would be valuable regardless were :

- K nutrition in rice
- phosphate response in rice (particular soils).
- increasing N fertilizer efficiency
- varietal differences in weed competition and integrated weed management
- stand establishment techniques

and for acid and peaty or saline soils :

- managing saline soils
- varietal response to soil fertility
- managing acid soils
- varietal response to nutritional problems of peat.

He offered to assist BARIF in any way he could, and promised to response as soon as possible to any questions concerning agronomy from junior (or senior) researchers. He also suggested that Dr. Suriani, a Bogor BIOTROP consultant in weed science might be a source of information and consultation. We can contact him or BARIF can send our diagnosis of weed problems to IRRI and they will send us additional information. M A. Fadi at Sukamandi may be valuable for consultation too.

Dr. Laurian Unnevehr. Dr. Unnevehr remarked that agroeconomists, soil scientists and agronomists have become more concerned with salinity problems in the last few years. This includes :

- the relation of water/soil salinity cycles to rice plant growth cycles
- agronomic trials looking at crop estimates for saline and acid areas
- effects of salinity on nitrogen utilization.

The Agricultural Development Council has continued to publish texts in Southeast Asian Agroeconomics which are available from ADC's Bangkok office.

Dr. Benito Vergara. Dr. Vergara encouraged BARIF to submitt rice seeds, perhaps through Dr. Siwi or Dr. Harahap for rapid generation advance. IRRI could carry out photosensitivity checks on varieties. IRRI also offers to process important F_3 rice seeds and screen them at seedling stage for submergence tolerance. For photoperiod sensitive, long maturing varieties, only about 2 cycles per year can be RGA'd. Dr. Vergara mentioned Dr. Harahap's role in breeding for swampy areas, and his acquisition of advanced materials (note: Dr. Brown and Mr. Suhaimi at BARIF have received these). It was suggested that candidates for the GEU program should bring in their own rice seed materials for rapid generation advance from their research centers.

Tests of photosensitivity and submergence tolerance were carried out on some varieties which G A. Watson submitted in 1981 - 1982. All varieties tested (46) of tidal swamp/inland swamp types were photoperiod sensitive (200+ days)[1]. The four major local rices used in the peat swamp - Layang, Tempokong Putih, Kapuas and Sibung Rendah did not have submergence tolerance (rating 9 = lowest rating)[2]. This seems reasonable, since the varieties were transplanted to deeper waters over time to avoid such submergence.

1 tested in December - July 1981-82

2 tested in January, 1982.

Appendix III.B.2.

No. : WR-035
To : AARP - GOI Project
From : Greta A. Watson
Subject : Interview with Dr. Melanda Hoque, Rat Protection Specialist, National Crop Protection Center, Univeristy of the Philippines at Los Banos College, Laguna 3720 Philippines.
Date : 2 October, 1983

Purpose

Discussion on the effectiveness of acute and chronic rodenticides under various baiting regimes, and their applicability in a tidal swamp environment. Emphasis on second generation anti-coagulents.

Summary

1. During the past 5 years, research on effective rat control in Malaysia and the Philippines had diverged considerably.
2. The Philippines has continued to use sustained baiting with first generation anticoagulents with individual baiters.
3. Malaysia is focussing on second generation highly lethal anti-coagulants, prepared with grain and made waterproof with wax. This bait is randomly spread in fields.
4. Both countries are deemphasizing acute poisons such as zinc phosphide.
5. In literature available in Banjarmasin, reasons for these different treatments were not apparent.

Dr. Hoque explained about rat behavior and rodenticides in regard to long and short term effectiveness. Three rat characteristics that influence the practicableness of baiting techniques in the Philippines are

1. rats are solitary eaters
2. rats establish runway border areas as paths
3. rats can be trained.

In Sustained baiting, baiting with 1st generation anti-coagulents begins 2-3 weeks before the critical period (when rice stalks show noticable damage). Rats are trained to feed at specific baiting points (generally

254

5-6 per hectare). Individual bait stations are established at these points. Number of these stations is related to the amount of bait eaten within a 2-3 day period. Stations are established to the side of rat runways. Rats lead other rats to these stations, and learn to feed on bait rather than on rice or rice stalks.

For swampy areas sustained baiting is problematic. Sometimes as many as 70 bait stations are established at one baiting point. Village cooperative management of this form of baiting along the periphery of swamp fields is effective in the Philippines. Stations can be made from bamboo tubes cut to prevent ducks from obtaining feed; however, poultry is little effected by 1st generation anti-coagulants : chickens must eat 2 kg of baited feed within a period of 5 days to die.

The use of second-generation anti-coagulents such as Matikus, Brodifacoum or Bromedrielone allows for single-dose toxicity. Baitfeed can be mixed with paraffin to provide a waterproof/rainproof bait which makes baiting station construction unnecessary. In Malaysia, rats seem to be well controlled/killed.

However, rats in Malaysia are of a different species than rats in the Philippines or Indonesia. Wax baits now used are made from corn which is less acceptible to rats than rice, so when rice panicles emerge, rats turn to them. Second-generation anti-coagulents are quite toxic to ducks and young humans. Wax chunks are easy to throw, and require less farmer labor. However, unless specified sites are baited, rats will not return to these points, nor will they bring other rats. Rats may need to eat less bait to die, but anti-coagulents work slowly and a rat may eat enough poison to kill 3 rats before it actually dies. Costs in this case are higher, not lower that with the use of bait traps.

Zinc phosphide is an acute poison. Farmers use it because its effect is immediate and therefore visible : the rat is dead and you can see it. Rats are intelligent animals however, tend to avoid baits and feeding areas where their species has been killed. Sustained poisoning is therefore not feasible for the long term. The local practice of boiling zinc phosphide with rice causes the chemical to become gaseous and escape, rendering the bait harmless.

In summary, Dr. Hoque argued that sustained baiting was the most cost-efficient and continuable method of controlling rat populations. Major difficulties arise in such rat control in swampy areas where cooperative village effort is necessary and baiting stations must be extremely numerous.

I feel that the problem of rat control will become increasingly problematic with the introduction of modern rice technologies for intensified production, particularly in the case of double cropping. In this case we can only expect an increase in the rat population with more regularly available yields. Moreover, the extensive forested land adjoining rice fields in many areas of Kalimantan provides another habitat for rats during non-rice seasons. The Rattus argentiver of Kalimantan must be further studied in relation to its ecology. Village cooperative units must be organized to test effectiveness of various type of baits and baiting systems.

Appendix III.B.3.

No.	:	WR-036
To	:	AARP - GOI Project
From	:	Greta A. Watson
Subject	:	Interview with Dr. Morris, Multiple Cropping Department, IRRI, Los Banos. Soil modification and plant tissue analysis for crops in swampy areas.
Date	:	4 October, 1983

Purpose

To determine soil qualities for multiple cropping, macro and micro nutrients under changing agricultural regimes, and to assess present work on multi-cropping in swampy areas.

Summary

Sorjan Systems. In histolic soils, the organic component of peat chelates heavy metals, and silica becomes deficient as well. Lack of silica predisposes rice to bacterias and fungi. Lack of metals such as zinc and other macronutrient deficiencies reduce yields. This can be especially problematic under submerged conditions.

In many areas of swamps, sorjan system is widely practiced. In peat areas this most often includes the mounding of mineral and pyritic subsoils. In the case of acid sulfate subsoils, leaching of mounds is dependent on the rate of the flow of water proportional to the hydraulic gradient and the inverse of resistence (v=kh). Leaching occurs on a slope. The acid component of the soil which obtains with pyrite oxidation cannot go back straight down into the subsoils but is flushed horizontally out into bordering canals. Leaching of free acids from a mound depends on the width of that mound. If the bed is quite wide, only its edges/sides would leach out and the central bed would remain acid. Addition of soil mounds sometimes occurs with the oxidation and consequent subsidence of organic matter.

Watson on Morris' information. Discussion in relation to traditional agriculture. Farmers in Central Kalimantan traditionally build round mounds for individual coconut plants, mixing histolic topsoil and clayey substratum. After 1-2 years, circular mounds are connected in narrow rows. After 2-4 more years, these rows are widened, and in a few years more time widened again. Flushing takes place incrementally. Farmers say that this method makes soil more fertile for planting. Considering leaching and hydrolic capacities, this method also makes agronomic sense.

Morris. Soil tests for micro nutrient deficiencies. One of the problems with soils tests to determine micronutrient levels (note: zinc and copper are often cited as lacking in histolic soils) is that testing equipment requires recalibration for field use and samples are sensitive to contamination in the lab. Even a determination of efficiency of uptake will not tell you if addition of a micronutrient or nutrient in soil will be effective in ameliorating growth or yield.

Testing for micronutrients.

Full treatment - 6 micronutrients. Observations.
Control and Cross replications.
Full factorial.

6 minus A or B or C or D or E or F.

1) This would be checked using leaf tissue analysis.

2) Use rainwater to wipe the leaves and keep them away from dusty areas or other types of contamination.

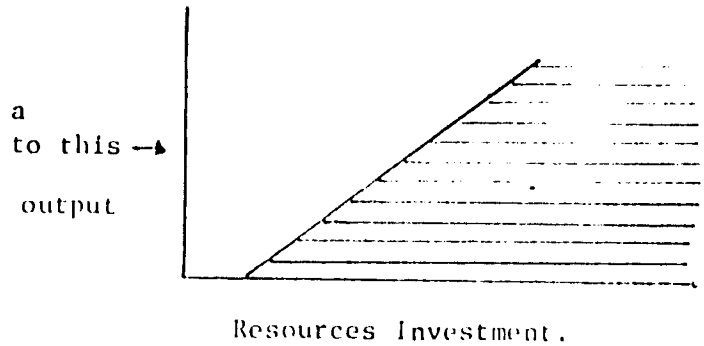
3) This work would have to be drawn from a representative area, and conclusions drawn from that.

4) Samples could be tested at IRRI, but governments would have to request service from IRRI.

Sago is a salinity tolerant crop with potential for agricultural investment.

In the future, the cropping systems program at IRRI may appreciate and possibly utilize a research management orientation. This would include 1) training to identify research priorities 2) ability to determine where, why and how to concentrate resources 3) promoting values of accomplishment and quality for all research instead of basing judgment of researcher or research program on the amount of money allocated or programs initiated alone. This becomes a problem when we "spread ourselves thin". This would be an especially valuable approach to take in the Philippines, where unstable and low agricultural productivity is a problem.

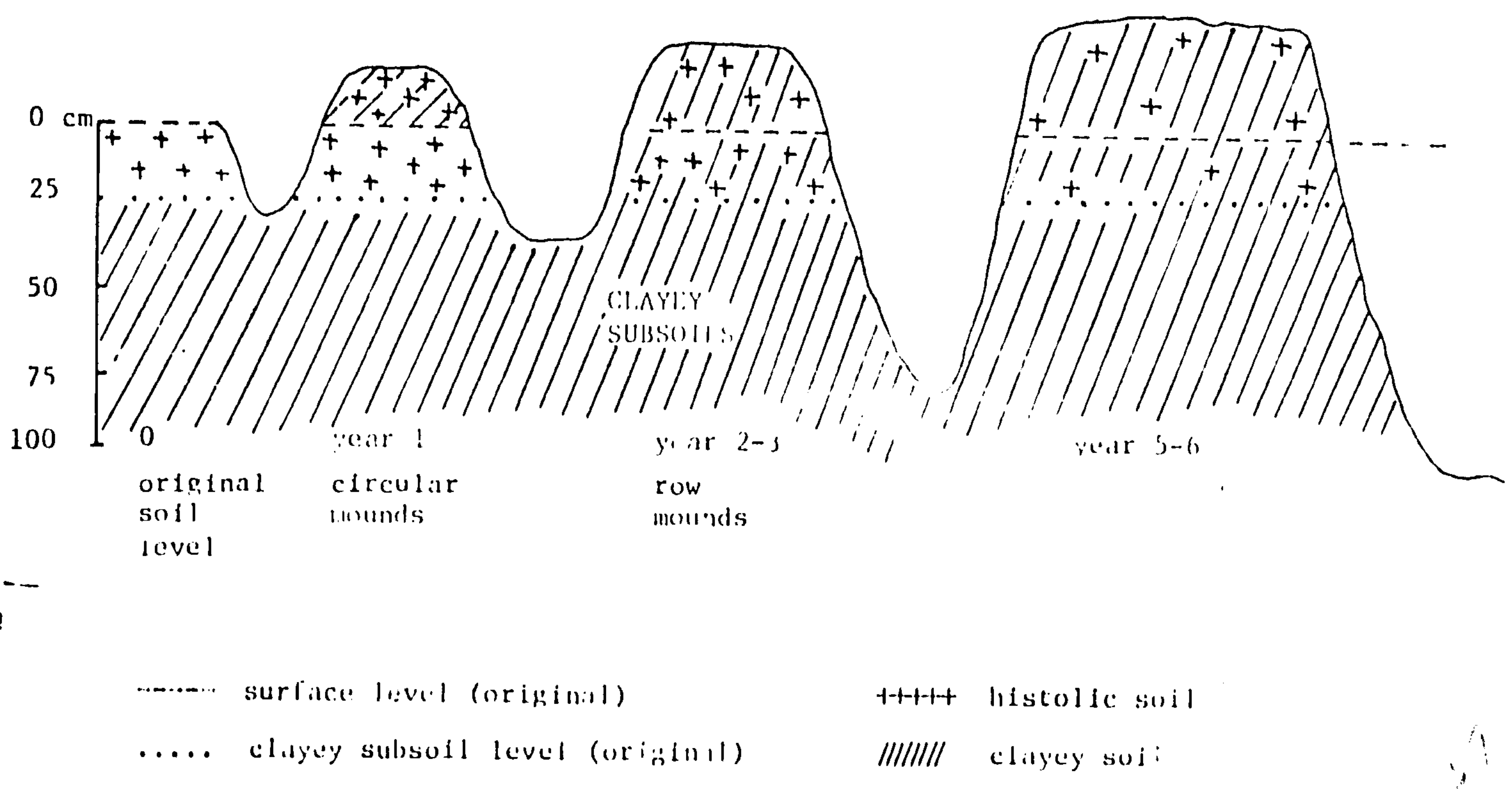
There must be a quality scale to this →



Morris advised periodic advising, support and checking which can be described as "backstopping". This would occur on regional, provincial, national and international levels.

Dr. Morris mentioned a meeting with Dr. Abdullah and Dr. Anwarhan in April.

Note : Visual Description of Soil Changes in Peat Swamps.



Appendix III.B.4.

No. : WR-037
To : AARP - GOI Project
From : Greta A. Watson
Subject : Interview with Dr. T. Mew, Plant Pathologist, IRRI Los Banos, the Philippines.
Date : 4 October, 1983

Purpose

. To assess the use of mutiple, intercropped rice varieties in traditional and modern methods of rice farming for reducing disease or pest incidence. To understand blast incidence and economic measures of prevention.

Summary

Multiple variety use. Uneven maturity or plant height through the use of mixed, intercropped rice varieties may be beneficial to the farmer. In the first case, the harvesting period would be spread out. In the second case, there maybe some protection against lodging. There will also be a different microenvironment as compared to pure stands.

Mixed stands of modern rice varieties may afford increased rice yields through the combined effect of their individual resistances to pests or disease. In one experiment concerning downy wildew on barley (Wolfe and Barrett 1980 Plant Disease 64 (2) : 148-155) average mixture yields were higher and less disease prone than singly grown cultivars. In U. Philippines Los Banos studies IRRI C_{22} upland variety with high yields but little blast resistance, was grown together with UPLPi3 and UPLRi5 which have blast resistance but lower yields. C_{22} itself could not be established as a pure strain, but with the two other varieties, growth was economically feasible: blast incidence was reduced from 30% in C_{22} pure stand to 1-2% in one experiment. There are now a number of other tests on upland rice mixes as blast resisting. This will appear in the IRRI Annual Report for 1982.

Problems with the above methods are that modern rice varieties may vary considerably in grain size & quality making sales difficult.

If HYV's are mixed with traditional varieties, time of harvest will vary among types. Note, Brown : There is also the possibility that, in the case of blast, more virulent strains of the disease may arise.

Blast (Layperson's introduction). Blast disease incidence in rice and other crops is related to the microenvironment, especially during the dew period. The blast fungus needs at least 8 hours of free moisture time to penetrate moist tissue. In upland areas heat is released quickly into the night, since soils do not retain heat well. Dew is quick to form and persists for a long time. In irrigated areas water releases heat more slowly at night, dew is slow to form and does not persist. For these reasons, blast is more common in uplands rather than lowlands.

In temperate climates, blast symptoms are more atypical. In Korean irrigated rice fields at the end of the growing season the dew period is long because of cooler conditions and results in neck blast. Earlier in the season leaf blast may occur due to greater fluctuation in temperature between day and night. Misty weather also promotes blast since water is retained on the leaf surface.

Dr. Mew thought that the addition of fertilizer and more free nutrients for fungus could promote blast but admitted he had no controlled experiments to support this.

He mentioned that two methods of cultural control. One was to place mats over rice to reduce dew formation and thus blast. The second, which is carried out in Egypt, is to shake the dew off the rice plant with a stick. This is carried in the early morning. Watson : A varient of this method of blast prevention might also be devised using lines of cord between plant rows in field, which could be shaken to disperse dew.

Information such as that derived from Dr. Mew (above) carried implications for incorporation of local knowledge in agriculture. Rice farmers in Kalimantan, for example, may plant 15 or more rice varieties in one field. Their justification is that this method spreads the risks of disease, pests and climatic problems such as flood or drought among varieties with different tolerances to these various problems. Further studies should be carried out by scientists for these areas. As well, special attention should be paid to seeding, transplanting, planting and harvesting in relation to seasonal variation in rainfall, wind, animal populations and other ecological variables.

Additional comments : Dr. Mew. As the monoculture approach toward higher yields continues, the genetic background of the high yielding varieties gets narrower and more uniform. Why do subsistence farmers have less disease in rice ? Less monoculture is evident. The increase in uniformity also may promote a tendency to certain diseases. Epidemics are more complete in a monoculture. The Cambridge Institute of Plant Breeding is promoting the multiline multivariety concept explained previously. The concept is not easy for plant breeding and few cases have been as successful as the cowny mildew or UPLB rice examples. Blast itself may cause shifts in multiline mixtures since in temperate regions in Asia, the average life of a rice variety's resistence to blast is 3.5 years. We are now turning to finding optimum mixtures of varieties and resistance in specific varieties to diffirent problems.

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Appendix III.B.5.

No. : WR-038
To : AARP - GOI Project
From : Greta A. Watson
Subject : Consultancy with Dr. Derk HilleRislambers, Deepwater Rice Breeder, IRRI, Los Banos, Philippines
Date : 3 October 1983

Purpose

To gather information on breeding lines and other research at IRRI concerning adverse environment tolerance, submergence abilities and other characteristics of new tidal and deepwater swamp rice varieties. To collect recent publications on breeding lines.

Summary

The discussion was carried out during a tour of the IRRI field breeding sites for deep and moderate deep water and adverse conditions. Present tests include rice tolerance tests for submergence, salinity, zinc-deficiency, stagnant water, disease resistance and alkalinity. Dr. HilleRislambers pointed out that for problem water or soils, suitable rice varieties must be specific to geographically limited areas. This is because adverse factors in any one situation vary obsolutely and in relation to other variables. IRRI's program for these areas is to produce lines with resilience under one or few limiting conditions : only national government breeding programs can develop higher yielding rice types from IRRI types relevant to their particular needs. IRRI needs feedback from national programs, however, to know if the rices are the right quality.

Several tests for salinity tolerance are now carried out at IRRI : 1) in vitro testing in plastic containers with NaCl 2) in field testing with a salt augment. Gowrung variety fron Thailand and crosses using Pokkali show some promise.

Advanced lines with Zn deficiency tolerance have been developed. To actually simulare all conditions which influence plant utilization of zinc from soils is, however, impossible. To test varieties under specific conditions involves national testing at particular field sites, or tests using soil samples from these sites. Often zinc becomes unavailable in submerged conditions. IR 27 - 97 is zinc deficiency tolerant.

Testing has been conducted for stagnant water conditions to 80 cm. This may be valuable for breeding for poorly drained back swamp areas.

Testing for submergence occurs when rice seedlings are 30 days old. At this point they are covered with 80 cm water then drained after 9 days. FR 13 A donor has strong viability after submergence. Dr. Anwarhan has been sent this variety.

Some resistence to tungro is evident in Tilokacari. This is the parent of the Untung variety. The former is photosensitive as well as tungro resistent (No. 29 at the G 12 field).

One way to protect tolerant lines is to transplant stems to monitored areas near to station supervision after screening tests are completed.

Dr. HilleRislambers stressed that IRRI and BARIF must continue communication about lines, especially those that are already known at IRRI. He is willing to come to BARIF stations in South Kalimantan during January of 1984. If BARIF has an interest in blast we may want to contact J. Mike Bonman, IRRI's blast tester.

Appendix III.B.6.

No. : WR-039
To : AARP - GOI Project
From : Greta A. Watson
Subject : Interview with Soil Scientists Gorinta Quihano and Gamani Jaya weera, IRRI, Soil Chemistry Department, specialists in peat and acid sulfate soils.
Date : 4 October, 1983

Purpose

To assess mineral deficiencies and toxicities of peat soils in relation to rice viability, diseases and yield in agriculture and social parameters.

Summary

Peat Soils, Peats are extremely variable in regard to their effects on rice growth. Peats may be inland or coastal. Coastal peats may be saline or freshwater. Acidity may vary from 3,5 or less to 6,0 or more. Peat soils can be more or less compact and differentially composed. Mineral deficiencies or toxicities of peat soil are also variable. For these reasons, different peats have different effects on rice growth. On Philippine Lalao inland deep peats and coastal peats in Bicol rice yields averaged less than 1 ton/ha. On shallow inland acid peats with sulfate toxicity in Bicol, yields averaged 2 tons/ha. In Sri Langkan coastal peats, yields were about $1^1/_3$ ton/ha.

Peats may have sulfate toxicity if soil has low iron content. High iron, on the other hard can cause conversion to iron sulfide, removing this chemical from rice uptake. IR 42 is moderately tolerant to iron toxicity. IR 42 yields well in iron-toxic soils although foliar observation is not so good.

Most peats are generally deficient in NPK and zinc. Adding zinc to peats to increase rice yields can be problematic. Addition of zinc

negatively correlates with uptake of sodium and iron. In rices, zinc deficiency tolerance is correlated with peat tolerant varieties. However HYV response to zinc varies - IR26 has a positive increase in yield, whereas IR34 has a negative zinc response. Fertilization with nitrogen is associated with a severe incidence of fungal diseases and blast.

Coastal peats have higher EC values. Pokkali has good salinity tolerance and makes a good parent, but yield is low. IR 5657-33 has been developed from it recently. For peat soils, IR 8192-31 has great potential.

Other peat soil problems include Helminthosporum and Cercospora leaf spot (which disease may spread to rice grains), monochoria (an aquatic leafy weed), grasses and associated weed problems. Rice plants must be spaced widely in order to weed on the undulating ground. Copper deficiency is highly probable. A further problem in inland peats includes aquifer upwelling which completely precludes total drainage control, although canals can be made.

Varietal tolerance of rice varieties to peat is necessary. Further, peats must be assessed in regard to their applicability for agriculture.

Social parameters of peat agriculture. Throughout the Philippines, farmers often create sorjan or raised vegetable beds in peaty areas, too. However, in areas of deep water, the creation of these mounds precludes rice cultivation. Fish ponds are also constructed in rice fields and are harvested in alternate seasons with rice. In coastal acid peaty swamps of the Philippines (Coastal Wisayas) land goes uncultivated during the dry season. During the wet season, after rains wash salt downstream to the sea, the area is transplanted to rice. Areas such as this in Sri Langka may also be broadcast with seed. With optimum care IRRI management of undrained peat soils may yield 3-4 tons/ha.

Peat soil and other swampy land farming is necessarily labor intensive : heavy machinery and draft animals are not suited to the environment. Except with high capital projects such as seaward diking (cost = US $ 3000 - 10,000/meter) the soils can not be put under continous production. We must work with the present condition. For that reason, varietal tolerances of rice are important. The socio-economic organization of the farming population, particularly relating to labor patterns on and off-farm, and the benefit and costs to be derived from modern rice cultivation must be studied.

In Lalao, a marshy district with 70 - 125 cm peat, neutral pH of 5.5 - 6.5, and soil deficiencies of NPK and Zn, farmers have adapted small-scale farm machinery to fit their needs for moderate peat depths of 65 - 70 cm. Inner tubes are inflated inside the open cylinder of the handtractor. UPLB is developing an "aquabug" land preparer. Even so, peat farming will always be a difficult task with less than optimum returns.

Appendix III.B.7.

No. : WR-040
To : AARP - GOI Project
From : Greta A. Watson
Subject : Conversation with TT. Chang, Head, GEU Project IRRI, Los Banos. Indonesian national plans for local rice collection and IRRI's potential role in this collection.
Date : 3 October, 1983

Purpose

To assess and discuss GEU collections for Kalimantan. To review Indonesian national and international policies for rice seed collection. To gather information for BARIF participation in encouraging collection of local rice types. To determine new focusses of GEU research.

Summary

The GEU researchers at IRRI and in national centers are beginning to demand local information on plant limitations, tolerances, abilities for rice seed in addition to regular plant phenotype measurements normally taken. Dr. Vergara handles feedback in this latter area. Local knowledge is valuable for breeders, who must choose among thousands of varieties each year. It can also be used by plant pathologists, entomologists, social scientists and others to fill in knowledge about the physical, biological, and social parameters of rice cultivation in an area. Many scientists want specialized, especially long grain rices with certain tolerances.

A new rice collecter, Roy Danton, has been added to the GEU staff. The old collector, Duncan Vaughn left a gap which had not been filled for 2 years. Mr. Danton worked in FAO Rome previously.

Dr. Chang surveyed the present rice collection available from IRRI for Kalimantan. For South and Central Kalimantan, he is limited to collections made by Vaughn in 1979, and those made by myself in 1981-82. Dr. Chang discussed the latest GEU International Meeting, which Dr. Bernard Siwi, Indonesia's national representative, attended. Indonesian priorities

269

for local rice collection were for the Kalimantan coastal areas and highlands, and islands to the east of Bali / Lombok.

Dr. Chang expressed interest in helping to acheive these priorities in collection (this would include double collection for both Indonesian GEU maintainence and IRRI accessions). If IRRI was invited, Dr. Chang offered to have Ray Danton come to Kalimantan to help BARIF researchers obtain training in rice plant measurement and seed collection and preservation. Danton's trip would be paid through IRRI. It could be carried out as early as February or March of 1984. Dr. Chang also mentioned that the costs of field collection for any Indonesian or consultant collector could be paid through IRRI if other sources of funding were unavailable. This would include gasoline, reasonable per diems, costs of shipping basic equipment, and necessary related costs. All rice collection bags and envelopes would be given and sample doubles could be shipped by IRRI from their Jakarta offices. IRRI only has to be invited to participate. This of course would have to be through the proper channels, months available, workforce and important officials noted. Sent an informal letter of the organization of official support, Dr. Swaminathan could probably even write the initiating letter.

Note. Watson. The present AID grant under consideration for the AARP - GOI project includes a research project for the collection of local rices, especially from the coastal and inland swamp regions. The proferred aid of a highly skilled collections. To acquire this aid, invitational letters must be sent to the proper authorities. If it is determined that BARIF wants this for the 1984 AID project (if and when the grant goes through) BARIF should begin to think of initiating correspondence now.

270

Appendix III.B.8.

No. : WR-041
To : AARP - GOI Project
From : Greta A. Watson
Subject : Library and Academic Research at the IRRI Library, Los Banos, Philippines.
Date : 1 Oct - 4 Oct, 1983

Purpose

To catch up in 1983 journal publications in agriculture and environment of coastal swamps. To evaluate and isolate semi-scientific international and national journals, particularly in agroeconomics and agriculture which are potential journals for publication of BARIF researcher studies. To obtain copies of articles and journals important to continuing research.

Summary

Articles and Books. Approximately 1000 current journals and journal articles and books were examined for relevance to BARIF research. About 60 articles or chapters in the areas of agroeconomy, cropping systems, soils, water social science, agronomy and development studies were photocopied. Most of this material was published in 1982 or 1983.

Semi-scientific journals of interest of BARIF researchers for article publication. Journals were chosen from over 500 publications at in the IRRI periodicals library as potential sources for sending BARIF articles. "Notes to authors" for preparing papers and a sample page or article copy were photo copied for each journal. The following journals were selected (* = international journal) :

* Agricultural Systems

Australian Journal of Agricultural Research
Borneo Research Bulletin

* Economic Botany

Farm Horizons

* Farm Management Notes
* Field Crops Research
* Food Policy
* Horizons (International Development)
  Ilmu Pertanian
* International Rice Commission
* The Journal of Development Studies
* Plant Genetic Resources Newsletter
  Tropical Agriculture

Utilization. The materials obtained through library research will help update the academic resources at the BARIF. Examples of articles and publication methods will be used for teaching the paper and article writing course which will begin shortly.

272

Appendix III.B.9.

No.	:	WR-042
To	:	AARP - GOI Project
From	:	Greta A. Watson
Subject	:	Conference on Women in Rice Farming Systems, IRRI, Los Banos, Philippines, 26 - 30 September, 1983.
Date	:	26 - 30 September, 1983

Purpose

To assess women's current and potential role in rice agriculture systems from an international and interdisciplinary perspective. To establish communication between nations on the development of programs and policies of benefit to women and their households. To unite social and technical science professionals concerned with women in agriculture. To present a paper entitled "Women's Role in the Improvement of Rice Farming Systems in Coastal Swamplands". To represent BARIF as a consultant and researcher.

Summary

The international conference included participants from all over the world, including South, Southeast and East Asia, Latin America, Africa, United States and Europe. This provided a broad experiential and documentary base of information. Participants disciplines ranged from agronomy, entomology, post harvest technology and agro-economics through anthropology and agricultural development planning.

The conference was composed of 6 distinct parts : 1) a general overview (½ day) 2) papers on women's role in labor in rice agriculture from a national perspective (1½ days) 3) papers on integrated work in rice based farming systems with focus on women (½ day) 4) a field trip 5) papers on emerging technologies in rice agriculture (1 day) and 6) working groups on the incorporation of women in agriculture at the levels of programs and policy, social science, and technology development (2 nights). A photocopy of the program is appended to this report.

The first two-and-one-half days of papers and discussions placed women in their agricultural contexts on the national and international levels. The over view was that women play a significant role in rice farming throughout the world; however, the social, political and economic contexts of rice agriculture promote differences in women's roles. In some countries, husbands and wives maintain separate incomes and separate fields. In others, women and men share labor and income, or men control and regulate all income. There are different methods and practices of labor allocation and duties between men and women in families and among different ethnic groups.

Knowledge of farming practices for rice, vegetables or other crops may be more or less a woman's domain. With modern technologies, tools and techniques may serve to disrupt traditional systems by displacing female labor or increasing the total female work load. Much of this is not the intention of such projects but the effect of agricultural development which does not take women's original role in farm labor or knowledge into account. For example, women are often ignored by farm extension programs and are overlooked by farming credit and input services. Women often account for more labor in the field than men, and they are often more involved with phases of agriculture which involve the use of fertilizers and pesticides than men usually are.

The value of research on women's role became patently obvious when the conference addressed equitability in agricultural development. Women are an integral part of the household, and supply labor and income for themselves and their families : the status, or economic level of the family also determines how much a women may need to work. Even jobs which the more affluent may call drudgery (such as rice hand pounding) may be the only source of money available to a lower class woman. The feasibility study and impact analysis of any agricultural project should therefore assess women's present roles and knowledge, involve women into project decision-making, include women in the extension project and maintain effects of the project as to benefit for women's social and economic status.

In this part of the conference I also presented by paper (included with this report).

On Wednesday, Sept. 29 in the afternoon, the group attended a field trip to Income Generating Project Sites of the Ministry of Agriculture, the Philippines. My group went to Sta Ana barangai (smallest political unit) of Sto Tomas, Batangas, Philippines. This is an upland valley area with high rainfall and a monsoonal wet/dry season distinction. We examined the cattle fattening project, deep wells, homegardens and tree intercropping. Of particular interest were homegardens, where specialization was in long and lima beans, black pepper, squash, guava, ginger, and sweet pepper. Intercropping in coconut tree groves included citrus trees, coffee, lanzones (Indonesian duku), papaya, banana, sweet potatoes, taro (dryland variety gabi), cassava, bitter cucumber (papare - Indones.), chilis and bamboo. Although this intermixture seems to incorporate numerous varieties, I have found far greater diversity in Indonesia. Of additional interest is the fact that young leaves of chili and the bitter cucumber can be eaten as vegetables (the latter with mung bean). This is not done in Indonesia. The farmers also told me that they plant a species of wet taro directly with the rice in lowland fields. It may be of particular interest to acquire some of these species to supplement agriculture in the inland regions of coastal swamps in Indonesia.

The following day of the conference involved the presentation of reports on emerging technologies. This included improved and hybrid rices, herbicides, biologic nitrogen fixation, pest control, mechanization of agriculture and post-harvest technologies. These lectures were enlightening:however, except for the speaker on post-harvest technologies, none of the lecturers addressed the role of women in technological development. This oversight in presentation of papers was prominent since it was the only part of the conference which did so.

During the conference working groups were organized to draft issues papers which addressed the role of women in agriculture from three perspectives :

1) Programs and Policies. This group was headed by M.S. Swaminathan and was the group in which I participated. Conclusions were wide-ranging. Action research projects and impact analyses must be conducted with women in mind. Government policies must give women access to knowledge, training, activities in farm development, and include increased female personnel in research, extention, conferences, and training. Labor and product cooperatives may also be operable. Most important, women's importance in agriculture should be recognized by government policy makers, academics, employees and the farmers themselves.

2) Social Science Research. This group was headed by Gelia Castillo. This research has a strong "applied" basis; that is the research will be used by development planners to better organize broad based development policy. The research will be oriented toward socioeconomic and technological aspects of women's role in agriculture with emphasis on interconnectedness of in-house and on-farm employment and nutrition and health. Examination of gender and class biases which influence policy and decision making will be analysed in relation to successful and unsuccessful farm projects.

3) Technology Development. This group was headed by Sri Siwi. The working group stressed the need to incorporate women in all phases of improved rice technology. Technology was treated not only as tools and input, but as knowledge and training. Women's present unequal access to technologies has not been beneficial and should be improved.

Conclusions of the Conference. In light of the prioritized issues derived from the Working Groups, IRRI agreed to continued support of women's role in agriculture through the following gestures:

1) Presentation of conference proceedings and conclusions at the Annual CGIAR Meeting in Washington this October, 1983.

2) Attempt to promote CGIAR Sponsorship of an International meeting of heads of all institutes and high-ranking government officials for recognition of women farmers in research, policy and planning.

3) Organization of a task force on the impact of agricultural development on women.

4) Organization of a newsletter or working group to insure international, interdisciplinary communication on this subject.

In Southeast Asia, the average household landholding is under 2 ha. Many and sometimes most farmers in a nation are tenanted or landless laborers. Institutes and research centers have often only provided opportunities to substitute capital inputs for labor inputs. "Misplaced norms" of medium scale (2 to 10 ha. land) technology may promote greater discrepancies in economic equitability between rich and poor. Cropping technology planning and analysis on a national level should consider wage labor rates. This is doubly important since women are the majority of the poor who are effected by changes in mechanication labor patterns (be it high labor / low mechanization or low labor / high mechanization).

Changes in rice farming technologies are inevitable, and women will certainly be effected by them. The technology should be analysed for economic, social, environmental and political impact on women. Feasibility studies must consider these variables. Income - generating activities for women within agriculture should receive credit and support on the local, national and international level.

Comments

The conference was a serious attempt to remove women farmers from their perpetual academic context of "Women's Studies in Social Science", and into the area of agricultural development. It also demanded the attention of higher-placed hard-scientists (at least these who attended), some of which display an unconscious prejudice toward technology development for male use even if they are female If the CGIAR conference is conducted, international notice will be achieved.

One of the problems which arose in the conference was the difficulty in communication and thus appreciation between many of the social scientists and hard scientists. It was obvious that social scientists were often not aware of the constraints in agricultural technology and increasing the economic efficiency of production. It was similarly obvious that many hard scientists had little knowledge of or sympathy for the small owner, tenant or landless farmer. However, attempts were made from both areas to gain knowledge.

I feel the conference was a success. From my own standpoint, 1) researchers should develop more interdisciplinary perspectives and 2) become aware of women as a crucial component of agricultural development as well as 3) taking steps to implement equitable social policy to this end.

Appendix III.10.

No. : TR-043
To : AARP - GOI Project
From : Greta A. Watson
Subject : Summary Trip Report to IRRI, Los Banos, Philippines and in Jakarta, Indonesia
Date : 23 September - 5 October; 11 - 12 October, 1983

Purpose

To attend the Women in Rice Farming Systems Conference at IRRI, Philippines 26 September - 30 September, 1983; to accumulate library articles and/or books on coastal swamp or agroeconomic data; to consult with IRRI scientists and conference participants on various aspects of coastal swamp and general agricultural development.

Schedule

23 - 24 September - flight to Jakarta, acquisition of plane ticket and passport to Philippines

25 September - flight to Philippines / welcoming night

26 - 30 September - conference*

1 - 4 October - library research* and consultations or interviews with

Dr. Marcos Vega*
Dr. Laurian Unnehver*
Dr. T. Mew*
Dr. Morris*
Dr. T.T. Chang*
Dr. SK DeDatta*
Dr. Benito Vergara*
Dr. D. HilleRisLambers*
Ms. Gorinta Quihano and Mr. Gamani Jayaweera*
Dr. Melanda Hoque*

5 October - return Philippines - Jakarta

11 October - interview with Dr. Eugene Turner*

12 October - return to Banjarmasin

* Work Report Included.

219

Appendix III.B.11.

No. : WR-044
To : AARP - GOI Project
From : Greta A. Watson
Subject : International Models for Coastal Swamp Development.
Date : 22 October, 1983

Purpose

To stress the need for international communication of research on traditional and government-developed systems of coastal swamp agriculture*. To give concrete examples of other traditional methods of traditional coastal rice cultivation.

Summary

In all parts of the world, people practice locally adapted agriculture in coastal swamps. The traditional ingenuity of people and their constant adaptation to the diverse environments of these areas has produced a wide range of variations in cropping. Farming in these regions demands adjustments to the major constraints in water and soils and the use of tolerant food crop varieties and agricultural practices. Indigenous, local farming uses technology which has been developed over time and which considers micro-geographical variation to a greater degree than agricultural research stations can hope to replicate.

Agricultural scientists might well research the coastal swamp farming practices which are extant. This seems only reasonable, considering that these indigenous technologies represent relatively successful adjustments to these regions. Agricultural development could build upon rather than supercede these practices to increase production.

*This report is in part derived from 27 September, 1983 conversation with Dr. Bochare from Sierre Leone, 28-30 Sept. talk with Ms. Isabel Miranda and Mr. Carlos Schawarz, Ministry of Rural Development, Guine-Bissau, and 4 Oct. conversation with Mr. Jayaweera, Sri Langka.

Not all farming systems within a region are equally practicable. To adequately assess local variations in coastal swamp agriculture for their usefulness in developing improved coastal swamp farming systems, we must first adequately assay them. It should be noted here that if agriculture is carried out by both women and men, we should logically obtain this information from both sexes, according to their knowledge of its particular aspects. This ideally, this demands the compilation information from many nations.

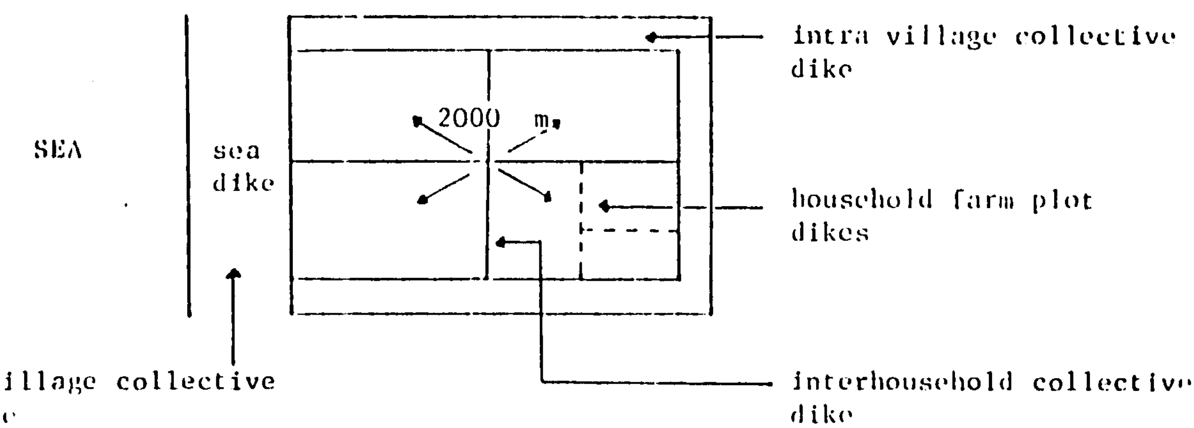
To this end, I inquired among the participants of the Conference on Women in Rice Farming Systems on the presense of coastal swamp farming in their nations. Many participants were aware of the practice, but few actually could contribute references other than cursory information. The nations of Bangladesh, India, Sri Langka, Brazil, Malaysia and China among others noted such farming activity. Dr. Bochare of Sierre Leone noted that the Ministry of Agriculture had made priorities for swamp farming, especially in the areas of Cambia, Bomballia and Makane. Dr. J. Dey, has noted mangrove swamp rice farming in Gambia.

The most complete description of coastal swamp rice farming came from Ms. Isabel Miranda and Mr. Carlos Schwarz DaSilva of Guine-Bissau. Mr. Gamani Jayaweera of the soils chemistry department of IRRI contributed information on coastal farming in Sri Langka. Their descriptions follow.

Guine - Bissau. Permanent coastal rice agriculture is carried out in the mangrove swamps by 'Animistas', a loosely related group of animistic populations of Guine - Bissau. Their techniques have been in use for at least 500 years and were recorded during initial Portuguese occupation of the country. The practice include the construction of lowlying sea dykes and sorjans in conjunction with the use of traditional and adapted 4 to 5 month rice varieties.

Tides in this area of Guiné-Bissau fluctuate from 3 to 4 meters in a day. Sea dikes are built using communal labor of all villages bordering the sea : dikes average about 2 or 3 meters in height, and are dug when the tide is at its lowest ebb of about 1 meter. Rebuilding of washed out portions of dike takes place before the beginning of the rainy season in June. A radio (shovel) is used. Dikes are not used to prevent interflow between farmlands and the tidal flat beyond, but to stay rainwater in farm plots during low tide as well.

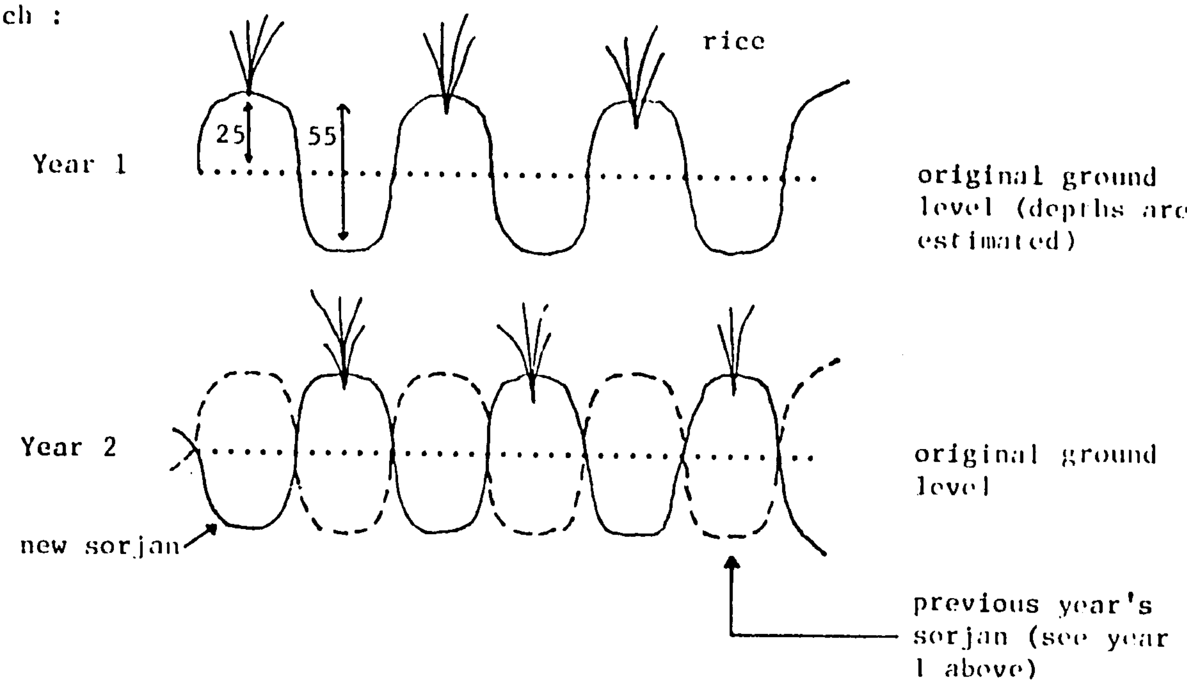
Inside the sea dike boundry, intra-village collective dykes are built to enclose areas about 2000 m^2. These dikes are themselves divided by a crosswise intersection of two lower dikes which are maintained by inter-household labor to form an inner fourfold partition. Households further create smaller dyked partions in fields. The arrangement appears as follows :



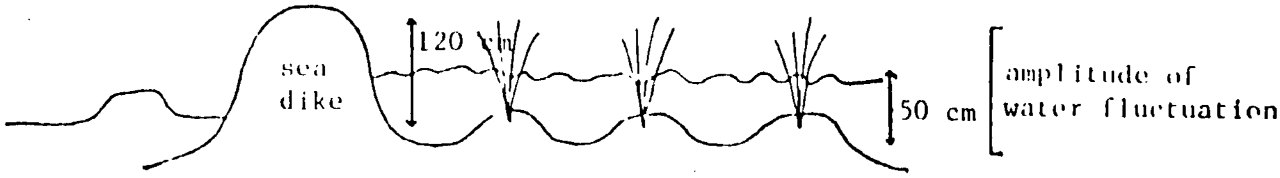
Depth of water in fields during rice agriculture ranges at about 50 - 120 cm in sorjan fields during the height of the rainy season.

Seedbeds are prepared in permanent household sites further inland in June. Seedlings planted in this area undergo no brackish water inundation (water in the fields at this time is still salty, ranging from 3-4 micromohs). After about a month, the seedlings are transplanted to sorjans built up within the dikes, when salt re. electroconductivity measurements averages 1 - 2 micromohs. During growing season and with the increasing rainfall these is from 0 - 1 micromohs of electroconductivity. Saltiness gradually increases until at 15 days before harvest it reaches 1 - 2 micromohs.

Sorjan construction and agricultural technology are aimed at insuring the continued fertility of soils for rice agriculture. There is no succession of rice to coconut farming as it occurs in parts of coastal swamplands of Indonesia. Sorjan row mounds are built up to 50 cm. higher than their adjacent ditches and are constructed using agglomorized rice-straw-mud from the mounds of the previous year. These mounds, called bilo, are thus shifted from year to year to the site of the previous year's ditch :



In this way, the rice roots, rice straw and worked earth of the previous year comprise the new sorjan of the next year. The mounds provide both fertilization and elevation to the rice plant, while diking retains rainwater in fields. Rice is planted on the mounds.



Both men and women work in agriculture. Men do the diking and ditching. Women make seedlings (?) and transplant. Men harvest the rice.

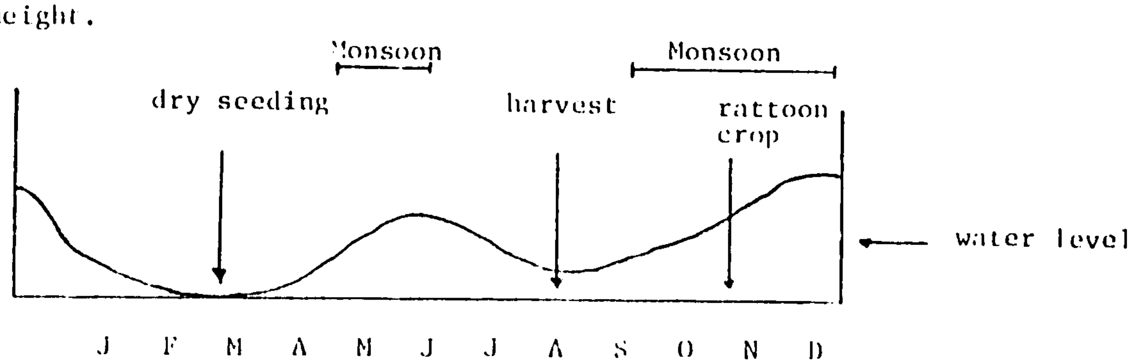
Some of the rice varieties which are used are Atanha, a native variety which has some salt tolerance, grows to 1 meter tall and has a 4 month growing period; Anine and Some, two other local types; and Rok-5, recently imported from Sierre Leone, which is 110 cm tall and has a 125-130 day growing period.

Reports on yield of farmers and research station testing has been favorable. Yields in farmers fields have ranged from 2.5 to 3.0 tons/ha., and that of research stations from 5 - 6 ton/ha. without fertilization.

I am presently trying to initiate further correspondence on this coastal farming system.

Sri Langka. This coastal agriculture is carried out in peats. The area undergoes two monsoons during May - June and again in September through December. One crop of rice is grown a year, using $5\frac{1}{2}$ to 6 month traditional varieties. Seawater and brackish water flows to 8 km inland. Farming is carried out from 1 km from the sea to more uprivers sites.

In February prior to the beginning of the May - June monsoon, weeds are cleared by machete. Rice is broadcast or directly dry seeded at this time. No transplanting is conducted. Rice plants grow enough to maintain their height above the level of the water, which can reach a meter or more in height.



Rice is not weeded during its growth period. Harvest takes places in August. Generally most traditional varieties have good rattooning abilities (about 20% of original yield), and, barring excessive rat predation this crop is harvested several months after the original crop. First yields are about 1.25 tons/ha.

One traditional variety, Devavaddiri is salinity and flood tolerant and has good kneeing ability. It is about $1\frac{1}{2}$ meters tall and can be rattooned. Wild rices also occur throughout the region.

In the past farmers tried to adopt high-yielding varieties in some of these areas. Unfortunately the project was not a success. Not only did farmers lose their crop for that year, but lost their stock of traditional seed and much land was abandoned.

These farming techniques adapt traditional rice varieties with specific growth patterns which can be integrated into the double monsoon climate. It is interesting to note that harvesting occurs during the hiatus between monsoons with lowered water levels better adapted to panicle filling and maturation for higher yields. The rattoon of this crop is likewise available before the Sept - Dec. Monsoon promotes maximum water depth in fields. A variety with rattooning abilities is especially important in this region since the gap between monsoons does not allow enough time for the establishment of a second crop.

The two methods presented, in conjunction with data on coastal rice systems in Indonesia demonstrate the variability in farming practices.

Appendix III.B.12.

No.	:	TR-050
To	:	AARP - GOI Project
From	:	Greta A. Watson
Subject	:	Survey trip to Bumijaya, a Javanese transmigrant village in South Kalimantan's rainfed uplands. Agroeconomic survey of cassava cropping systems and marketting potential.
Date	:	27 October, 1983

Participants

Ir. Eddy Purwanto, head of survey
Ir. Rosita Galib
Ir. Rohlini
Ir. Mukhlis
Greta A. Watson, consultant

Summary

Bumijaya is Javanese transmigrant village which was established by the Indonesian government in 1976 in the kecamatan of Pleihari in the kabupaten of Tanah Laut, South Kalimantan. It is an upland, rainfed district with red-yellow podzols (apparently with lateritic potential). Very little of this hilly land is under agricultural production : most is completely covered with alang-alang (Imperiata cylindrica) weedy regrowth and only about 2 - 3% is still under forest cover. Erosion of hillsides is common.

Farming families have received 2 ha. of land each from the government and already have received certificates of ownership for this land. They have found it difficult to grow rice on these areas, owing to the unpredictability of rainfall, type, fertility and slope of soil, necessity of extensive land preparation (due to Imp. cylindrica invasion) and distance from their homes (sometimes 5 km. or more). Many farmers have either abandoned these areas or turned to planting cassava there until future agricultural extension provides some solutions to their problems. Other farmers have resorted to buying land from surrounding local populations or "claiming" land on far-off erosion/prone hillsides

where they can farm rice.

Food consumption appears to be based on cassava as principle crop. People also grow a variety of vegetables for consumption and sale. Many families care for cattle using the gado system. Wealthy merchants or doctors from the Banjarmasin area buy cattle as an investment and leave them with less well off Javanese families for their care. The farmers receive a portion of the profit. Other farmers rely on their skills as housebuilders, stone cutters, construction workers or canal diggers for supplementary income. It can be safely said that most farmers do not rely on farming as the primary source of monetary income, but on these additional activities. Farming is truly a subsistence activity for most families.

The survey in this village concerned the problems in the cropping and marketting of cassava. Eddy Purwanto, head of this particular survey had selected Bumijaya village from villages in the kabupaten because it had the highest production of cassava, and theoretically the highest marketting. This did not prove to be the case. There is a glut of cassava at the local market in this area and no economically profitable means of transportation. During harvesting time (June-Aug) cassava sells at the local upland market for Rp 7.5 to 20 per kg. in comparison to Rp. 40-70 in coastal swamps of Anjir Tamban or Rp. 100-150 in the capital city of Banjarmasin. Most farmers do not sell their cassava at all, but find it more profitable to make gaplek (sliced dried cassava which is easily stored) or simply feed the crop to their cattle or chickens. Farmers say that cassava is the starchy/carbohydrate crop best adapted to the soils of the region and productivity is high. The problem is in its marketting.

Marketting of cassava and not its production is the problem for these farmers. Still, it is unclear what impact more intensive production systems would have on the environment. Presently cassava is intercropped with rice, corn and vegetables, or used as terrace borders in uneven fields. It was evident during the jeep ride through this area, however, that monocropping of cassava occurs on a greater scale than farmers would admit. This was particularly evident in more remote, hilly areas covered with alang-alang. Cassava tuber production does not require as much attention to weeding or protection during the growing cycles as a crop like rice or eggplant. Moreover, its height allows for photosynthetic competition with alang-alang. Monocropping should be studied for its erosional qualities.

Farmers were also questioned on the potential marketability of other starchy or lower input crops (in contrast to vegetable cropping for example). Farmers admitted that local population did a thriving business selling the sweet potato (ubi jalar), but that they themselves had no experience with it. Long beans, eggplant, bayam (a spinachlike leaf) were the primary cultivated crops which were marketted.

It was evident that the Javanese farmers had no prior experience with a rainfed upland environment. With little interaction between themselves and local populations, farmers have not been able to adjust sufficiently to the economic and natural farming environment to support themselves through cropping. It is suggested that, to increase livelihood a program be developed whereby Javanese farmers can examine planting methods and patterns and talk to Banjarese farmers, or that the government farming agencies reexamine introduced cropping systems for ways to improve them. This would include improvement in production/yield, marketting, erosion, seasonal labor and other areas.

No. : TR-054
To : AARP - GOI Project
From : Greta A. Watson
Subject : Trip Report to Kolam Kiri Village, Barambai, South Kalimantan
Date : 21 - 22 November, 1983

Participants

Ir. Rosita Galib, head of survey
Ir. Eddy Purwanto

Purpose

To conduct a presurvey concerning cropping systems, on-farm and off-farm labor and income; to develop a relevant survey concerning the socio-economic status of the transmigrants.

Summary

The village of Kolam Kiri, Barambai, South Kalimantan was established and settled between 1969 - 1972. It is a transmigration site on the left "fork" of the Gajah Mada fork drainage system (see Fig. 1 and 2). There are about 660 farming families residing here. They are presently of East and Central Java origin. At the establishment of the site, West Javanese also settled here. Brackish water conditions and the inability to apply West Javanese methods of agriculture resulted in almost complete migration of West Javanese from this area.

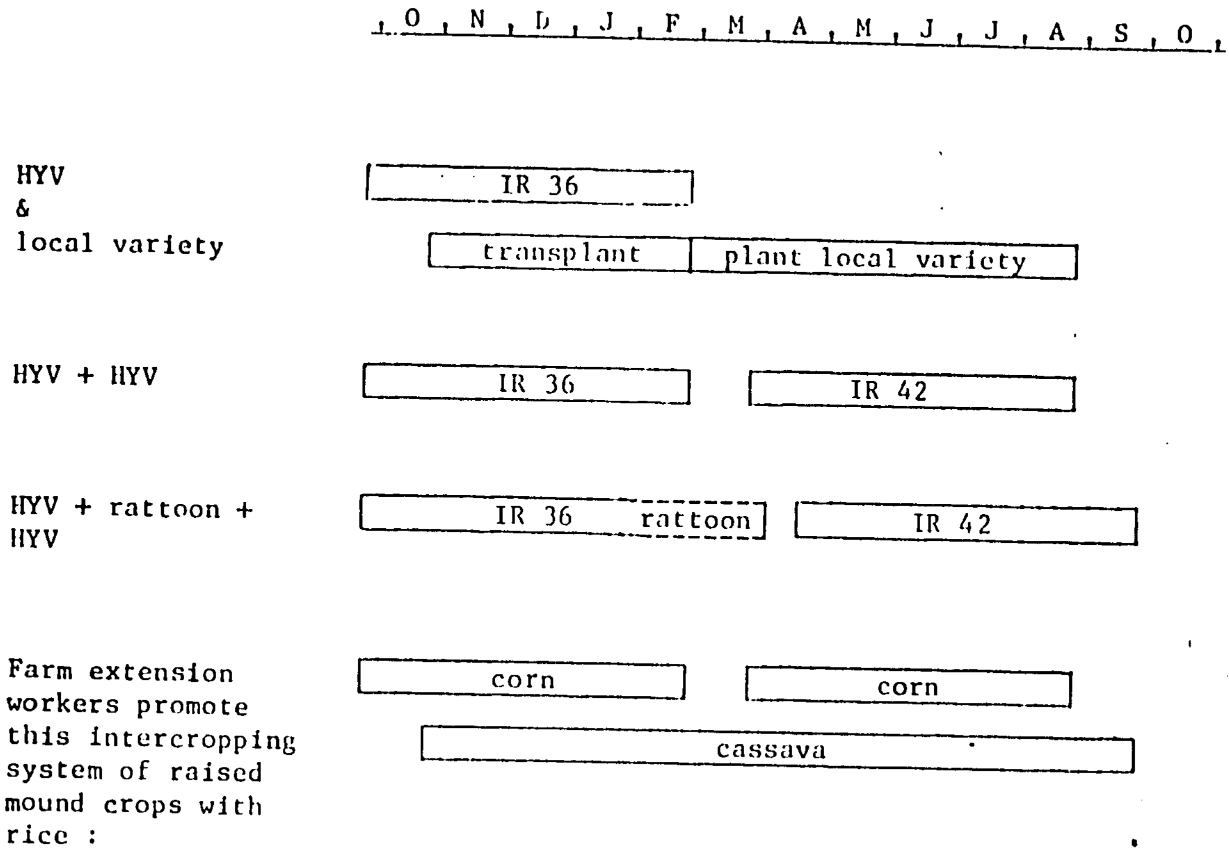
Kolam Kiri village is presently experiencing farming problems in regard to soil and water conditions. Drainage is insufficient in those areas farthest from the river and from major canals. The 1982-83 dry season dried and cracked soils so severely that rains from the following wet season brought up underlying acid sulfates. This resulted in a large area becoming unfit for rice planting in this 1982-1983 year. Mr. Kaswa, BARIF Station manager at the site, described the severity of the conditions for different

areas (see fig. 3). He described a recent visit by NEDECO consultants. After preliminary investigation the consultants felt primary canals should be deepened and banked and ancillary canals should be dug to promote drainage from secondary and tertiary canals.

During a group farmer interview, farmers also maintained that recent and on-going acidification of soils was the main problem in agriculture. Near to the forest drainage is poor, but water is less acid because of rainwater inflow from forests. Here peat is still deep. Areas further from primary canals and which have stagnant water in drainage ditches are most acid. This is because acid water originates from canalized or cracked acid soils but has no way to run off. Purun tikus (Cyperus spp.) is the only plant that will grow in these most acid areas. Areas which are most directly influenced by tides are least acid. Farmers note erosion into canals and inadequate upkeep as contributing to the acidity problem.

Cropping systems seem to be a response to these soil and water conditions. Mr. Tris, the village head, says that areas farthest from the Barito River are not directly influenced by tides at all, and during the planting season are rainfed. Peat initially can be 50-100 cm deep in these areas. During the first 4 years of farming only local rices can be grown. As canals gradually drain the land, soils compact and the water level is reduced. Only after 4 years can the high-yielding varieties be planted to allow for double cropping.

Most farmers interviewed practiced rice double cropping. Either high yielding variety - local variety or HYV - HYV patterns of rice planting were used. In the case of HYV - HYV, a rattoon crop was possible after the first rice harvest, making this a method of triple cropping. Farmers said that they could get up to 50% of their first harvest from a rattoon crop. The rice planting methods are shown below :



Farmers using the double rice cropping system farm the whole year. Under this system they do little if any off-farm labor, since rice yields usually provide sufficient income. This year, because of the adverse conditions of the soil, some farmers have instead sought construction work or work as hired laborers on other farms.

In the double cropping systems, farmers may work in groups on each others' farms to prepare land or plant. Shortages in labor at planting time are solved in this way. At harvest time, shortage of labor is more acute, and harvesters come down from upland sites to harvest. Usual division of harvest is 5:1, but when Kolam Kiri farmers lodge and feed t[illegible], the portion may be smaller.

Farmers cited rats as the major pest in rice fields. They have used zinc phosphide poisons in the past, but at present these poisons are not sold in the market. Farmers do not feel anti-coagulant poisons are effective. When rat problems are severe, farmers destroy nests or raid the fields in groups at night, killing rats by surrounding them in the bush.

Where lands are good, farmers are satisfied with their rice yields.

Farmers explained that they themselves practice different farming on raised mounds in the rice field, depending on the age of the mounds, condition/fertility of the soil, and the rooting systems and canopy cover of the crops grown. Vegetable crops are grown only for the first two years of mounding, when the soils is fertile and soft. After this time the soil is less fertile and dung, weedy compost, or inorganic fertilizers must be used if vegetables are to be cropped.

Instead of continuing in vegetables, most farmers switch to cassava, sweet potato and corn crops after this time. Taro can also be planted at the edge of mounds in rice fields. If coconut has been planted, the spreading root system quickly begins to occupy the topsoil and soon these secondary crops cannot be grown. Banana trees also shade out crops. The farmer can, however, plant banana as an intercrop.

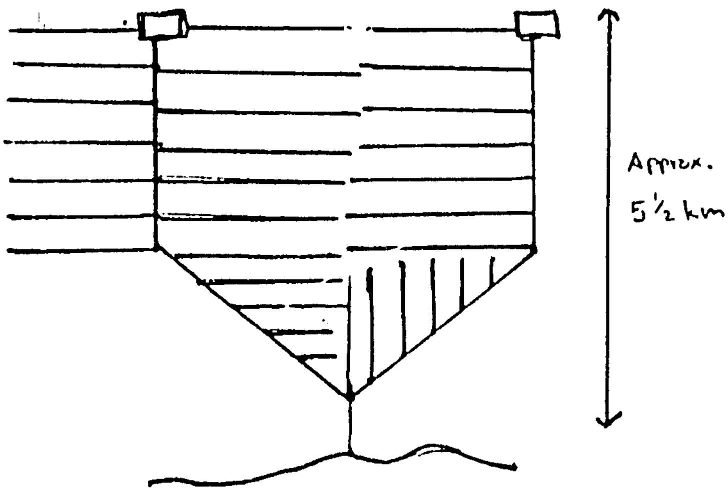
Many farmers have begun to plant only raised mound crops in areas with very acid soils. Raised rows of soil are eventually leached of acids. In Kolam Kanan village, where there is the most severely effected soil, the transmigrants raise cassava as the primary crop. It should be noted here that mounding of land is almost impossible to reverse; therefore almost impossible to switch back to rice anymore. This is because acid sulfate or iron toxic soils are exposed when soils are dug up to make mounds. The lower levels of land are toxic.

It is obvious that if drainage of acid waters is to be improved it must be done immediately. Otherwise farmers will continue to either abandon their land or build mounds.

Additional comments : Mr. Kaswa Sulaiman, the BARIF field station manager is quite intelligent and particularly concerned with farmer problems. This consultant was surprised to learn that after 5 years, he was still an honorary employee (that is, not yet a government employee) and that he had no formal education past high school. It would be in the interest of BARIF to encourage him in his education and retain him as a permanent (government) employee.

BARAMBAI TRANSMIGRATION SITE
SOUTH KALIMANTAN

FIG. 1

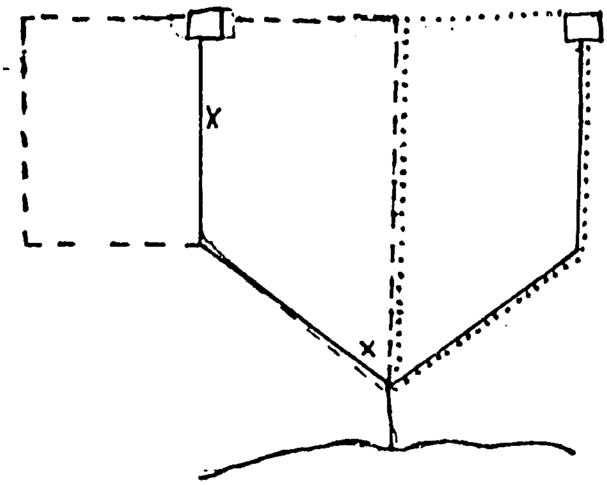


Gajah Mada Drainage Plan

canals

pond

FIG. 2



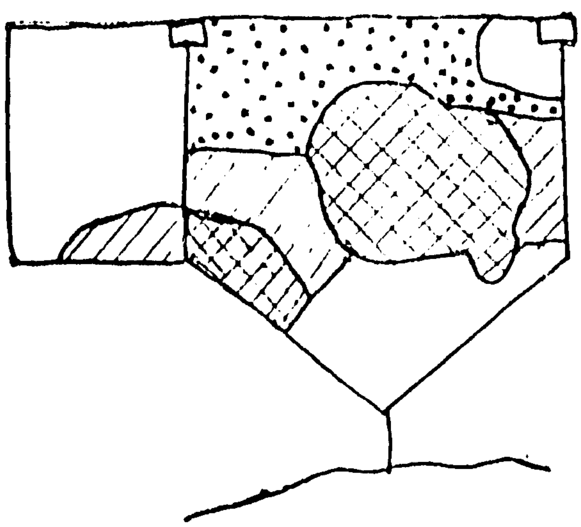
Kolam Kiri Village Site

limits of Kolam Kiri Village

X area visited in presurvey

limits of Kolam Kanan Village

FIG. 3



Acid Sulfate & Iron Toxicity

severely effected

strongly effected

moderately effected

slightly effected

Appendix III.B.14.

No. : WR-065
To : AARP - GOI Project
From : Greta A. Watson
Subject : Working Group on Stable Plant Resistance, Denpasar, Bali
28 November - 3 December, 1983 (International Conference).
Date : 28 November - 3 December, 1983

Purpose

To present a paper on "Farmers" Knowledge of Plant Protection : A theoretical and Practical Framework". To contribute to the evaluation of current methods of crop breeding and integrated pest management and how these areas might be enhanced through farmer input.

Summary

This conference brought together researchers from Indonesia, Thailand, Sri Lanka, the Philippines, FAO participants in integrated pest control and breeding, other experts from CIAT and myself. Our purpose was to evaluate current breeding technique, integrated pest control and environmental evaluation and how they could be adapted to encourage greater farmer participation and better fit farmers' needs and abilities.

Six theoretical/practical papers were presented in the areas of breeding, pests and disease, farmer traditional knowledge, researcher and technician monitoring systems. Each of the represented countries also presented a summary of methods of breeding and integrated pest management in their country (see 'Notes' on Working Group').

The working group was then divided into 3 parts which were given the task of writing up recommendations for either breeding, IPC or environmental evaluation. Each of these groups had to focus on ways in which farmer knowledge and participation could be blended with researcher and technician skills. The resulting recommendations (see Working Paper) will be used to advance policy which emphasizes farmer participation. Mutual responsibility must be taken in the use of new technologies and crops. This demands

farmer participation in a decision making capacity as well as a monitoring one. New crop technologies and types must be adjusted and make use of existing indigenous social organization, methods and knowledge wherever possible. Farmers can be taught by technicians to monitor their crops more effectively and use technicians as an intermediary in case of pest and disease outbreaks. Farmers can make better use of varieties if they are taught about the suseptibilities as well as tolerances of those varieties.

Varietal tolerances and suseptibilities also vary according to the location in which a variety is planted, and over time. Durable or stable plant resistance then becomes relative. What we call durable resistance to a pest or disease may mean resistance 1) within one rice variety for 6 or 7 growing seasons at least 2) among a mixture or through the sequential use of different varieties 3) by use of biological, social or chemical control of pest or disease incidence through management. Since suseptibilities vary by location and overtime, farmer monitoring become integral to durable or stable resistance. Farmers are the best authorities on what stresses occur in there fields.

Integrated pest management must fit farmers abilities to use it, be economical and non-polluting. It was shown that pesticide use frequently destroys pest predators and promotes resurgence of pest populations. Biological and social controls often can prevent serious and continuing pest outbreaks. Farmer participation is essential here.

The working group also visited various fields during a one day tour of Bali. This included a trip to observe the Balinese subak system of irrigation and social regulation of water management, a talk with field technicians about early warning and monitoring systems for rice pests and disease, and observation of field sites with tungro, helminthosporium and other diseases.

In all, the conference made important inroads on establishing farmers as prime participants (non just informants or recipients) in agricultural development. Durability and stability of crop production was seen to be a product of location, environmental problems and crop management as well as the particular genetic makeup of a variety. The working groups paper of this conference will be used by national programs and FAO for the establishment of further priorities in maintaining stable & durable crop production.

APPENDIX

Banjarmasin Research Institute for Food Crops : (BARIF)
Applied Agricultural Research Project

TRIP REPORT
LAPORAN PERJALANAN

(TR-057)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name / Nama: Greta A. Watson

Department / Kelompok: Agroeconomics

Date of Departure / Tanggal berangkat: 24 November, 1983

Return / Tanggal kembali: 24 November, 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Balai Proteksi Tanaman Pangan, Banjarbaru

Accompanied by / Pengikut: -

Purpose of trip / Maksud perjalanan: Meeting with Dr. Rais of the Plant Protection Agency for Kalimantan.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Dr. Rais and I discussed the potential for integration of the crop protection sciences and socio-economic and ecological sciences to utilize farmers knowledge to reduce pests, weeds and disease. Dr. Rais is attending the National Pest Management Conference in Bali (3-7 Dec.) which occurs directly after the FAO conference there (29 Nov - 2 Dec), and to which BARIF and associated experts have been invited. We have coordinated focus on gathering data from farmers to use in future development planning.

296

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project : (BARIF)

TRIP REPORT
LAPORAN PERJALANAN

(TR-364)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name / Nama: Greta A. Watson

Department / Kelompok: Socioeconomy

Date of Departure / Tanggal berangkat: 26 Nov. 1983

Return / Tanggal kembali: 2 December, 1983

Principal Locations Visited / Tempat-tempat yand dikunjungi: Sanur, Denpasar, Bali - Working Group on Stable Plant Resistance - FAO - GOI Sponsored.

Accompanied by / Pengikut: Alone

Purpose of trip / Maksud perjalanan: to present a paper on "Farmers" Knowledge of Plant Protections A Theoretical and Practical Framework" and to attend and contribute to the conference.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

The conference included international representation in the areas of integrated pest management, breeding, environmental evaluation (social, biological and physical), and development policy. There were six perspective papers presented. Each representated country also gave reports on the status of IPC research in their country.

The focus of the conference was on using farmer participation and information and blending farmer skills and practice with those of the researcher, breeder, and technician. This would lead to more basic information for planners. It would also allow the farmer to take greater responsibility in the monitoring and improved or stabilized maintainence of the crops he/or she grows.

A trip to the subak irrigation systems of Bali was organized.

APPENDIX

Banjarmasin Research Institute for Food Crops : (BARIF)
Applied Agricultural Research Project

TRIP REPORT
LAPORAN PERJALANAN

(TR-068)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name / Nama: Greta A. Watson

Department / Kelompok: Agroeconomics

Date of Departure / Tanggal berangkat: 12 Dec. 1983

Return / Tanggal kembali: 12 Dec. 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Unit Tatas, Central Kalimantan; Handil Manarap, South Kalimantan

Accompanied by / Pengikut: Dr. Bernardo Gabriel, Dr. Kevitt Brown - RMI; Dr. H. Anwarhan, Mr. Syahrani - BARIF; Dr. Paul Stangel, Dr. Hargono Singgih, Dr. Prabowo, Dr. William Collier - AARP Project evaluators.

Purpose of trip / Maksud perjalanan: To observe farm station and experimental sites, evaluate architectural plans and environment, consider project plans for development of sites, research and experimentation.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

This t... was made to evaluate the environmental conditions and architectural plans for station construction and/or expansion at the Unit Tatas and Handil Manarap BARIF sites. Development of these sites will be funded by an AARP-GOI grant, and evaluation by AARP-GOI evaluaters was conducted. Unit Tatas is an indirect tidal swamp area recently opened in Central Kalimantan. Handil Manarap has been in long term use and experiences both indirect tidal and rainfed conditions. After AARP-GOI consultant evaluations a AARP evaluator-BARIF staff meeting was held. Investigation of the 5 Year Plan for BARIF development of tidal and inland swamp agricultural research was primary focus. SWAMPS II funds, collaboration with Bogor institutions for field and laboratory research, adequate use of library & English language facilities, and distribution of responsibilities throughout BARIF staff was also discussed.

Appendix III.B.15.

No.	:	WR-070
To	:	AARP - GOI Project
From	:	Greta A. Watson
Subject	:	Directions of BARIF Research Under the AARP and Swamps II Programs: Dr. Hargono Singgih and Dr. William L. Collier of the AARP Evaluation Team 13 December, 1983, BARIF discussion.
Date	:	19 December, 1983

Summary

During the visit of the AARP evaluation team, formal and informal meetings were held with the BARIF staff. During these meetings we discussed the AARP and upcoming World Bank sponsored SWAMPS II project in relation to the previous research and potential capabilities of BARIF, including possible areas of deficiency. The discussions pointed out directions for basic upgrading BARIF staff and equipment.

Reassessment of priorities for swamp research : Goals. In order to better focus on tidal and inland swamp agricultural policy, we must assess the direction such research will take. Some areas include choices for:

A. Integrated or single discipline research. Integrated research demands the coordination and cooperative effort of different disciplines to provide a holistic base for development. This method is more time-consuming but is better able to cope with interrelated aspects of the farming environment. Singular discipline research tends to produce research in isolation and sometimes at odds with other disciplines. However, it is more easily carried out.

B. Focus on recipients : original inhabitants, spontaneous and government transmigrants. We need to attend to the farmers who will be implementing our recommendations. The socio-economy, cultural and agricultural history of farmers is different depending whether they are migrants or original inhabitants and their place of origin (Banjarmasin, Central Kalimantan, Java, Madura etc.). Land ownership, marketting, and transportation constraints vary from region to region. The BARIF program under SWAMPS II will ostensibly cover all swampy regions in Kalimantan and Sumatra. We need to define and focus on target farmer populations so that we may serve 1) the greatest number of farmers 2) those with the greatest need.

C. Environmental parameters. Tidal and inland swamps are designated by their hydrological pattern of inundation over time. Other more regional or microgeographic factors may be equally important. These include soils capabilities and limitations, especially for acid or peaty soils; brackish or freshwater inundation both seasonally or annually, rainfall, and forest areas among other factors. Definition of target environments is important to breeders as well as agronomists, physiologists, plant protection experts and other researchers.

Establishment of prototypical farm research stations and centers, and "typical" farming villages for assessment. The research sites and typical villages that are chosen for experimentation and survey must fit with the goals concerning research, target farmers and environmental parameters, mentioned above. This will insure that the priorities established for AARP and SWAMPS II research is realized. In particular, this means that :

A. Stations and farm research centers are evaluated for their environmental and management capabilities. This includes adequate staffing and further staff training in experimental station and research procedures, as well as in the use of equipment. Research would not be carried out arbitrarily, but be planned to coincide with needs of farmers and in specific agricultural environments.

B. "Typical" swamp villages should be monitored over time for socio-economic and environmental factors. These baseline studies will provide data on the status of various villages in swampy regions through time. Monitoring effects of population and land use will help in describing potential changes in a wider area. If test sites or field sites are to be established in villages, they should also be monitored for effects on the economic status and production of individual farmers who adopt and do not adopt BARIF recommendations. Longterm investigation is worthwhile.*

Library and other information facilities. The effective use of literature helps to produce able researchers. At present, BARIF library facilities are minimal. AARP consultants have improved the information base through literature searches and the establishment of a consultant library which will eventually be transfered to BARIF. The new library at Banjarbaru will be better organized and has a stipend for book and journal acquisition. Researchers should be encouraged and trained to use library facilities.

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* Farmers' participation in planning, implementing and monitoring projects is essential.

Laboratory equipment. Much of the laboratory equipment will be both complicated and fragile. As yet, there are no provisions for upkeep and maintainance. This includes, not only outside agents such as computer technicians, but in-BARIF maintanance employees. Moreover, there not yet a clear plan for the training of BARIF researchers in equipment use. The need for training in this area is clear.

BARIF staff, departments and procedures. The head of a research center or government office has the final responsibility for the results of his or her institution. Dr. Prabowo pointed out, however, that unless the responsibility for various departments and disciplines is made the collective and individual responsibility of members of those disciplines, it is hard to establish a well-running organization. That is, individual departments and members of those departments must be able to organize, control and have the final say on research themselves. When each and every staff member is responsible for their research, abilities improve and there is a feeling of self worth. In this case the head of the institute acts as a source of advice rather than a research organizer. If heads of research departments are not allowed to design and control their own research, problems arise in morale.

At present BARIF staff is still growing. There is still a lack of enough trained researchers to carry out every type of possible research. However, trained staff is capable of directing and controlling the course and funds of research. They must be guided to take responsibility for this.

Some restructuring of BARIF is necessary to allow day to day procedures to be carried out better. This fundamentally includes severe reduction in absenteeism, lateness & prolonged work breaks. More explicitly, a revised approach demands researchers take more responsibility for their research administration organization, especially if they are the heads of departments.*

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* At present, some department heads and staff are productive, capable and responsible, but many others could be more so.

Training. Applied and basic training is being considerably upgraded. There is a weekly seminar series on ongoing BARIF research, one on writing for publication, and one on organization of research. There are monthly meetings of the rice breeding and secondary crops groups. Other in-house training is ad hoc and includes methods of crop evaluation, identification of insect pests, capture and preservation of rat specimens and agroeconomic methodologies.

It is unfortunate that there are little funds available for training in the Banjarmasin area, since Lambung Mangkurat University and government organizations frequently after short term courses at low cost.

Many of the research staff have been sent to complete Masters degree training at universities in Java. Short term training at IRRI in pest control, agroeconomy and other areas has been of considerable benefit.

Conclusions. In short, there is much work that has been done to upgrade BARIF research, but much work that still must be done. In particular, we need to make a strong effort to focus research, organization and training to meet demands of the AARP and SWAMPS II projects in the future.[5] This is difficult, in the case of SWAMPS II, if BARIF is unsure, when, if and how such funds will become available.

Appendix III.B.16.

Workshop on Stable Plant Resistance
Denpasar, Bali, Indonesia
29 November - 2 December 1983

FARMERS' KNOWLEDGE OF PLANT PROTECTION:

A THEORETICAL AND PRACTICAL FRAMEWORK

Prepared by

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and

Mahrita Willis[2]

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FARMERS' KNOWLEDGE OF PLANT PROTECTION: A THEORETICAL AND PRACTICAL FRAMEWORK

Abstract

Farmers' knowledge of different crop varieties and techniques of crop protection can be used to guide institutional research and develop new agricultural technologies. Farming practices are generally dynamic and variable, and not static or unchanging. Local methods of weed, disease and pest control vary by location and through cropping seasons. This includes the interaction of crop varieties and associated farming practices with different levels of pests or weeds, physical factors such as soil or water conditions, and social factors. Flexible strategies allow farmers to adapt their methods to different situations.

A dynamic and contextual approach to local or indigenous farming practice and knowledge is necessary to understand its complexity. Literature on 'traditional' methods of crop protection is reviewed. Rice cropping strategies of farmers in Central Kalimantan, Indonesia are examined contextually and ecologically. Methods of weed, rat, and insect control are interrelated with the choice of rice varieties and associated farming practices through time. A discussion of the ways in which farming knowledge and practice can be used by crop protection researchers concludes the paper.

The authors thank the Banjarmasin Institute of Food Crops, Indonesia, for the opportunity to present this paper. Pre-doctoral field research in Central Kalimantan by the primary author was supported by the Wenner-Gren Foundation for Anthropological Research (No. 3382), the East West Center Resource Systems Institute, Honolulu (No. 19-E 100), the Indonesian Institute of Sciences (LIPI), the International Rice Research Institute, and the Government of Central Kalimantan, Indonesia. The authors also thank the farmers of Central and South Kalimantan, whose knowledge and constant help made this paper possible.

FARMERS' KNOWLEDGE OF PLANT PROTECTION : A THEORICAL AND PRACTICAL FRAMEWORK

INTRODUCTION

Indigenous, local or traditional* methods of plant protection practiced by farmers are valuable for developing plans for future agricultural research. Examples of effective weed, disease and pest control by farmers' are numerous. The problem lies in understanding the contextual framework of these practices. Traditional farmers act upon observations which are ecologically oriented; that is, farmers consider crop varieties, pests, weeds, soil, water and climate as a whole. Fluctuations in these parameters occur both in space and time, and the farmers responses are likewise variable and dynamic. Agricultural practices are also related to the social organization of a group and reflect farmer "trade-offs' of labor, money, social obligations and responsibilities in other areas of farm work or non-farm activities. All of these factors may cut down efficiency of production. Most indigenous cropping systems are aimed at keeping plant pests and protection to a tolerable level. Farmers work toward satisfactory rather than optimum yields and reduce plant problems to insure economic thresholds of these problems are not reached.

* The world traditional has often carried the connotations of archaicness, primitiveness, unchangingness or ignorance. This is a misapplication of the word. Tradition refers to cultural or experiential knowledge in longterm use. Local or indigenous farmers often use traditional knowledge in their farming strategies. Sometimes traditional knowledge improves farming conditions, sometimes it doesn't. The farmer is generally responsive and innovative to changing environmental circumstances. In this sense it is not the local or indigenous farmer who is traditional, but the practices he or she uses.

Farmers' approaches to plant protection tend to be contextual and dynamic. In contrast, research scientists' orientations are often particular to one pest or crop in a controlled, stable environment. The traditional farmer mainly acts in relation to concrete, specific observations for present situations, while scientists have a more abstract, linear, generalized overview directed toward the future. Local level microgeographical practices and observations of pests and problems by farmers also contrast markedly with large scale strategies proposed by most development researchers.

Both research/practice viewpoints are necessary for developing appropriate, sustainable, stable, socially and economically productive plant protection methods (IRRI 1982). Problems arise, however, in both using farmers' knowledge and extending new technologies to them. The trained scientist who works within the research institute often focusses on the most efficient methods of plant protection from a regional, economic cost-benefit perspective. Farmers are infrequently consulted before pest, weed, or disease treatments have been established. That farmers frequently do not or cannot implement researchers' recommendations, or implement them incorrectly should not be surprising. The local social and environmental problems that farmers face must be adjusted for in plant protection practices. Through direct communication between researchers and farmers, more appropriate pest and disease management is likely to be developed.

How can this exchange of knowledge be accomplished ? Interdisciplinary teams composed of researchers with training in social science or biological and physical science have worked on large projects for agricultural development, including plant protection (Goodell at.al. 1982). For smaller projects scientists are frequently constrained by both time and money. Social scientists are able to point out economic, social or agricultural constraints to production. They infrequently have training in the life cycles of pests, weed succession or environmental parameters of plant disease. It may therefore be difficult for them to obtain or communicate this type of information with other scientists. Similarly, plant pathologists, pest and weed specialists may find it difficult to integrate socio-economic information.

It is in the interest of plant protection experts to understand and integrate local or indigenous farmer knowledge into research and project design. The farmer informant/participant in pest and disease control can aid in environmental surveys (Howes 1980 : 338), assessing project practicality (Goodell <u>et.al</u>. 1982; Howes and Chambers 1980) and its appropriateness.

<u>The most certain way for crop protection specialists to obtain farmer knowledge is ask it themselves</u>. In-depth or holistic knowledge of pests and diseases in agriculture requires time and patience to obtain. Researchers can also hope to gain important data from farmers through short term interviews and conversations. This requires attention to farmers' observations, practices and goals; respect of farmer opinions; and the ability to see the cropping system as the farmer sees it.

Farmers' knowledge about pests, weeds, and diseases is illustrated and criticized. This is demonstrated through various isolated accounts from texts. Trade-offs between yield and other social factors are examined. The researchers' own experience with farmers in Central Kalimantan, Indonesian Borneo is assessed : this provides contextual perspective of a rice agroecosystem and its crop protection.

THEORETICAL PERSPECTIVES OF INSTITUTIONAL RESEARCH AND INDIGENOUS OBSERVATIONS AND PRACTICE

INSTITUTIONAL EXPERIMENTATION AND RESEARCHER PERCEPTIONS

Institutional research is a necessary and invaluable part of the development of new and better pest and disease control. Through carefully constructed scientific experiments we can insure reliability, assure comparability with future research and establish the validity of theories. Theoretical precision is enhanced by statistical power. Negative cases are also an important learning tool. Plant protection research seeks to identify and delimit factors about a pest, disease or crop which may help in the decrease of crop predation. This research is dependent on the premise that, within an environment, pest or pathogenic influence is directly measureable on a crop if all other variables remain controlled. That is, experimental research depends on a linear or componential linear causation model. This form of experimentation is conducted within relatively stable and bounded conditions in space and time. Uniformity of environmental variables such as soil type, water and timing are maintained. Variables can be added or subtracted. Most often, crops are tested for their yield performance to pests and disease in isolated and relatively optimum conditions. Similarly, pesticides, herbidices or foliar spray treatments are generally judged for their efficacy on monocropped crops in limited areas. Much of the resulting data is abstracted and generalized for recommendations on both future research and farmer use.

This type of short term experimentation in delimited areas often does not provide enough data to make accurate predictions for the microenvironmental variability of a region over the long term. Novel or unexpected adverse changes in the biological or physical environment arise in the natural environment. New pest biotypes, reduced plant varietal resistence, and epidemic disease spread are only three examples of some of the ways problems may arise in new technology in future situations (Oka 1979, IRRI 1982). Parameters of agroecosystems vary, in a geographical or spatial and historical or temporal sense. In short, scientific methodology is not always representative of the social and biophysical environment of the farmer's agroecological organization. Farmers are rarely asked for their own perceptions, their opinions of new technologies, or how new techniques can be changed to fit their needs. They are rarely given specific reasons for using the technologies they are given.

AGRO-ECOLOGICAL FRAMEWORKS AND FARMER PERCEPTIONS

In general, farmers perceive the agricultural environment from a contextual and dynamic perspective. They observe the physical, biological and social interactions within the organization of their farming and how it varies in time and space. Adjustments of farming practice and adaptations to new conditions are specific, concrete and oriented in the present. However, responses may occur in the short or long term as incremental changes or widespread reactions to new conditions.

Within the context of the agroecosystem, crops, together with pests, diseases and weeds, climatic, soil and water parameters and factors such as labor, income and other socio-economic variables are seen within a contextual format. Their agroecosystem is comprised of microenvironments which are examined and acted upon at different times from different perspectives. Historical change is an integral part of this situation.

Change occurs in the choice and succession of crops on a plot or plots thoughout the season and in the annual and longer term planting cycles. It also occurs in the outbreaks of pests and disease invasion of weeds, variability of rainfall and soil type and its consistency. Change effects individuals, families and groups differently. Problems may be continous or discontinous.

Farmers, particularly "traditional" ones, must be responsive to environmental changes around them. This includes practices which reduce destruction of crops and which present opportunities for greater yields. Necessarily, the appropriateness of continued agricultural practices including crop choices is conditional upon circumstances and context in which these practices occur. Farmer must manage the natural and social environment to the best of their ability to insure their continued livelihood.

AGROECOLOGY AND CONTEXTUAL ANALYSIS

Agroecology is the study of the interaction between cultivated crops, their human caretakers and the rest of the biophysical environment. The agroecology of farming includes 1) the place of one crop or variety within the farmers' organization of the cultivation practices in space and time 2) interactions between crops and various pests and other biological or physical parameters 3) the role of farming within societal organization. Disturbances are frequent and influence the relationship among people, places and things. The plant protection specialist is concerned with just those disturbances and deviations from the norm, such as pest or disease outbreaks or novel and acute problems for which a systems model often cannot account.

319

It has been shown (Randall 1976, Gladwin 1979, Hunn 1982) that farmers do not make decisions and carry out practices using an all inclusive theoretical, ecological model of the environment. Rather, they focus on the job or problem at hand and on those factors which they feel have an important influence on getting the job done or the problem solved. Approaches to a particular problem depends on the space and time and context of the situation in which they occur. As situations alter the farmer generally makes observations and alters his or her response or continued farming strategies.

This type of progressive contextualization is also applicable to researcher investigations (Vayda 1982; Kartawinata and Vayda 1981). Within the area of research, the focus might be on the situational context and not necessarily on the spatial or temporal boundries of a hypothetical "ecosystem". In the case of rat research, the researcher might first observe effects and interview farmers on rat predation of coconut fruits. This might lead to studies of fluctuations of rat populations, damage to coconuts at specific times, actions of the individual farmer, village groups or regional in methods of rat control. This could include both chronic and particularly severe cases through time. Depending on the direction and scope of research, investigations might lead to other areas. This type of research can place interactions in dynamic context, and provide "a fluidity or flexibility [of research] to match that of the things and processes we [are] ... trying to understand (Vayda 1982:9)".

FARMERS' KNOWLEDGE AND ADAPTATIONS TO PESTS, WEEDS AND DISEASES TO OBTAIN STABLE CROP YIELDS: REVIEW

Farmers like scientists make decisions and practice agricultural techniques using the knowledge they have at hand and the crop varieties, tools, inputs and methods they have available to them. Most studies indicate that physical and biological environmental factors are crucial in determining which strategies and processes provide satisfactory yields. Social factors such as labor, money, or the history of a group or culture are also influential. The fact that farmers do not always cultivate in a way which development planners consider to be optimum or efficient may be a matter of farmers balancing inputs when responding adaptively to a number of different perturbations, problems or frequent hazards (such as flood or drought). This can reduce risks of total crop loss, or insure stable if not necessarily high yields. For farmers who are only beginning cash crop production, a lack of transportation, marketing facilities or good market price are problems that may inhibit more intensive methods of farming.

Farmers may also be slow to adopt new agricultural innovations. Often this has been credited to the "backwardness," the "tradition" or "ignorance" of the farmers. As Lees (1980:372) states:

> Empirical investigations in the field rarely support such widespread beliefs. Rejection or misuse of new agricultural inputs have repeatedly been demonstrated to result from such factors as risk aversion, lack of correct information, lack of access to essential resources, or inappropriateness of innovations to local conditions.

The above factors are or should be of major concern to all agricultural researchers including plant protection specialists. It has been shown that inattention to these factors in developing new plant protection technologies can have extremely hazardous effects. This is particularly evident in the adverse effects of some insecticides which promote insect damage to crop plants both in the laboratory (Oka 1979; South Korea 1982:94) and in the field (Barducci 1972; Glass and Thurston 1978:113). Problems with new pest management technologies may also arise when farmers feel that new practices are too labor intensive or otherwise socially inappropriate (Goodell *et al* 1982).

PAST RESEARCH ON CROP PROTECTION

Investigations into farmers' methods of crop protection under local conditions can help to avoid problems or hazards. Local, indigenous or traditional methods of pest or disease control can also provide new insight into the validity and effectiveness of farmers' methods. Indeed, the last 15 years has seen an explosion of research on the practices of small farmers in the tropics. In the area of plant protection, scientists working in institutional settings have demonstrated in experiments on traditional agriculture that:

(1) multiple cropping, when combined with the correct choice of crops and agricultural techniques can be a "powerful component of pest control" (Perrin 1977:93; Kass 1978);

(2) no-till farming can prevent pest outbreaks (Perrin *op cit*:110, Glass and Thurston 1978:112),

(3) polycropping can increase ground cover and shade out weeks (Glass and Thurston *op cit*; Perrin *op cit*:99),

(4) use of multiple crop varieties can reduce incidence of blast fungus (IRRI 1982:17-18), downy mildew (Wolfe and Barrett 1980), and insects (IRRI 1982:22),

(5) spiders which inhabit one crop can be predators of insect pests of another crop when the two crops are planted together (Kass 1978:441)

(6) synchronous planting can reduce pest damage (IRRI 1982:69; Goodell _et al_ 1982:36; Castillo 1975:60),

(7) damage from disease or pests which results in decreased yields for one polyculture crop can be compensated for by increased yields in another (Kass 1978:46),

(8) certain plants or their parts may be used in agriculture to kill or control pests, through use of their toxicities (Secoy and Smith 1983).

This is only a small portion of the institutional research that has been conducted on some of the methods of traditional plant protection. Agricultural technologies include specific fit of planting patterns to the local environment, soil and water manipulation, maintenance of predator species, control of pest populations through biological constraints, weeding, and use of resistant crop varieties.

Social scientists and other concerned researchers have also made observations on biological, physical and social controls of crop problems by local and/or indigenous populations. It has been noted that insect predation in traditional agriculture is often low enough to make pesticides unnecessary (Batra 1962; Soemarwoto 1975). Farmers aim at keeping pests under the economic threshold (Glass and Thurston 1978:113).

Of necessity, all practices and crops in the agricultural cycle have both a space and time component, since they occur in particular places during particular periods. The below examples stress circumstances where one or the other factor is more obvious.

Control of pests, weeds and disease through spatial manipulation. The use of spatial relationships in crop ecology and within the rest of the environment has long been recognized as a method of plant protection. Among shifting cultivators, weed invasion and increased levels of pest and disease incidence are reasons frequently cited for abandoning one farm patch within a forest and movement to another (Conklin 1957; Okibgo and Greenland 1975:87; Seavoy 1973; Jessup 1981).* These are longer term movements. In areas where land is more limiting, there may be shorter term fallow periods, Control of eelworm (Barlett 1978:5) and nematode cyst problems (Glass and Thurston 1978:111) use fallows as short as four years to bring pest populations down to tolerable levels. Land may also simply be abandoned (McNetting 1974:26).

For farmers who are limited by the availability or costs of preparation of land (such as the construction of irrigation or terracing systems), the process of moving from site to site may not be feasible. In these cases, spatial adaptations such as the creation of discontinuous crop patches or the use of multicropping techniques may be applicable (Norman 1974). Plants may act as insect repellent for other plants (Kass 1978:43) and lessen weed problems (Geertz 1963).

Predator species are also used. Herbivores such as geese or cows

*References cited are only a few examples from the literature. Lack of access to bibliographic materials and paucity of data on the relationship of indigenous agricultural techniques to pest, weed and disease incidence prevent further inclusion.

may reduce weeds (Glass and Thurston 1978:112) and carnivores such as cats may prey on rats (Conklin 1957:103). Farmers also recognize the prevalence or absence of predator insects and fungi as a control to grasshopper populations (Richards 1980 : 183).

Timing of agricultural technology for plant protection. Periods during which specific farming practices take place can be generally related to seasonal cycles of pest and disease occurrence. It is therefore not only the type of agricultural technique which is crucial for crop protection, but the timing of such techniques. Entomologists or plant pathologists use this principle in the timing of pesticide application, just as rat protection specialists emphasize the importance of sustained baiting.

Techniques used by farmers may or may not be as obvious, depending on the ability of the farmer and/or the researcher to elicit the connections. Plowing, harrowing, transplanting, or flooding are all methods to disrupt pest populations and suppress weed regrowth (Glass and Thurston 1978:111). Farmers recognize that mole crickets in rice fields can be controlled by flooding and that weeding and insect removal have favorable effects on rice yields (Goodell et al 1982:36; Rindos 1980:759). Synchronous or timed interval planting and/or harvesting can also reduce pest buildups. Rat predation can be reduced through such methods (Castillo 1975:60). Grasshopper outbreaks, their severity and geographical extent, are also based on time factors (Richards 1980:183). Farmers and entomologists can use this information to design control methods.

SOCIAL CONSIDERATIONS

These aforementioned situations develop through the historial relationship between humans and their environment (Rindos 1980) when dependability and stability in yield of the whole farm are important (McNetting 1974:44; Barlett 1978:28-31). Farmers may thus be able to reduce risk and labor, but may have to be satisfied with lower yields (Perrin 1977:109).

The complexity of agricultural decision-making, however, not only includes patch choice, crop type and agricultural techniques, but the persona, regional, national or international risks to the agriculture of the farmer and his or her family (McNetting <u>op cit</u>; Barlett 1980). Even the definition of risk itself is variable. It can conern the dependability of return in the face of problems or hazards or the consistency of yield with income (Chibnik 1981:1-5; see also Norman 1974:9-12).

Importance of different kinds of risk varies. Such groups as shifting agriculturalists or isolated farmers may be less concerned with cash returns and more concerned with averting environmental risks. Local farmers who are more closely linked to cash systems may necessarily be more influenced by socio-economically created risks of the larger system in which they operate. High level technology and control methods may overlook or override methods of lower level local control. Researchers must be aware that larger scale efforts to combat problems or hazards may disrupt control at the local level (Burton <u>et al</u> 1978; Morren 1980). In plant protection this may mean increased problems in the local community (Richards 1980).

Diversity has been noted as a characteristic in stable ecological relationships within bounded environments (Colinvaux 1976). Stability of yield has been shown to be greater under multicropping or polycropping rather thanmonocropping. Diversity of work and job patterns may provide more stability to livelihood (McCay 1981). Diversified and/or integrated

317

methods of crop control including farmer training can be a more stable method of insect (Litsinger 1984) or disease control.

CROP PROTECTION IN CONTEXT: SOME EXAMPLES FROM SOUTH AND CENTRAL KALIMANTAN, INDONESIA

It is to the credit of institutional and field researchers of all disciplines that local and indigenous crop protection techniques are being recognized as valuable for the development of adaptable agriculture technologies. With very few exceptions (see Conklin 1957; Richards 1980 for examples of inclusive research) most research on local pest, weed or disease management is neither comprehensive or contextually illuminating. We should begin to take full advantage of the flexible and adaptive knowledge of the farmer. To do so, we must study the situations and temporal conditions which make such practices warrantable. This includes attention to ecological concepts previously mentioned such as perturbations, problems and hazards, historical significance, patchiness, adaptations and their adjustments and the complexity of farming in space and time. Such research also calls for a clearer focus on particular subjects of interest and their interrelationships with other organisms in the ecological context.

The following examples of local methods of crop protection are taken from field research conducted in the coastal swamps of South and Central Kalimantan, Indonesian Borneo. Information mainly comes from the village of Semuda Kecil, Central Kalimantan, where the primary author conducted her doctoral dissertation research. The primarily Banjarese farmers in the studies are spontaneous migrants to this area or are descended from these migrants. Established villages are up to 150 years old, and most inhabitants move to these peaty or mangrove areas in family or village groups. Opening of unclaimed forests for agriculture is still practiced. Initially rice is cultivated in fields and vegetables grown in home gardens. After several years farmers begin to establish coconut groves. This involves a succession of rice to transitional crops such as cassava and vegetables to coconut in newly mounded swampy areas.

Rice is cropped once a year. Agriculture includes from one to three transplants of rice seedlings to adapt them to deep water and other conditions. Canalization promotes increasing drainage of rice fields. Gradual soil and water changes that occur encourage the corresponding successions of weeds, pests and diseases. Rice yields are low (1-2 tons/ha) and are differentially affected by these organisms through space and time. Farmers predictably adjust their cultivation practices to the changing biological and physical dimensions which they observe. These social adaptations are reasonable and valid in the light of labor availability, economic returns and environmental conditions.

The cases provided are not intended to describe or explain plant protection methods *in toto*. Rather, the focus is on management of pests, weeds and diseases, and utilization of multiple varieties for rice stable crop protection. These particular examples are drawn from farmer information. These samples provide contextual appreciation of farmer knowledge and insight. It should also be noted that these farmers are *without formal training* and yet commonly monitor the performances of varieties and the occurrence of problems within changing environmental circumstances.

WEEDS

As populations grow and old rice fields become coconut groves, farmers progressively clear forests further and further from the center of their original settlement. This produces a number of different microenvironments along the successional ecotone of agricultural land. This includes changing populations and proportions of weed* species and farmers' control of them.

Weed succession and weed characteristics. Farmers recognize and can categorize weed successions in their fields. During the first two years ferns (i.e. Stenochlaena palustris, Nephrolepia hirsutula), a few reeds (Cyperus spp.) non-flowering sedges, and woody species (Alstonia spp.) predominate. At this time the rice field is at the edge of the forest. During the third and fourth year of rice cropping "domesticate" grasses (Panicum spp. Leersia hexandra) and reeds (Rhynchospora coryinbosa),

*For the purposes of this paper, we will call "weeds" those plants which farmers consider to be a perturbation, problem or hazard to the effective management of agriculture or other humanly regulated activities. There is no word for this in the Banjarese-Sampit language of the coastal swamp villages researched in Central Kalimantan. The gloss word, rumput, applies to non-woody species of uncultivated plants, but farmers often "weed" woody tree seedlings (kayu) from their fields near the forest as well.

Rindos comments,

> ..... the distinction between weed and domesticate is at best a tenuous one ..... Independent support for a coevolutionary view of domestication may be found in the existence of weeds specifically adapted to the conditions of cultivation (p. 756 and 760).

It must also be noted that plants considered "weeds" by one group may be usefully employed by another. The same argument may be applied to pests or diseases. Insects of the Zonocerus genus of grasshopper are eaten by an ethnic group in Nigeria and only become a "pest" when populations are high and predation severe (Richards 1980). Farmers of Central Kalimantan could recognize both Helminthosporum and Cercospora leaf spot, but did not consider this disease a "pest" in any sense of the word.

320

Schleria pururascens) invade lower ground and a few broadleafs (Ludwigia spp.) inhabit higher land. After the third year, additional grasses (Hymenochne interrupta, Brachyaria mutica) establish themselves while water-loving weeds (Sagittaria spp., Limnocharis flava) begin to inhabit canals built to drain off swamp water. During the fifth to tenth year, plots have been distanced from the forests by continued opening up of new forested area. Soils have become drier and more compacted with drainage, and taller weeds, (Thysanolaena maxima, Pennisetum purpureum) invade. Beyond the third year, grasses are the principle weed species. Changing soil and water conditions, invading "domesticated" weeds and human manipulation all influence this succession.

According to the location of their fields, number of years the field has been opened, and the prevalence and characteristics of certain weeds, farmers cite different weed species as being most problematic.* Density and period of regeneration and presence in particular times during the growing cycle are characteristics that are noted about weed populations. Farmers also observe weed traits that relate to their destructiveness to rice plants, weed difficulty in removal and their means of destruction (see Table 2).

Clearing. All fields must be cleared of weeds each year before planting. In the dry season in younger fields, fern, reed and tree

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*In an initial introductory census of the village, farmers were asked to name the weed that presented the most problems in their rice fields. The great variability in answers was puzzling. Later field observation presented some ideas about weed succession. It was only when the researcher could describe her problem to the farmers that they understood what she needed to know about local weed succession, and weed characteristics. They then clearly and succinctly explained soil, water and plant interrelationships. The problem in this case was not farmers' ignorance but the researcher's own.

seedling regrowth is quick. This is due to moister soils and their increased nutrient supply (through recent burning down of the forest). Slashing and burning are carried out in the end of the dry season to insure a good burn. A parang or long machete-like knife is used. In older fields where grasses predominate and ground is drier, slashing is followed by burning only when the dry season is relatively short, but is carried out in the beginning of the rainy season when the dry season is long. This is done to insure that the peaty top soil does not burn away. In the latter case, slashing is followed by either mulching or burying of weeds in the water in the fields or transporting weeds to the borders of fields.

Farmers do not indiscriminantly burn all weeds or mulch all weeds. They observe that each type of weed has particular characteristics which lend themselves to different methods of disposal. Banta (variously identified as Leersia hexandra and Panicum spp.) can regenerate from their nodes or tiller underground as well as seed. When they do not burn banta, farmers compost the weed by chopping it up (cincang), gather it into large balls (puntal) and submerge these in field water. Balls are turned once after a week and, having rotted, are used as green manure. Other weeds, such as the reed sampahirang (Rhynchospora coryinbosa) are usually burned in piles at field borders or in fields after slashing. This weed burns easily, but is not easily destroyed by mulching.* Kumpai laki (Hymenocline aplexia) has a thick, watery stem. It does not burn or compost easily, and farmers try to bury it when its population is high.

If a field is burned in the dry season, all mature weeds are destroyed

*Sampahirang is also uncomfortable to tread upon if encountered in a rice field, and this is another reason to burn it.

above ground. Farmers try to burn as late in the dry season as possible to minimize weedy regrowth and necessity of reclearing at planting time. However, this is mitigated by a number of factors including length of dry season and the previously mentioned desire to avert uncontrolled fires and retain peaty topsoil. Onset of the wet season and unwillingness to subject planted seedlings to drought, height and density of weeds from the previous season are also factors. Although they practice synchronous harvesting, farmers plant rices at different times. These rices have differing lengths of maturity, ranging from 6 to 10 months on the average.

The farmer may find it necessary to clear land after burning in August or September and again before planting if a shortlived rice which will be planted in December is used. This is done <u>after</u> the onset of the rainy season and <u>directly</u> before final planting of rice in the field. A <u>parang</u> is used in drained areas on higher ground, and a <u>tajak</u> (long sickle-shaped knife with blade perpendicular to shaft) in inundated areas. Farmers prefer using the <u>tajak</u> since its use make it easier and quicker to cut the soft weed stems on a flat plane to soil surface underwater. However, the <u>tajak</u> can only be used in grassy, inundated areas, since dense clumps of reeds or woody species are difficult to remove by this method. In general it is the tool of farmers in flatter 3-5 year fields. Both <u>parang</u> and <u>tajak</u> are used in older (6-10 year) fields.

<u>Planting</u>. As mentioned previously, rices are transplanted from one to three times including final planting. At the time of planting, the immature rice is already from 30 to 50 cm tall. Farmers attribute this practice to the need for tall plants to survive deep water in the fields.*

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*It is interesting to consider farmers' changing perceptions of problems. Flash flooding of 50 cm or more in fields may submerge and kill plants

323

They will add, however, that tall rice plants shade out (melindungi) weeds if you plant them at the correct time. Pons and Wirjahardja (1980:45) note:

> .....especially early emerging weeds should be controlled since they potentially have the most severe effect. Later emerging weeds will only grow slowly since they are very much suppressed by the already established crop and will not exert an influence on crop growth. In fact, one of the reasons for transplanting crop seedlings is to give the crop an advance over weeds.

Choice of the rice variety is also important. Taller varieties of rice (1.5 to 2.0 meters) have good competitive advantage with tall weeds such as reeds or ferns, even if no weeding is done following their planting. Medium-tall varieties of rice (1.25 to 1.50 m) have similarly good advantage, especially with shorter grasses. Not surprisingly, farmers tend to plant tall varieties in younger fields and medium-tall in older. No farmer ever mentioned rice resistance to possible allelopathic effects of weeds (see Pons and Wirjahardja 1980:45-46).

Weeding after planting. Farmers vary in the amount of weeding they do, generally in relation to the age of their field, the amount of family labor they have during the cropping season, the amount of weedy regrowth and its observed effect on the rice plant (see Figure 1).

Areas near the forest have little weed regrowth. Weeds here do not regenerate as quickly as grasses, and dense stands of weeds form only on higher widely dispersed mounds of taller ground. Farmers rarely weed

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during early growth. Waters are considered floods (ba'ah) at 50 cm when they effect/kill young plants, but only deep water (banyu dalam) when they reach 1 meter or more, later in the season, since the traditional varieties have reached full height (to 2 meters).

1-2 year old rice fields. This is primarily because most weed regrowth is sparse and no farmer enjoys laboring in a mushy, peaty field strewn with partially burned logs interspersed with potholes. The environment is just plainly one that discourages the to the farmer unnecessary labor of weeding in these areas.

As woody vegetation settles into the soil, the soil itself compacts, drainage lowers the water level, and grassy weeds concurrently invade. Regrowth of these weeds is denser and crops suffer more loss if they are not weeded. Farmers can minimize this problem without weeding by clearing directly before planting and only final planting taller rice plants. In this case, the 8 to 10 month varieties are used. This is not only because they can stand water levels better, but because they can be transplanted at a later age (4 months or more) and not experience reduction in tillering because of this.

In the cases of newly opened forest land, farmers prefer not to weed. However, they observe the conditions in their field after the rice has been planted for two months. If it appears that weed regrowth is interfering with rice too much; that is, if the rice is being choked by weeds, they will generally complete one weeding. This situation occurs only if the rainy season is light to moderate and weeds compete better under lowered water conditions.

In the oldest rice fields (5 to 10 years) weeding is mandatory to obtain good rice yields. Weeds grow quickly on the better drained soils and invasion is always dense. In these areas farmers may weed once or twice depending on accessibility of family labor and field observation. For farmers who grow rice as the primary crop, and cannot rely on coconut crop production for cash to buy rice, weeding appears to be more intense. Many of these farmers begin to weed after the first month the rice has been final planted, and weed again after the second or third month if they are using higher yielding medium (1.10 - 1.25 m) or medium tall (1.25 - 1.50 m) rice. Other farmers generally weed by or about the second month after planting, and weed once.

Harvesting. Weedy, overgrown fields are difficult to harvest. Harvesting is usually carried out with a hand knife (rangaman), and panicles are hard to cut if they are caught up in weeds. Weeds also make harvesting a very unpleasant job by severely scratching the hands.

RATS

Farmers in the Kalimantan coastal swamplands consider rats the most important and destructive pests of rice. Indeed, rats are one of the most problematic pests in all of Indonesia (Soekarna et al. 1977). The farmers in Central Kalimantan coastal areas recognize two rat types : tikus tungun, the sawah rat, (Rattus argentiventer) and tikus agas, the little rat*.

Tikus tungun, the sawah rat, is large bodied and a pest to farmers through all parts of the cropping cycle. At seeding time, it eats dry seeded rice. After rice is final planted, the rat gnaws stems of young rice plants.

* The taxonomy of this rat is still in dispute. Some scientists think it is the immature offspring of Rattus argentiventer, while others argue it may be of a completely different species (see Wirjosuhardjo 1975), and possibly Rattus exulans a secondary ricefield pest which inhabits lowland shrubby areas adjacent to forest.

When the rice panicle first begins to mature in May and June, the rat population has increased and predates rice on the edge of fields or where wind has lodged rice plants. It can ruin an entire crop.

Tikus agas, or the little rat, is observed to prey on ripened rice panicles beginning in June. This period extends through July, beginning about 2 weeds after harvest has ended. These little rats are also called tikus mariangin because of their tendency to come when the equatorial winds change direction. They enter rice fields in hordes and climb the rice stalk to devour remaining rice grains*.

Rats tend to be a chronic pest. If properly controlled, rat populations do not become so acute that they reduce yields to an unsatisfactory level for the farmer. Farmers notice the fluctuations in rat populations and their distribution in fields (see Figure 1). Burning fields clears out above-ground rat nests and haunts. When farmers first seed rice, there is noticable, though minor predation. Farmers can reduce this predation by

1) seeding rice in small burned-over plots which are somewhat avoided by rats,
2) covering seed holes and seeds with ash or weeds to make their discovery less likely (this is done to avoid bird predation, too),
3) wet-seeding rice to encourage quick sprouting (the sprouted seed is thought to be less appetizing).

When farmers transplant or final plant their seedlings, they sometimes try

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* That this rat may be the immature Rattus argentiventer is also supported by the appearance of the little rat after the major rice harvest in May in Central Kalimantan. In South Kalimantan this rat also appears after the major rice harvest in September (Wirjosuharjo op. cit:3-4). Rochman (1981:4) notes that rat reproductive patterns follow food availability closely. It is not unreasonable to assume that rats which have eaten during harvest time would have lower mortality and be more reproductively fit. Large populations of the immature "tikus agus" would then appear directly after rice harvest.

327

to do so in the deepest water plants can tolerate. The plants are thus clumped in lower lying areas. The researchers feel this may reduce predation by making seedlings more isolated from embankments or higher ground where rats are more likely to run. Farmers themselves state that they may plant a particular variety because its tough hard stem makes it less attractive for rats which attack the plant and eat the pith (umbut) since the stems are more hard (karas). Other rices tiller quickly and have softer stems. Rats prey on these.

Sawah rat populations decrease somewhat in rice fields during the height of the rainy season. This is possibly due to the combined effects of lowered populations through inavailability of food in rice fields and rat migration into forests or coconut groves. In the latter area rats are a pest of coconut and other crops. Weeding also reduces rat predation.

Rat populations in rice fields increase at harvest. The primary means farmers use to prevent rat damage during this time is synchronous harvesting. All farmers try to final plant their rice between December and January. With the correct evaluation of plants' length of maturity, this insures that all rice will be harvested between May and June*. Some uneven maturity is to be expected since rice takes longer to mature in areas of deeper water. This is somewhat compensated for by farmers. They first plant areas of deeper water. These areas occur more often near the forest, but also as irregularities within individual fields. Well drained areas are planted slightly later.

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* Since labor is scarce, all farmers generally cannot harvest all rice within a period shorter than one month.

Farmers recognize that rat populations are generally densest in agricultural plots nearer to the forest or in uncropped secondary regrowth (belukar) (see also Willis 1983). Rats also are slightly more acute in areas bordering newly mounded coconut rows than in central fields. Rice fields furthest away from these areas therefore are generally the least affected. Farmers try to open and plant cut forested areas in farming groups to prevent excessive rat predation in the fields of any one person.

Different rice varieties may withstand rat predation at harvest better than others. Some grain hulls are called 'bitter' (pahit) and are said to be less appetizing to rats. The ability to withstand lodging is also an important factor since rats can 'trample' fields.

Farmers avoid starting new seedling beds for the following season for approximately 2 month after harvest. They do this to avoid tikus agus population which appear at this time. Some farmers measure this period by counting 40 days after the rising of the karentika star, which appears on the horizon about the second week in June.

Farmers are tolerant of low levels of rats. It is assumed this is because of the difficulty to kill and/or control them. When rat problems become acute, farmers try more drastic control methods. At this point these measures are usually too late to have any real effect. Some of these methods are traditional : farmers mash and soak the pulp of sugarcane and spray it on the fields. They may also charcoal bats and distribute the ashes over the field. Other farmers capture rats and leave their tails or other parts of their bodies distributed throughout the field as a "warning" for rats to avoid the area. It is not known how effective these repellents area.

Farmers also use acute poisons. Zinc phosphide is mixed with cooked, unhulled rice, dried and put out as bait. Although the farmer is happy to see dead rats, this method does little to control whole populations. Chronic anticoagulents are not used, although this bait tends to be the mose effective when used properly. Unfortunately it requires cooperative effort and intensive labor (Rochman 1981 :13-17). It is also costly relative to farmer income during this period in the cropping cycle.

During the two years research was carried out in Central Kalimantan, only four farming families in a survey of 60 had such severe rat predation such that much or all of their crop was lost to rats. The most severe predation occured in 1981, when 3 farmers lost their crops : two newly established farming families planted rice too early in the season (earlier than in surrounding fields) and it was ravaged. The third did not have the labor to harvest all rice immediately (the family was not well liked and so had little access to communal labor). In the fourth case (in 1982) the ri matured too late, the plot was at the edge of the forest and rats destroyed it. In all other cases, farmers were able to harvest the majority of their rice (at least 80% of mature grain) without severe predation.

BIRDS

The chestnut-headed Munia, or burung pipit (Lochura malacca jagori) inflicts damage on rice by eating seed at sowing time and at harvest. Farmers observe that birds only forage fields in large flocks in early hours of dawn and for the hour before sunset. Predation is worst near forest and tree groves where birds stay during the day. Farmers combat this predation by constructing bird scarers of cloth, string and sticks above their seed beds and covering seed beds with weeds to camouflage them. During the harvest season farmers may organize into small groups, each of which takes turns guarding the rice fields from birds at sunrise and dusk.

RICE BUGS

The rice bug or hampangau (Leptocorisa spp.) is a chronic and damaging pest of rice in Central Kalimantan coastlands. Farmers use various control methods to keep the insect from severely damaging their crop. They observe that rice bug populations peak in March and the beginning of April* and that these population are denser when the dry season is long prior to the onset of the rainy season. Farmers are aware that both mature and immature rice bugs can suck the milky sap from the unripe rice panicle and that such predation reduces grain yield.

Most farmers burn their weeds. This helps to reduce the alternative host plants of rice during the dry season, eg. grasses and reeds (mainly Panicum spp.). Since rice bugs are densest in March, farmers plant their varieties so that they will not head (maurai) during this time. In this way, the bug population is unable to feed on rice at its milky stage and populations remain at a tolerable level during panicle initiation. Rice bugs are not numerous at the end of the rainy season; that is, at harvest (see Figure 1).

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* During her research, the primary author found it puzzling that farmers could predict times of greatest density with such accuracy. Later research pointed out that, indeed March is a heavy season for rice bug (Kalshoven 1981:106). Control in this period would reduce the May-July second generation and Sept - Oct third generation and thus reduce pest buildup.

Farmers sometimes choose rice varieties which they say resist the bug. In a few 8 month varieties, all rice panicles on the plant mature evenly. Informants point out that because grain hulls all become hard (karas) at the same time it is difficult for the bug to feed for more than a short time. Some rice varieties are also touted as having a very thick hull which is impenetrable by the rice bug.

Farmers maintain that rice bug density is greater with a long dry season. A short dry season finds one rice bug per plant the following March; with a long dry season three rice bugs per plant is common. Large bug populations in a particular location are also evident by their overpowering rancidly sweet smell.

Few farmers can afford chemical pesticides. Those that can spray when rice bugs reach high density as measured by count or smell. They consider the bug as an unavoidable problem (from 10-20% of grain was discolored by rice bug in the 1981 cropping season).

MOLE CRICKET

The mole cricket or sensorok (Gryllotalpidae spp.) is a pest which eats rice roots. Farmers observe that they generally live in moist ground but cannot stand flooded field conditions. They are therefore less severe with the quick onset of the rainy season. In these swampy areas, the mole cricket tends to be a pest of rice in its seedling or transplant beds. Except in the case of an extremely prolonged dry season which reduces water levels to below ground, the cricket is not a pest in the rice in the field except in isolated mounds (see Figure 1).

Farmers alleviate mole cricket predation at the seedling stage in a number of ways :

1) for longer maturing rice, seeds can be planted in wetter areas near the forest and isolated from the previous year's populations.

2) for shorter maturing rice farmers may plant in canal beds which can be flooded if predation is severe,

3) the first seedling stage time (usually from 20-40 days) is minimized, and seedlings are directly transplanted into field standing water,

4) table salt is scattered in seedling beds. Farmers say salt is not liked by the cricket and also that it encourages the growth of the rice seedlings.

CROP VARIETIES AS DYNAMIC TOOLS

As shown in previous examples, farmers commonly recognize and discuss various characteristics of their rice varieties. These varieties are chosen for use in specific locations and specific times. The attributes of a variety and its choice for use are those which reflect water or soil conditions and which make them more resistant or to tolerant pests, weeds or diseases. Biological and physical conditions vary from year to year, within the season, and from plot to plot. Crop varieties must be monitored and adjusted to correspond with these changing conditions.

It is impossible for the Central Kalimantan coastal swamp farmer to make a blanket statement about the best variety he or she can plant*.

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* The researcher has asked farmers for their evaluation of what the best rice variety is in general. Farmers predictably respond by asking which area in the field is in question, what the environmental conditions in the year are, how much labor is available, and what type of rice consistency is preferred, among other things. Clearly their evaluation is dependent on the existing conditions in the environment, and how these conditions vary over time. a rice that does well in one given year may do poorly in the next, and this relates to both social and biophysical conditions.

The farmer is not the perfect judge of what conditions will occur in the context of the cropping season. Neither is he or she a fortune teller. In Central Kalimantan, farmers plant an average of 3 major rice varieties with at least 2 different maturity periods to account for unpredictable factors which might influence rice crop production*. They tend to plant at least 2 varieties in each of their differently located rice field patches.

Rice varieties are chosen in relation to their major characteristics such as deep water tolerance, height△, drought resistance, strong stems, length of maturity period and evenness of maturity. Photoperiod sensitive varieties are used (Vergara 1982). Rice is also grown for characteristics such as aroma and cooking consistency. Each rice type thus has different levels of horizontal resistance which come into play in different environmental contexts (see Table 3) and aesthetic qualities.

The use of a number of varieties increases the total horizontal resistance of the mixed rice crop in the field. Farmers recognize that this increases stability in yields.

An examination of a few varieties of rice and their characteristics will illustrate the complexity of farmer choice and the risks and tradeoffs the farmer must make.

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* Some farmers plant over 20 varieties with 3 different maturity periods. They say they do this to 1) provide sufficient varieties for preservation of differing characteristics, 2) to use if environmental conditions are different in the following year 3) according to task preferences, cooking quality and other variables such as use in traditional ceremonies (see Watson 1983 for further discussions).

△ Height is influenced by water level in fields as well as overall characteristics of plants (see DeDatta and Abilay 19).

Umbang Varieties - Umbang Inai. Umbang varieties of rice are planted in freshwater swamps in minimally tidally influenced areas. They are of medium (110 - 125 cm) to medium tall (125 - 150 cm) stature, and do not bear well when standing water is over 25 cm in fields. They are transplanted only once to these areas and length of maturity is from 5 to 6½ months under these conditions*. The rice is harvested from May to June. Yields are moderate (from 1.5 - 2 t/ha).

Because of their shorter stature and lack of tolerance to deep water, Umbang varieties cannot be planted in areas near forest if the farmer wants high yields. Rather, these plants are more adapted to conditions in the better drained older fields. The variety demands less transplanting labor than taller, deeper water varieties. Their shortness makes it necessary to weed them more often.

Umbang Inai is a delicious, aromatic, moist consistency (medium amylose) rice that is highly prized for its flavour. It is commonly mixed with other rices in cooking and imparts a flavor that can only be described as ethereal. Although many farmers plant this variety for its taste, not all farmers do, and Umbang Inai is not commonly planted in abundance. Farmers may either grown it in a small patch or mix it among other Umbang varieties.

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* The rice is also grown in more upland swampy regions. Here the rice is direct-seeded, and length of maturity is 4-5 months. Growth is slower when rice is transplanted, and deeper water conditions in the coastal area also promote later maturity. Farmers recognize that transplanting prolongs maturity, adapts plants to watery situations, and allows for harvest at a later date.

335

If Umbang Inai is such a prized variety, why is it not grown more often or densely ? Its stems are weak and farmers call its pith "sweet" (umbut manis) and observe that rats as well as humans are attracted to it. Its grains' husks do not harden quickly or mature evenly, making it easy prey for rice bugs. It lodges easily and may rot when winds force panicles into water. It yields less than other Umbang varieties. For these reasons it is either planted in a patch as a rat attractant or among other rices to offset chances of its predation. And why do farmers plant it ? The previous paragraph shows ample reason. These farmers are the most particular connossieurs of taste when discrimination involves their rice varieties.

Intermediate varieties - Layang. Varieties of rice which have a maturation period of from 7 to 8 months are intermediate in age between the Umbang varieties and the longlived 10 month varieties (called banih barat). This intermediate category is sometimes called the Raden or "royalty" group. These types of rice are generally transplanted twice. They are medium tall to tall. Stems are strong. They can be grown in all environments from backwater areas to well drained conditions in drier years but are best adapted to moderate (25 to 50 cm) water levels and fields which are at least 3 years old.

Layang is a particularly favored variety of farmers in Semuda Kecil, Central Kalimantan. They like it because it can be grown with one transplant in older fields, but its maturation may be extended and height increased through two transplants and final planting in deeper areas. It bears well under favorable conditions (to 2.5 t/ha) and has even maturing of panicles. This 1) reduces rice bug predation through time 2) insures complete harvest

336

at one time.* Layang has bitter hulled grains (kulit pahit) which farmers observe are less attractive to rats than other varieties. Over 50% of farmers planted either this or another Raden variety (Kapuas) in their fields. This is important to note since the rice was introduced only 5 years before the survey was taken and indicates widespread and quick adoption by the farmers and a tendency toward opportunism.

The farmer must be careful that the variety is timed to mature at the middle of the harvesting cycle. If it ripens too quickly or too late, rats will attack this crop severly because of its abundance.

Banih Barat - Bayar Varieties. Rice varieties which take the longest time to mature, that is, 9-11 months, are classified as banih barat. These rices require at least two to three transplants, including final planting. They range from 1.5 to 2.0 meters in height, have hard sturdy stems and deep, strong root systems. Since these varieties were originally from tidally influenced areas, they can withstand deep water and do not lodge easily. Farmers plant them near forested areas as an adaptation to deep water conditions (sometimes to 1 meter). The rice bears moderately (1.0-2.0 tons/ha) but this low yield is also due to patchy planting in fields to avoid logs and debris, and the continuously water logged conditions during the rainy season. Within its tidal environment, banih barat can yield 2.5 tons/ha or more.

Field conditions of stagnant or slow flowing acid waters and uneven debris-strewn peaty land make rice agriculture problematic. The Bayar variety which is predominantly grown is the most hardy of the taller rices. Bayar is not an optimal rice in these areas; it is a tidal rice whose virtue of

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*In deeper fields with uneven water levels, individual rice plants may bear unevenly. However, the particular rice plant itself matures evenly.

deep water tolerance allows it to produce tolerable yields. It matures unevenly. It requires many transplants and thus much preliminary labor. Although it has a strong panicle neck, it is prey to forest birds and monkeys. Rat predation occurs. It has a low grain to straw ratio. Bayar is, however, a variety that allows the farmer to carry out rice farming under extremely adverse conditions which he or she must adapt to in bringing new land under cultivation.

Rice cultivation in newly opened areas is a way of changing the environment into better rice fields and eventually coconut groves. Rice farming with its attendant practices of burning, evening land, and digging canals gradually changes forest to fields and fields to groves, stabilizing soils in the process. While the farmer is modifying soil and water conditions it is to his or her benefit to reap rewards of this labor, however slight. Bayar allows for this exploitation.

For the coastal swamp farmers of Central Kalimantan there is no one perfect variety of rice. Environmental and social constraints and opportunities are far too complex for the farmer to make one choice. He or she must make many choices throughout the year, and try to practice an agriculture which corresponds to variable conditions.

Acquisition, trade and discussion of rices. Farmers commonly meet and discuss rice varieties, pest and weed problems and control, and farming practices throughout the rice growing season. They note the advantages and disadvantages of varieties in the short and long term. They trade selected seed of different rices and maintain enough viable seeds of different varieties to adjust planting to the next year's conditions.

Farmers have conversations about rice in their homes and the homes of friends or family. They commonly travel to the homes of their relatives in

338

nearby or distant villages and discuss rice varieties with them. They bring new varieties back from these villages and experiment with them in different locations. Indeed, the way that farmers have been able to adapt rice cultivation to various coastal swamp conditions has been through this exchange of seed and information about its cultivation. Banih barat, from South Kalimantan, has allowed farmers to exploit the tidally influenced areas on the edge of wide rivers and eventually move to deepwater peat areas. Layang is a rice from the swampy interior regions of Kalimantan in the Kapuas/Kahayan River. region. It has allowed for adjustment to moderate depth, slightly tidally influenced areas. Umbang Inai, the most recent addition to the farmers' varietal repertoire, was brought from Central Kalimantan upriver regions where it was grown as a lowland (not swampy) rice. It has become adjusted to the better drained areas.

DISCUSSION

Observations of farmers are related to the fluctuations within the environment and crop variety performance. At minimum, this means observations on relationships between the crop variety and the problem or pest. In a more complicated situation, multiple pests, their effects on and the performance of multiple varieties, and secondary environmental factors are also considered. Appropriate actions toward controlling or monitoring (not necessarily killing) pests to reduce plant predation or changing farming practices or varietal types to control predation of pests may be necessary.

It is not enough to credit these local, indigenous farmers with the ability to carry out "traditions of their ancestors," or to pretend that they are unaware of the reasons for their actions. These farmers consciously and

339

deliberately experiment with new varieties. They control and monitor varieties and pests under changing environmental conditions. They may experience failures. Some farmers may obtain consistently better yields than others. It is not forward to assume that other local, indigenous or "traditional" farmers in other parts of the world are gifted with a similar power to observe, interpret and experiment as these farmers are (Johnson 1980).

TAPPING FARMERS' KNOWLEDGE ABOUT PLANT PROTECTION

CONCLUSIONS

Previous descriptions and references have demonstrated the wealth and range of knowledge farmers use in managing pests, weeds and disease. That farmer information occurs in a contextual framework should be considered at all times. Through a combination of conversations with farmers and observations of their practices and their fields, crop protection experts will be able to design programs which are better fit to the community's abilities and needs.

Farmers can theoretically provide integrated agroecological data on:

1. Time factors: Elaborate cycles of pests, disease and weeds within fluctuating seasonal, annual and longer term periods in time. These include pest population growth and decrease, successional patterns of vegetation, and sporadic or regular disease outbreaks. These situations vary in time and data are often unavailable from government sources.
2. Spatial distribution of pests and other problems throughout various ecological zones. Different niches or patches exist within the physical and biological environment, and include particular crop species. These areas are ecologically different and modify pest and disease prevalence.
3. Crop protection practices. These include both preventative and

curative measures of crop protection to keep problems at a level which is economically tolerable. Particular areas of study include:

a. use of resistant or tolerant crop varieties,

b. varietal mixtures and multicropping to reduce pest/disease damage,

c. methods and timing of agricultural labor and techniques variations,

d. prevention of endemic and epidemic outbreaks of pests, weeds and disease,

e. controls and concerted actions to reduce levels of virulence of problems,

f. cropping alternatives or other social responses in case of widespread pest attack or other inadvertant destruction of crop (eg. levels of response),

g. tolerable economic levels of risk with endemic predation; socio-economic constraints and opportunities related to crop protection.

These methods of crop protection are carried out within a social framework. They vary for individual farmers, farming families, social groups, villages and regions. Farmer knowledge is also dependent on age, sex, education, practical experience and social status. The history of agriculture in an area modifies crop protection adaptions and strategies.

Surveys, questionaires, or interviews must be specifically organized to obtain farmers' knowledge and practice. This calls for a flexible format. Group farmer interviews and on-site observations are suggested for gathering initial information. After an accurate assessment of the variety and range of crop protection methods, questionnaires which reliably and accurately reflect farmer strategies can be designed.

It is hoped that this paper will provide the interest and impetus for future farmer-based research.

342

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342

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Table 1.

PESTS OF RICE

SEMUDA KECIL VILLAGE, CENTRAL KALIMANTAN, INDONESIA

English	Banjarese	Indonesian	Damage Freq.	Damage Sporadic
rice bug	hampangau	walang sangit	slight	heavy
mole cricket	sensorok	gaang, orang-orang	slight	heavy
cutworm	ulat pasak	ulat cokolat-hitam	slight	mod.
armyworm	ulat pasak	ulat tentara	slight	mod.
rice black bug	kukup	kepinding tanah	slight	mod.
mice/rats	tikus tunggun (rats) tikus mari angin	tikus sawah tikus	mod. (after harvest)	heavy moderate
kresek	luwai	kresek	slight	heavy
cercospora leaf spot	daun babintik-bintik	noda daun cerc.	slight	slight
helminthosporum leaf spot	"	penyakit becak-cokolat daun	slight	slight
salinity	banyu asin	salinitas	slight	slight
flooding	banjir/ba'ah	banjir	slight	heavy
drought	kakaringan	kekeringan	moderate	heavy
lodging	banih barabah		moderate or slight	heavy
grasshopper, locust	balalang	belalang	slight	moderate
stemborer	ulang batang	ulat batang	slight	moderate
birds	burung pipit burung betet	- -	slight-mod. slight	severe severe

347

Figure 1. FARMER OBSERVATION OF WEED AND PEST FLUCTUATIONS

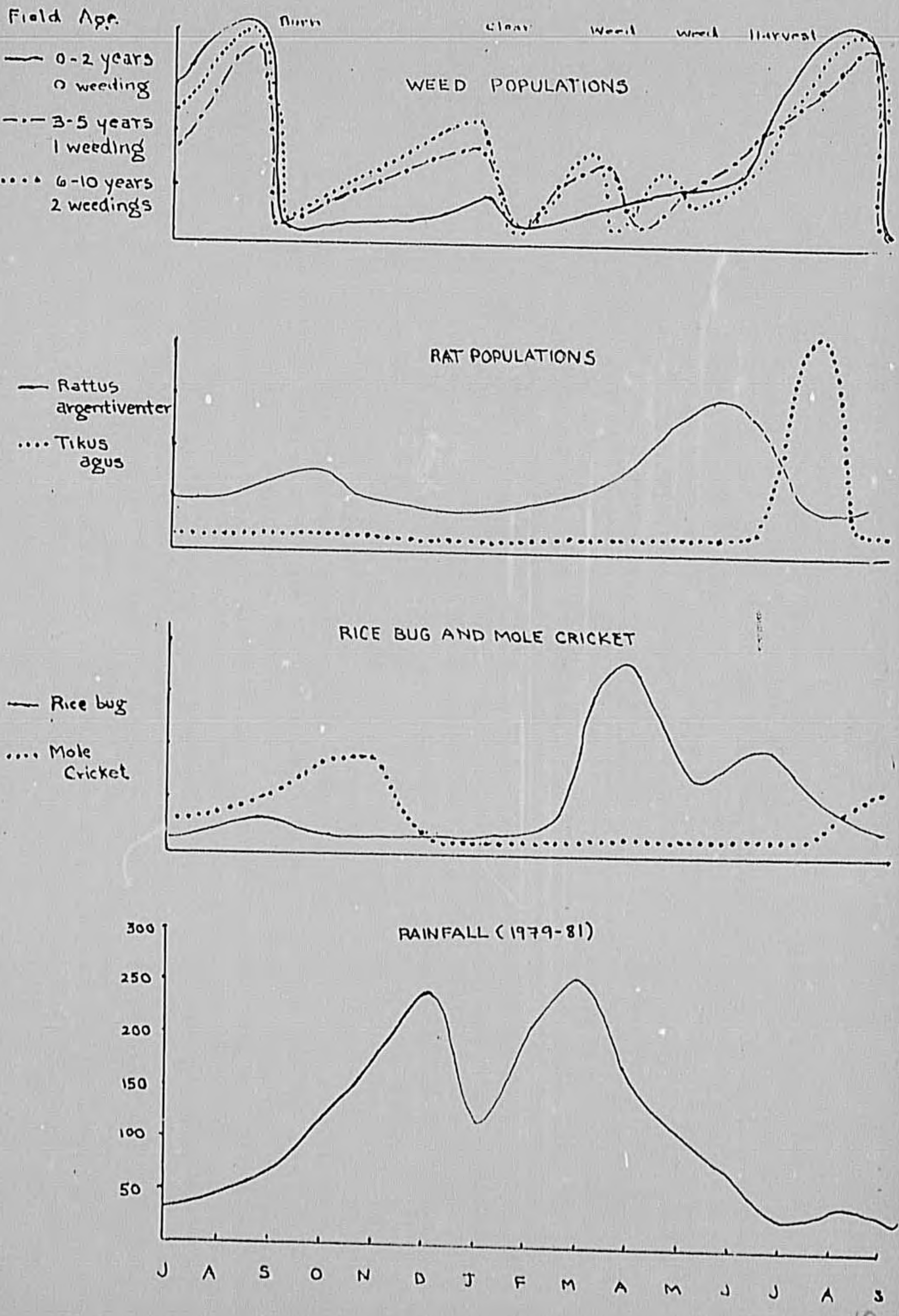

Table 2.

WEEDS AND GENERAL WEED CONTROL METHODS OF FARMERS

Semuda Kecil Village, Central Kalimantan, Indonesia

English Gloss	Local Dialect	Yields Premominant After Clearing Forest	Method of Clearing and Destroving Slash . . . dry season	wet season	Average Frequency of Weeding and Planting	Height of Associated Rice Varieties
sapling/ tree seedling	anak pohon	1-2	burn	remove to side	0	tall (150-200cm)
fern	paku-paku	1-3	burn	remove to side	0-1	tall
ramput pohon	sedge, reed	1-6	burn	remove to side	0-1	tall
rumput/ rumput jalar	grass/ rhizomous grass	3-10	mulch	mulch or bury	1-2	medium tall
rumput badaun	broadleaf	3-10	mulch	mulch or bury	1-2	medium tall

Table 3.

RICE VARIEITES: FARMER SPECIFIED AND OBSERVATIONAL CHARACTERISTICS

Semuda Kecil Village, Central Kalimantan, Indonesia

Rice Group	Rice Variety	Months to Maturity	Height	Usual Transplants	Water Level Tolerance	Age of Field Where Predominant	Outstanding Tolerances or Resistances	Other Positive Qualities
Banih Barat	Bayar	10	150-200cm	2-3	good	1-3	flood, lodging	non-glutinous, rattooning
	Kamuning	"	"	2	"	"	"	"
	Karang Duku	"	"	2-3	"	"	flood, lodging rats	non-glutinous, rattooning, excellent eating quality
Banih Raden	Layang	8	125cm	1-2	moderate	3-10	flood, lodging rice bug, rats	non-glutinous. good eating quality
	Nangka	"	150-175cm	1-3	"	2-5	none	none
	Tempokang Putih	"	125-150cm	1-2	"	3-6	none	good eating quality
Banih Umbang	U. Inai	6	125	1	poor	6-10	none	excellent eating quality
	U. Putih	"	125-150cm	1-2	"	4-8	none	moderate yield (other Umbang varieties have low yield

350

Working Paper 2 Dec. 1983
Conf. Stable Plant Resistance
Group on Environmental Evaluation

Cooperative Efforts Among Farmers, Researchers and Technicians in Environmental Evaluation for Agricultural Development

Agricultural researchers and technicians work to increase and stabilize crop yields and to improve the livelihood of the individual farmer and farming community. Difficulties may however occur on the local level, where breeders, researchers or technicians are unable to adequately monitor and regulate environmental conditions. The social organization of local farming practices and knowledge can provide such information. Local, longterm agriculture has coevolved with specific biological and physical conditions in a particular environment. Farmers have methods and networks of directing and classifying the natural and humanly modified farm environment in time and space. This includes the ecological relationship among people, crops, pests, soils and water. Farmers also organize their crop management in correspondence with political, economic and social parameters which occur in village councils and markets, for example.

Traditional and 'modern', farmers both are indispensible participants and informants for continuing agricultural development.

Traditional farmers can provide breeders, researchers and technicians with fine-tuned environmental information. This includes types and characteristics of individual crops and their performance and the social management necessary to insure reasonable yields. Farmers who have already adopted government-sponsored farming technologies are also valuable contributors. Farmers constitute the ultimate authorities on the stresses that characterize their farms. Their observations and insights are on soil, water, and climatic stresses, pests and diseases. They monitor crop performance. They often have well organized social institutions which can be mobilized to cope with environmental problems.

Researchers ideally produce specific technologies for specific environments. It follows that the farmer is integral to the decisions of the researcher. His or her knowledge of the local situation can result in appropriate technology tailored to combat specific farm problems.

Technicians, breeders, and researchers must take farmer priorities into account, to better address the needs of the farmers in particular environments. These priorities may be necessary to deal with biological or physical factors : resistance to lodging pests and diseases are included in these. Social and economic factors within & without farm management may also dictate priorities. These may include taste and cooking quality, high yields, low fertilizer needs or other management technologies. Farmers must be given information about problems or suseptibilities of varieties, as well as their potential.

We should utilize farmer monitoring and environmental information and evaluation systems more effectively. To do so, we should strive for mutual participation and mutual responsibility in crop development, crop management and monitoring. This requires better information networks from technicians to farmers about crop characteristics and technologies. This will enable farmers to take more responsibility upon themselves for crop production. It also demands improved communication and feedback networks from farmers to technicians about crop performance in specific environments which change throught time.

Mutual responsibility for environmental evaluation and farm management requires mutual participation of farmers and researchers and technicians. Farmers must feel that their priorities and knowledge are considered, valued, and acted upon. In many cases, the technician trained to interview and evaluate farmer knowledge is the ideal conduit between the farm and the research station. The technician moniters and evaluations newly introduced technology and pest and desease in the farm environment and can teach farmers to do so too. This activity provides an early warning system on incipient problems. It alerts both farmer and researcher to specific limitations of technology in particular environments and enhances the indispensible flow of information from farmer to scientist and back to the farm.

The technician can also provide the farmer with more specific and reasonable information concerning crop varieties and their technology. It has been shown that the most important source of information on crop varieties and management techniques for farmers is most likely to be from farmers. Farmers act on their perceptions about varieties and management techniques (such as pesticide spraying). The better the information base the technician provides the more probable that farmer and technician can work together to improve crop yields through environmental knowledge and appropriate practice.

Stable plant resistance can be developed best using an interactive framework which includes the scientist, technician and farmer working together. If early detection and monitoring systems are to function well we need farmer participation, confidence and input. Farmers socio-political organization and economic priorities are as much a part of the environment as biological and physical factors. Farmers require a voice in agricultural decision-making.

Some of the particular areas where farmers and researchers can contribute to knowledge of the agricultural environment are the following :

1. Soils. Farmers classify the potentials and constraints of particular soils for specific crops and varieties, pests and diseases. This includes classification of physical characteristics such as color and consistency, as well as interaction of soils and water. Farmers measure and describe soil characteristics under changing circumstances. Scientists and technicians may use these differentiations _per se_, or may adapt their own soil descriptions to better fit farmer evaluation abilities.

2. Water. Water management for farmers is a social as well as a physical problem. This is evident in the organization and construction of drainage and irrigation networks and their maintainance (the Balinese Subak system is one example). Insurance of water quality and availability is necessary for any crop. Researchers can work to utilize these existing systems and to extend their potential.

3. Climate. In many areas of the world, there are existing bodies of knowledge concerning the relationship between climatic conditions methods of their observation, and suggested farming patterns. One famous example is King Kubuono VII's book on the observation of indicator species in natural phenomenon to regulate crop management

in Java Indonesia. Farmers also note more microenvironmental fluctuations and can be the best source of technician information on this.

4. Biology. In general, farmers have much knowledge of varieties, management, biology and ecology of crops pests and disease. They are able to act effectively on this knowledge in traditional situations. Scientists and technicians have more generalized knowledge of insect behavior and chemical controls. Monitoring and evaluation of farmers can benefit from scientist knowledge and the scientist' from farmer observation practice.

   Indigenous or traditional crop varieties which have resistances or tolerances to specific pests diseases or soil & water environments can improve genetic breeding stock.

   Appropriate control of pests & diseases (including use of pesticides) requires farmers be given adequate information.

5. Economics. Farmers' economic environment extends from the immediate family throught the village, regional, national or international level. this includes the areas of marketting and transportation of goods as well as labor and input costs, riskiness, and stability of yield, and income social costs to the family and community. Post-harvest costs arise. There are therefore internal and microeconomic costs and macro-economic costs. It is therefore important to supply the farmer with technology which is adapted to these costs.

   On the part of government institutions, this includes a holistic framework for new technologies which considers credit, institutions, marketting and transport as well as on farm economic considerations.

6. Socio-cultural. Farmers have values, tastes and preferences for ways to carry out agriculture through individual, group or village organization. Special task forces are commonly set up by local farmers (mutual aid groups are a common example). Rituals can also be important in cropping patterns. Technicians researchers can design farming technologies to fit this social environment and extend its potential. Problems in acceptibility of a crop or management practice are often the result of insufficient farmer information about environment or participation in planning.

7. Political. It is the political will and sensibilities of the government which determine whether integrated pest control and other new farming technologies are carried out smoothly. This includes the cooperation of government officials as well as researchers and farmers. We must go through the correct channels.

This same idea applies in political systems that occur within the village. We can use these political institutions to make things work.

Appendix III.B.18.

Greta A. Watson
BARIF Seminar Series
23 November, 1983

Farmers' Knowledge of Plant Protection : A Theoretical and Practical Framework

Outline Format

I. Introduction

Farmers' methods and knowledge of crop protection can be used to develop more effective and useful agricultural technologies. Farmers' approach to pests, weeds and disease may differ from the institutional researchers'.
In general we can say that :

A. Researchers' approach :

1. Environmental variables are controlled for,
2. Measurements and practices are precise and standardized,
3. Cause and effect model is used,
4. Theory is abstract and generalized,
5. View is to the future,
6. Social factors are not accounted for,

B. Farmers' approach :

1. Environment is variable in time and space,
   a. soil, water and pest problems vary from place to place, and
   b. soil, water and pest problems vary from year to year.
2. Farming practices are flexible and changing.
3. Situational model is used,
4. Ideas and practice are concrete and specific,
5. View is to the present
6. Social factors influence farming decisions,

II. Review of Past Research on Farmers and Crop Protection

A. New agricultural technologies which are not developed with the farmer often fail. To help new cropping patterns succeed :

1. Social factors of farmers' village life must be considered including :

   a. history of farming patterns and pest, weed or disease outbreaks,

356

b. labor availability,
c. costs and benefits,

1) for the specific crop
2) within the whole farm system
3) on shortterm and longterm basis - risks

2. Intervillage marketting and transportation costs must be evaluated.

B. Use of traditional methods for crop protection in modern research include :

1. Multiple cropping

a. reduces pest populations
b. shades out weeds
c. reduces disease incidence
d. evens out and stabilizes yields

2. Use of toxic plants to control pests
3. Synchronous planting
4. Predators for pest control
5. No till planting

C. Researchers have also noted that other farming techniques

1. Can disrupt pest populations and life cycles. These include :

a. shifting cultivation
b. fallow periods
c. burning fields
d. transplanting
e. flooding

2. Certain crop varieties have tolerances or resistances to environmental conditions.

III. Some Examples of Farmer Knowledge in Context : Semuda Kecil village, Central Kalimantan

A. Weeds. Farmer knowledge and practice include :

1. successional patterns of weeds (fern to reed to grass)
2. types of clearing and weeding methods related to

a. weed type, and
b. weed density,

3. use of rice varieties to combat weed problems (tall types),
4. social factors related to weeding (labor availability, expected yields).

B. Rats. Farmers identify :

1. types of rats (Rattus argentiventer, tikus agus),
2. fluctuations in rat populations (seasonal peaks),
3. tolerance of rats
4. methods of rat population control (Synchronous harvest, wet seeding,

5. use of rice varieties which may be resistant and have

   a. thick stems
   b. 'bitter' hulls of rice grains.

C. Birds (burung pipit) have

   1. seasonal and daily cycles of predation (at harvest, during dawn and dusk)

   2. Can be controlled through group farmer organization.

D. Rice Bugs

   1. Bugs peak in population in March and April
   2. Are biologically controlled by farmers through

      a. burning of host weeds,
      b. planting rice to boot after March to avoid predation,
      c. use of evenly maturing rice varieties,
      d. and spraying.

E. Mole Cricket

   1. lives in wet or moist earth environment but cannot stand flooding.
   2. farmers control its predation by

      a. transplanting rice from high to low areas
      b. flooding fields

F. Characteristics of

   Rice varieties

   1. Examples

      a. Umbang Inai
      b. Layang
      c. Bayar

   2. Farmers trade, acquire and discuss rice varieties and their characteristics.

IV. Researchers Can Survey Local Farmers to Obtain Information About :

   A. cycles of pest, weeds and disease
   B. Spatial distribution of pests and other problems
   C. Crop protection practices
   D. Resistant or tolerant crop varieties

V. Conclusion

Rencana Penelitian Bidang Agroekonomi BARIF Banjarmasin

A. Tolok Ukur	Tahun dan Prioritas					
	83/84	84/85	85/86	86/87	87/88	88/89
I. Keragaan agroekonomi lahan lebak, pasang surut dan lahan kering Kalimantan Selatan.						
A. Pola Usahatani						
1. Keadaan Umum - Lingkungan Socio-ekonomi, Biologi, Fisik.	p	L	L/p	p		
2. Ekonomi Sumberdaya			L	p		
a. Optimum peluasan tanah			L	p		
b. Status penguasaan tanah			L	p		
3. Tenaga kerja						
a. Potensi tenaga kerja	x					
b. Distribusi tenaga kerja	x	pk	L	p		
c. Produktivitas tenaga kerja			L/p	L/p		
d. Mobilitas dan Transmigrasi	x		L/p	L/p	L/p	
4. Modal						
a. Kelembagaan (uang tunai, kredit, penyediaan sarana produksi)			p	L		
b. Penawaran dan permintaan sarana produksi			p	L		
c. Ternak				p		
5. Pengelolaan						
a. Intensifikasi & teknik bercocok tanam					pL	pL
b. Pasca panen (prosesing, penyimpanan)	x	pk	p	L	pL	pL
c. Tataniaga			p/L	L	p	p
d. Kelembagaan untuk hasil usahatani					p	L
e. Permintaan dan penawaran komoditi		pk	pL			
f. Hasil sampingan					pL	pL
6. Agribusiness						
B. Non Usahatani						
1. Jenis usaha dan daya substitusi terhadap usahatani					pL	pL
2. Sumber-sumber ekonomi yang tersedia					pL	pL
II. Evaluasi kelayakan teknologi Balittan Banjarmasin		x	x	x	x	x
1. Cost benefit		x	x	x		
2. Efek hambatan alam				x	x	x
3. Distribusi waktu kegiatan			x			
4. Potensi pengembangan				x	x	x

L = Lebak ; p = pasang surut ; k = lahan kering.

359

Rabu Seminar
Des. 1983 - Mar. 1984
Greta A. Watson

Rangkaian Seminar : Pembuatan Artikel-Artikel Untuk Jurnal dan Buletin

Minggu	Tanggal	Judul Seminar
I	7 Des. 1983	Outline Rangkaian Seminar dan Objectif-objectif
II	14 Des. 1983	Pemilihan Jurnal
IIII	21 Des. 1983	Pembuatan Konsep-konsep dan Tujuan Artikel
IV	28 Des. 1983	Menentukan Jabatan Untuk Pengarang Artikel-Artikel dan Kommunikasi Diantara Penulis-Penulis
V	4 Jan. 1984	Tulisan Outline (I) : Menentukan Hal-hal
VI	11 Jan. 1984	Tinjauan Pustaka : Pengumpulan Data-data Yang Diperlukan
VII	18 Jan. 1984	Tulisan Outline (II) : Memasukkan Referensi-referensi dan Organisasi Penelitian
VIII	25 Jan. 1984	Penulisan "Draf" Artikel Pertama Kali, dengan Memakai Peraturan Jurnal dll.
IX	1 Feb. 1984	"Draf" Pertama : Tabel-Tabel, Grafik-Grafik, Bibliografi dll.
XI	8 Feb. 1984	"Draf" Kedua : Perbaikan
XI	15 Feb. 1984	Artikel-Artikel Didiskusikan dan Diselidiki Satu Persatu Oleh Para Pengikut Seminar
XII	22 Feb. 1984	Cara Pengiriman Artikel Kepada Redaksi-Redaksi Jurnalnya.
XIII	22-29 Feb!84	Seminar-seminar Tentang Artikel-Artikel

Seminar Penyelidikan,
Organisasi, dan Penulisan
Artikel Untuk Publikasi
21 Desember, 1983
Greta A. Watson

Pembuatan Fokus dan Konsep untuk Jurnal

Jurnal Yang Dipilih :

bidang atau ilmu yang diteliti :

macam riset yang dilakukan :

inclinasi fikiran (slant of opinion) :

para pendengar :

gaya bahasa :

panjangnya artikel :

model artikel (peraturan para penulis) :

type bibliografi atau pemeriksaan riset lain :

penjelasan lain :

Kalau pengertian semua faktor-faktor tersebut terkumpul, artikel yang ditulis harus menurut bentuk berikut :

Greta A. Watson
1983

Persetujuan Artikel Dengan Publikasi Dalam Jurnal-Jurnal

Kalau pengarang-pengarang ingin melihat artikel-artikel mereka dapat dicetak dalam suatu journal, mereka harus menyesuaikan artikel tersebut dengan peraturan majalah itu. Maksudnya, setiap journal mempunyai permintaan-permintaan sendiri kalau menerima artikel.

Beberapa faktor yang penting adalah :

1. bidang atau ilmu yang diteliti :

   bidang : pertanian, ekonomi, atau lebih khusus

   macam tanaman : padi, kelapa, jagung;

   fokusnya : perkembangan daerah, "prosessing" tanaman pasca panen, perindustrian, dll.

2. macam riset dilakukan :

   riset di lapangan atau laboratorium; peninjauan atau survei riset, teori atau komentar; riset sekondar di perpustakaan, dll.

3. inklinasi fikiran (slant of opinion) :

   pro-melestarikan hutan, pro-perusahaan kayu, anti Marxist, anti-keluarga berencana dll.

4. para pendengar :

   peneliti-peneliti : pegawai-pegawai kantor, konsultan-konsultan, mahasiswa-mahasiswi atau professor-professor di universitas; masyarakat umum/ petani-petani, dll.

5. gaya bahasa : serius, singkat, lucu, berkata akademis, berkata umum, cara surat kabar (newspaper); subyektif, obyektif;

6. panjangnya artikel : panjang, pendek

7. model artikel

8. type bibliografi atau pemeriksaan riset lain.

Jurnal-jurnal atau majalah-majalah bervariasi bagaimana mudahnya artikel-artikel diterima, dan bagaimana cepatnya artikel-artikel dicetak. Kadang-kadang artikel-artikel tidak diterima tanpa nama pengarang atau surat dari professor yang terkenal, atau diterima tapi dua tahun baru dicetak. Lebih mudah dan cepat kalau menulis artikel untuk "news letter" dari pada "buletin", dan "buletin" dari pada "jurnal".

Karena itu, jenisnya jurnal dan bentuk dari artikel harus dipilih dengan penuh perhatian.

Pemberian Judul Artikel

Nama artikel harus singkat dan lengkap. Misalnya :

untuk jurnal pertanian : "Pertanian di Tanah Asam Sulfat di Daerah Pasang Surut"
untuk jurnal tanah : "Tanah Asam Sulfat dan Pertanian di Daerah Pasang Surut"

jauh lebih singkat dan jelas dari pada :

"Status dan Keadaan Tanah Asam Sulfat Mengenai Penggunaan untuk Pertanian di Wilayah Rawa di Daerah Pasang Surut".

Saran-saran

1. Memeriksa penelitian yang sudah dilakukan di BALITTAN atau untuk mencapai Ir. atau Sarjana. Berpikir tentang kemungkinan-kemungkinan untuk publikasi, dan subyek.

2. Memeriksa jurnal-jurnal di perpustakaan. Mencek artikel-artikel lain dalam jurnal-jurnal itu. Subyek anda sesuai atau tidak ? Bisa menurut gaya bahasa dan modelnya artikel-artikelnya atau tidak ?

3. Mencoba memilih nama/judul untuk artikel anda.

Daftar Journal-Journal Mengenai Beberapa Aspek Penelitian Pertanian

Luar Negeri :

- Agricultural Systems
  Australian Journal of Agricultural Research
  Borneo Research Bulletin
- Economic Botany
  Farm Horizons
- Farm Management Notes
- Field Crops Research
- Food Policy
- Horizons (International Development)
  Ilmu Pertanian
- International Rice Commission
- The Journal of Development Studies
- Plant Genetic Resources Newsletter
  Tropical Agriculture

Dalam Negeri :

- Informasi Pertanian
- Pertanian
- Pemberitaan, Lembaga Penelitian Tanaman Industeri
- Prisma
- Biotrop Newsletter
- Buletin Informasi Pertanian
- Bulletin Penelitian Hortikultura
- Hortikultura
- Penelitian Pertanian
- Jurnal Agro Ekonomi
- Indonesian Agricultural Research and Development Journal
  (Jurnal Penelitian dan Pengembangan Pertanian)
- Contributions : CRIA Bogor
- Trubus
- Forum Penelitian Agro Economi.

Dari artikel dalam bahasa
Inggeris oleh J. Bolton
dirobah oleh G A. Watson
AARP-Balittan Banjarmasin 1983

Faktor-faktor yang Menentukan Jabatan untuk Pengarang Artikel-Artikel dan Ucapan Terima Kasih Untuk Mereka Yang Membantu

Untuk setiap peneliti, menentukan siapa yang akan menjadi pengarang-pengarang untuk artikel-artikel sangat penting sekali. Penentuan ini harus dilakukan dengan adil dan baik, karena kalau tidak, akan merusak hubungan kerja diantara teman-teman sekerja. Dalam jaman ini, diseluruh dunia mempunyai peraturan yang hampir sama. Dengan cara ini pengarang-pengarang bisa ditentukan dengan jujur dan benar.

Proses penelitian ilmu pengetahuan, dan pelaksanaan penelitian adalah beberapa bagian penting untuk menentukan jabatan pengarang-pengarang. Bagian-bagian pekerjaan yang menentukan siapa yang akan menjadi pengarang adalah :

1. Hal mula untuk melakukan penelitian dan cara yang asli untuk melakukan penelitian tersebut.

   Teori-teori yang didapat dari percakapan, pertemuan masih boleh dikatakan "teori bebas". Teori-teori atau hal-hal ini bisa dipakai, tetapi kalau teori atau hal ini dianggap unik dan berharga, biasanya kami akan mengakui bahwa teori itu berasal dari orang yang mengeluarkannya atau membicarakannya pertama kali.

2. Ihwal-ihwal tertentu dalam bentuk penelitian, yang memakai cara yang berdasarkan dalam survei buku-buku penelitian terdahulu.

   Pengarang-pengarang atau peneliti-peneliti membuat bentuk penelitian dengan mengambil dari buku-buku yang berhubungan dengan penelitian tersebut. Orang-orang lain bisa memberi nasihat atau kritik-kritik tapi biasanya tidak menjadi pengarang. Kadang-kadang mereka hanya diberikan kata ucapan "terima kasih" saja dalam artikel oleh pengarang.

3. Peraturan penelitian di laboratorium atau di lapangan.

   Yang melakukan penelitian atau mengawasi penelitian tidak langsung menjadi pengarang. Yang penting, sampai dimana orang membantu penelitian tersebut (pembuatan, penerangan, perbaikan, dll).

4. Managemen dan kokumentasi data-data.

   Lihat No. 3

5. Manipulasi, keterangan, dan ikhtisar hasil dari penelitian.

Ini dikerjakan oleh pengarang-pengarang itu sendiri, tetapi mereka bisa juga dapat pertolongan sampingan dari ahli statistik atau ahli lain. Walaupun pertolongan ini sangat penting pada thesis artikel, tapi sangat jarang mereka ini dibuat menjadi pengarang.

6. Tulisan untuk draft pertama

Bagian paling penting. Ini hampir selalu dilakukan oleh pengarang pertama yang sudah tahu aspek-aspek semua dalam data riset dan buku-buku seluruhnya. Biasanya, orang yang pertama kali menulis artikel (draf kasar) akan menjadi pengarang pertama.

7. Pemeriksaan dan perbaikan artikel oleh pengarang-pengarang atau kritik-kritik lain

Pengarang pertama akan memperlihatkan draf kasar kepada pengarang lainnya, dan draf tersebut dapat dirobah dan dikritik. Orang-orang lain di departemen atau kantor juga bisa mengkritik artikel tersebut.

8. Perbaikan terakhir

Biasanya harus menulis artikel sebanyak 3 kali sampai menjadi cukup jelas, teratur dan sesuai dengan semua pikiran pengarang-pengarang. (kadang-kadang 4 atau 5 kali).

9. Pengiriman artikel melalui Direktur atau kepala bagian penelitian.

Artikel-artikel yang dikirim ke jurnal-jurnal harus di sponsori atau diketahui oleh kepala-kepala departemen yang bertanggung jawab terhadap artikel-artikel tersebut. Lebih baik lagi kalau ada 2 penunjang : satu untuk penelitian lapangan, satu lagi untuk penelitian laboratorium. Penunjang ini tidak akan diikutkan menjadi pengarang, kecuali mereka juga ikut dalam bagian 1 - 8.

Sampai bagian 9, sudah jelas siapa yang akan menjadi pengarang pertama atau pengarang senior, siapa yang menjadi penunjang, dan bagaimana membagi pekerjaan :

Pengarang pertama atau senior ialah orang yang :

1. Bertanggung jawab terhadap penelitian yang dilakukan dengan seksama baik di laboratorium, di lapangan, dalam artikel, diskusi, dan kesimpulan.

2. Membalas surat-surat dan kritis penyurat-penyurat.

Kalau masih ada masalah mengenai peraturan pengarang-pengarang, bisa memakai peraturan ABC atau menang dalam undian.

Selau menjadi hal penting sebelum mulai menulis artikel atau buku, untuk mendiskusikan karangan dan pertangung-jawaban. Kalau tidak, bisa terjadi perselisihan-perselisihan, kurang banyak kooperasi atau masalah-masalah lain. Yang paling penting ialah kerja sama dan keadilan.

Daftar Journal-Journal Mengenai Beberapa Aspek Penelitian Pertanian

Dalam Negeri

Informasi Pertanian

Pertanian

Pemberitaan, Lembaga Penelitian Tanaman Industeri

Prisma

Biotrop Newsletter

Buletin Informasi Pertanian

Bulletin Penelitian Hortikultura

Hortikultura

Penelitian Pertanian

Jurnal Agro Ekonomi

Indonesian Agricultural Research and Development Journal
(Jurnal Penelitian dan Pengembangan Pertanian)

Contributions : CRIA Bogor

Trubus

Forum Penelitian Agro Ekonomi.

Tentative List of Articles to Be Written

GAW

Human Ecology of Agriculture in the Tidal Swamps
Women in Rice Farming Systems
Soils, Water and Choice of Cropping Systems in Coastal Swamplands

GAW & WLC

Macroeconomic and Microgeographical Considerations in the Development of the Coastal Swamps

GAW & RI

Agroecosystem Approach : A Framework for Coastal Agricultural Development

GAW & Y.R.

Women in Vegetable and Root Cropping in Coastal Swamp Areas : Prospects for Development

GAW & EP

Labor Use in Rice and Coconut Cultivation in Tidal Swamplands : Implications for Double Cropping

GAW & SS

Agronomic Parameters in the Choice of Varieties of Rice for Tidal Swamps

Individual Seminars

How My Survey / Balittan Trial / etc. Research Gives Me Ideas of Possible Direction for Papers, Further Research.

Survey of Previous Studies in A Particular Field / Pest. Disease / Soil / Land Type

369

Seminar Penyelidikan, Organisasi
dan Penulisan Artikel untuk
Publikasi
21 Desember, 1983
Greta A. Watson

Pembuatan Fokus dan Konsep Artikel Yang Akan Ditulis Untuk Jurnal

Subyek atau penelitian yang akan dipakai untuk menulis artikel (Masalah-masalah lingkungan atau dalam bidang yang bersangkutan) :

Bagaimana subyek atau penelitian ini dapat dihubungkan dengan minat-minat jurnal ? (disebutkan satu-satu) :

Mengapa penelitian ini bisa menarik para redaksi (Misalnya, "pengetahuan tentang padi pasang surut belum diterbitkan walaupun diinginkan oleh mereka", "mereka sangat memperhatikan effek pestisida terhadap lingkungan" dll) :

Perhatikan focus jurnal, apakah judul artikel mengenai subyek tersebut yang paling menarik ? (dicoba lebih dahulu) :

I

II

III

Yang dipilih karena sebab-sebab :

Dengan judul ini, cara penerimaan jurnal, bagaimana subyek atau arah paper bisa dirobah sedikit supaya lebih sesuai ?

Cobalah menjelaskan subyek dengan bentuk tersebut :

Dengan mata subyek itu, kata-kata, teori-teori atau faktor-faktor apakah yang akan sangat penting dalam artikel ?

1.
2.
3.
4.
5.
6.

Kalau artikel ini mengenai penelitian atau pengamatan apakah sudah ada bagian-bagian mengenai :

	Ya	Tidak
Hipotesa	____	____
Metoda	____	____
Analisa	____	____

Seminar Penyelidikan,
Organisasi, dan Penulisan
Artikel Untuk Publicasi - VI
11 Januari, 1984

Seminar Organisasi Perencanaan
Riset - III
22 Desember, 1983
Greta A. Watson

Tinjauan Pustaka : Pengumpulan Data-Data Yang Diperlukan

Agar penelitian kita dapat disesuaikan dengan aliran zaman di universitas-universitas dan institute-institute penelitian lain, maka kita akan tinjau tentang pustaka. Dengan cara ini penelitian kita sudah siap dan tersedia untuk menghadapi masalah-masalah lingkungan pertanian, dan menghargai tujuan-tujuan BARIF dan ilmu kita.

Tetapi tinjauan pustaka tidak bermaksud hanya untuk tinjauan di perpustakaan BARIF saja. Tetapi juga pada pustaka lain, termasuk :

1. Perpustakaan BARIF,
2. Perpustakaan institute dan universitas lain (UNLAM, Balai Proteksi Tanaman Pangan),
3. Perpustakaan Bogor, IRRI, dan lain-lain, atau menerima photo copy, dan buku-buku dari luar,
4. Konferensi-konferensi, pertemuan-pertemuan dan seminar-seminar yang penting,
5. Percakapan dan pertukaran pengetahuan dengan ahli-ahli, peneliti-peneliti dan orang-orang dari disiplin lain secara informal,
6. Peninjauan yang paling baik pada penelitian kita sendiri,
7. Berdirinya dan terpeliharanya metode-metode pengetahuan tersebut.

I. Tinjauan di Perpustakaan.

1. Kartu-kartu referensi di perpustakaan didaftar dengan cara berikut :

   A. Subyek. Subyek biasanya terdaftar secara singkat dan umum.

      1) Dapat mencari buku-buku yang terdaftar yang memakai nomor dan langsung bisa dicari.

      2) Dapat meninjau secara umum nomor-nomor yang dipakai untuk subyek-subyek buku itu. Seterusnya meninjau bagian papan buku tersebut, memeriksa buku-buku dengan subyek sama.

   B. Nama penulis. Akan terpakai kalau kita mencari 1) suatu buku oleh para penulis, lebih baik kita cari dulu nama penulisnya diantara kartu-kartu referensi. 2) Judul-judul atau tulisan-tulisan baru dari seorang penulis yang mana kita sudah tertarik dengan tulisan-tulisannya.

   C. Judul buku-buku, buletin-buletin, jurnal-jurnal, konferensi-konferensi.

   D. Bibliografi-bibliografi, atau buku-buku referensi.

2. Jurnal-jurnal, konferensi-konferensi, bibliografi-bibliografi.

Referensi ini biasanya tertulis secara umum saja, walaupun seringkali berisi dengan ilmu yang bermacam-macam. Kalau kita ingin mencarinya, dapat dengan beberapa cara, yaitu :

A. Artikel Jurnal-jurnal

1. Banyak artikel atau buku berisi referensi di bagian belakang. Maksudnya, kalau seluruh artikel sesuai dengan penelitian anda, biasanya referensi yang terlampir mempunyai hubungan juga.

2. Jurnal-jurnal yang berhubungan dengan penelitian atau ilmu tertentu yang bisa diperiksa sekaligus setiap bulan atau beberapa kali setahun. Dengan cara ini kita tahu penelitian apa yang paling sesuai dengan aliran zaman (up-to-date).

3. Dalam bibliografi terdaftar semua artikel yang dicetak atau diterima dalam waktu tertentu.

   a) Yang terdapat di BARIF :

      Indeks Biologi dan Pertanian Indonesia

      Indonesian Agricultural Bibliografi

   b) Yang terdapat pada Pusat Perpustakaan Biologi dan Pertanian

      Daftar Tesis

      Daftar Majalah

      Daftar Tambahan Majalah Baru

      Daftar Buku-buku Baru

      Bibliografi Khusus, seperti : Tanaman Pekarangan

      Tanah

      Tanaman Talas, Ubi Jalar, Jagung, Pisang

      Komoditi Padi

      Pengawetan Ikan,

      dll.

B. Bibliografi-bibliografi. Semua bibliografi yang terdaftar diatas datang dari Perpustakaan Biologi dan Pertanian Bogor. Setiap buku atau majalah yang didaftar dalam bibliografi-bibliografi bisa dipesan melalui perpustakaan dengan harga Rp 25,- sehalaman dan dengan ditambah ongkos kirim.

C. Buku-buku dan Catatan Konferensi Baru. Setiap minggu BARIF menerima banyak buku dari institut-institut, balai-balai dan kantor-kantor dari dalam negeri dan luar negeri. Kalau kita dengan pemimpin perpustakaan sudah kenal satu sama lain, dia bisa menunjukkan buku-buku atau hasil konferensi yang berhubungan dengan penelitian kita.

D. Artikel-artikel Yang Belum Tercetak. Yang ini bisa diambil dari kantor-kantor atau institut lain. Termasuk :

1. Seminar-seminar
2. draf artikel
3. paper-paper yang diajukan dalam pertemuan
4. komunikasi perorangan (seperti surat-surat)
5. catatan tertulis tersendiri (tentang penelitian, pengamatan, dari seminar atau lain-lain).
6. Laporan lisan

373

E. Konferensi-konferensi. Peneliti-peneliti sangat baik untuk menghadiri konferensi, untuk :

1. mendapatkan pengetahuan yang terbaru dan relevan
2. memberitahukan tentang penelitian apa yang sedang dilaksanakan di BARIF
3. mengevaluasi dan mengeritik paper orang lain pengikut konferensi, termasuk paper yang dibikin sendiri.
4. Mengorganisir atau memperkuat hubungan diantara ahli-ahli dan balai, institut atau kantor-kantor lain.

374

Seminar Penyelidikan,
Organisasi, dan Penulisan
Artikel Untuk Publikasi
4 Januari, 1984
Greta A. Watson

Tulisan Outline (Hal-hal dari Communicating in Technical English : A Hand book for Agricultural Scientists (1979) oleh Barbara Wiggin dan Janice Bernsten. Bogor; AARD : 31-35)

Prinsip-Prinsip Dasar

1. Dari konsep-konsep menulis sesuatu outline sepanjang 1 halaman tentang hal-hal yang terpenting bagi artikel yang akan ditulis. Membagi konsep-konsep dan hasil-hasil dalam bagian tertentu, termasuk 1) pendahuluan 2) bahan-bahan dan metode-metode 3) hasil 4) pembahasan dan 5) penutup.

2. Memperpanjang outline sampai 2-3 halaman. Menjelaskan outline dan hal-hal tersebut dengan perincian-perincian tertentu. Ingatlah : lebih lengkap dan bagus outlinenya, lebih mudah menulis artikel.

3. Menulis outline dengan kalimat yang berdasarkan kepada outline yang kedua.

4. Memasukkan referensi/artikel-artikel yang akan didaftarkan dalam bibliografi disamping kalimat-kalimat dalam outline terakhir.

Contoh Outline Singkat

Bagian-Bagian Artikel Riset;

I. Abstrak
   - A. Tujuan - meringkaskan artikel
   - B. Bagian-bagian
     1. Maksud dan latar belakangnya
     2. Bukti - penelitian dan hasil
     3. Pembahasan/kesimpulan
   - C. Panjangnya - lihat jurnal yang dipilih

II. Pendahuluan
   - A. Tujuan - menarik para pembaca
   - B. Bagian-bagian
     1. Konsep-konsep atau masalah dengan subyek yang umum
     2. Pendapat-pendapat orang lain
     3. Hipotesa
   - C. Panjangnya - satu halaman kalau bisa

III. Bahan-bahan dan Metode-metode
   - A. Segala hal ihwal tentang metodologi
     1. Kutipan-kutipan tentang asal mula metode-metode.
     2. Peraturan metode-metode, satu persatu dari awal sampai selesai p[illegible]ian (secara kronologi).
   - B. Replikasi, Kontrol, dll.

IV. Hasil Penelitian

A. Tabel-tabel, Grafik-grafik dll.

1. Penjelasan maksud
2. Berdiri sendiri dari pembicaraan lain didalam artikel tersebut
3. Menghidari adanya ulangan dalam pembicaraan

B. Sesuai dengan [illegible] hipotesa

V. Pembahasan

A. Maksud, arti dan pengertian hasil penelitian

B. Rekomendasi dan saran-saran untuk riset atau pengembangannya dalam waktu yang akan datang.

VI. Kesimpulan dan Penutup.

<u>Outline yang Berkalimat - Bagian-bagian Artikel Riset</u>

I. Abstrak

A. Abstrak meringkaskan artikel riset.
Abstrak harus dapat dimengerti untuk diri sendiri, agar para pendengar bisa mengerti subyek, riset dan hasilnya sebelum (dan tanpa) membaca artikel.

B. Beberapa bagian-bagian abstrak.

1. Abstrak harus memberi pengetahuan tentang keadaan, pertanyaan atau masalah yang harus diuji, dan mengapa keadaan, pertanyaan atau masalah itu penting.

2. Abstrak mengikhtisarkan metode-metode (tindakan-tindakan) dan bahan-bahan yang terpakai.

3. Abstrak memberi hasil dan pembahasan mengenai penelitian.

II. Pendahuluan

A. Pendahuluan harus menarik para pembaca artikel.

B. Pendahuluan dibagi dalam beberapa bagian.

1. Perdahuluan menjelaskan subyek secara umum dan asal mula subyek itu sangat penting.

2. Pendahuluan memberi pengetahuan dan referensi-referensi orang-orang lain yang bisa dapat dikeritik atau dikembangkan.

3. Pendahuluan menunjukkan hipotesa yang akan diuji.

C. Pendahuluan harus pendek, kira-kira satu halaman yang diketik.

III. Metode-metode dan bahan-bahan

A. Bagian ini memasukkan seluk-beluk mengenai bahan-bahan, teknik-teknik, peraturan penelitian dan keadaan lingkungan.

1. Metode-metode harus memakai referensi.

2. Seluk-beluk dan penelitian seluruhnya harus diatur dengan cara perhitungan waktu (chronological order).

B. Seluk-beluk (details) harus cukup jelas agar para pendengar bisa mengulangi penelitian sendiri kalau mau.

IV. Hasil Penelitian

A. Bagian hasil penelitian memberikan penjelasan pada subyek, masalah dan hipotesa yang didapat dalam pendahuluan.

B. Tabel-tabel dan grafik-grafik yang didapat pada naskah artikel harus dengan penjelasan yang jelas.

1. Tujuannya

a. Tabel-tabel dipakai dengan data tertentu dan tepat diperlukan

b. Grafik-grafik atau gambar-gambar dipakai untuk menjelaskan hubungan-hubungan dan arah penelitian.

2. Tabel-tabel dan grafik-grafik dapat diberi judul-judul yang menjelaskan maksud agar berdiri sendiri dari naskah.

3. Pengetahuan yang sudah jelas dalam tabel-tabel dan grafik-grafik tidak diulangi lagi dalam naskah.

V. Pembahasan

A. Pembahasan adalah pusat artikel dan memberikan arti pada hasil penelitian.

B. Bagian ini bisa juga menunjukkan bagaimana hasil penelitian bisa dipakai dalam rekomendasi-rekomendasi perkembangan pertanian.

C. Diskusi atau pembahasan bisa memberikan saran-saran untuk penelitian yang bisa dilaksanakan dalam waktu yang akan datang.

VI. Kesimpulan

A Good Outline:

Advanced yield trials of promosing rice lines

I. Introduction

A. Rice field area, environment, and varieties which are needed (background)

1. Area & environment

The total rice field area is about 8.2 million ha. Rice grows in extremely diverse environments in Indonesia including tidal swamps, lowland (irrigated), gogorancah (rainfed), upland and high elevation (lowland and upland) conditions.

2. Varieties which are needed

Many high yielding varieties have been released like C4 - 63, PB5, Pelita I-1 but unfortunately they are susceptible to brown planthopper. Now high yielding varieties resistant to brown planthopper are needed.

B. The purpose of the study

Rice breeders try to obtain new varieties which have resistance to brown planthopper and major diseases and which are high yielding by making crosses between resistant varieties and high yielding varieties and then selecting the best.

II. Materials and Methods

1. Location - Sukamandi experimental station
2. Time - Wet season 1976/77
3. 21 treatments (17 promising lines & 4 control varieties)
   a. Promising lines - different origins (8 = IRRI, 6 = Bogor, 3 = Sukamandi)
   b. Control varieties - IR 20, PB 30, PB34, C4 - 63
4. The experimental design used was Randomized Block with 3 replications.
   a. Plot size - 3 x 5 m^2
   b. Plant spacing - 25 x 25 cm^2 (3 plants/hole)
5. Fertilizer level was 120 kg/ha. (N:45 kg/ha, P:5 kg/ha and K:50 kg/ha.)
   a. Nitrogen - three applications (1/3 21 days after transplanting, 2/3 50 days after transplanting)
   b. P + K - one application (one day before transplanting)
6. Insecticide diazon applied 5 times at 10 - day intervals at 1.5 l/ha.

III. Results & Discussion

A. Results
   1. Productive tillers from each line are compared with control varieties
   2. Yields from each line are compared with control varieties
   3. The best lines from three seasons are presented

B. Discussion
   1. The best lines (selected lines) from three seasons will continue to be planted in adaptation trials (outside Sukamandi)
   2. The best lines (selected lines) from one season will continue to be planted in advanced yield trials one or two seasons more
   3. The lines not selected (low yield) will be discarded and replaced with new lines, even though they have resistance to brown planthopper.

IV. References

Source : Student paper (Taryat Tjubaryat)

Kamis Seminar
Des. 1983 - Mar. 1984
Greta A. Watson

Rangkaian Seminar : <u>Pembuatan Rencana Penelitian</u>

Minggu	Tanggal	Judul Seminar
I	8 Des. 1983	Outline Rangkaian Seminar dan Objectif-Objectif
II	15 Des. 1983	Fokus dan Objectif-Objectif Penelitian : A. Tujuan Yang Penting Bagi Disiplin, BARIF Dan Petani B. Ide-Ide Penting dan Latar Belakangnya
III	22 Des. 1983	Tinjauan Pustaka : Pengawasan-pengawasan, metode-metode riset, kesimpulan-kesimpulan, prasarana-prasarana dan saran-saran bagi ahli-ahli lain.
IV	29 Des. 1983	Hipotesa-hipotesa : Cara-cara membuktikan; pemakaian kontrol.
V	5 Jan. 1984	Metodologi I : A. Membatasi riset secara tertentu B. Metodologi pengambilan contoh
VI	12 Jan. 1984	Metodologi
VII	19 Jan. 1984	Metodologi
VIII	26 Jan. 1984	Metodologi
IX	2 Feb. 1984	Analisa : Mencocokkan metode-metode analisa dengan metode-metode pelaksanaan riset.
X	9 Feb. 1984	Analisa : Statistik-statistik
XI	16 Feb. 1984	Pemeriksaan Hasil Riset : Hasil dan Pembahasan
XII	23 Feb. 1984	Perbaikan Penelitian dan Penyelesaian Perencaan Riset. Formulasi bentuk Saran-saran yang akan terjadi dari riset.

Seminar Pembuatan Rencana
Penelitian
15 December, 1983
Greta A. Watson

Menentukan Subyek dan Judul Penelitian

		Diisi oleh peneliti
Bidang	Hama Penyakit	
Macam Riset (Basic/ Applied)	Basic	
Lahan	Pasang Surut	
Daerah	Belandean, KalSel	
Musim	Musim hujan	
Tanaman	1. padi 2. 3.	1. 2. 3.
Faktor-faktor Lingkungan Alam yang Akan Diperhatikan	1. wereng 2. 3.	1. 2. 3.
Faktor-faktor Pengelolaan Yang Akan Diperhatikan	1. pestisida EQ-748 2. waktu penyemprotan 3.	1. 2. 3.
Hubungan antara faktor-faktor tersebut, dan penjelasan singkat tentang penelitian	Efek waktu penyemprotan dengan pestisida EQ-748 terhadap populasi wereng, akibat "hopperburn" dan hasil padi di daerah pasang surut	
5 Kata Paling Penting dalam Subyek ini :	1. padi 2. wereng 3. waktu penyemprotan 4. EQ-748 5. pasang surut	1. 2. 3. 4. 5.

Penjelasan dan Sebab-Sebab Melaksanakan Penelitian Ini :	Populasi wereng bisa dikurangi kalau memakai pestisida. Tapi tergantung umur dan kedesawaan hama waktu disemprot dan dapat dibedakan yang mana yang lebih berkurang hamanya diantara 2 penyemprotan tersebut (sebab mereka bisa bertelur, dll) Kalau terlalu banyak memakai pesticida, bisa mematikan laba-laba yang banyak memakan telur wereng, dan populasi wereng akan naik, tidak turun. Juga tergantung faktor lingkungan lain. Penelitian ini akan dites kalau pada waktu penyemprotan terdapat efek negatif pada hasil padi, terutama di daerah pasang surut. Di daerah ini, lingkungan berawa, dan kita tidak bisa memakai pestisida karena bisa menyebabkan matinya beberapa jenis ikan. Walaupun kita sudah tahu banyak akibatnya kalau memakai pestisida lain terhadap hama wereng di sawah, tapi kita belum tahu akibatnya dengan pestiside EQ-748 ini atau juga di daerah pasang surut.
Judul I	Hama Wereng Serangga Padi: Effek Penyemprotan EQ-748 Mengenai Populasi dan Hasi Padi (Subyek: wereng).
Judul II	Pestisida EQ-748 dan Effeknya Terhadap Wereng dan Hasil Padi (subyek: pestisida)
Judul III	Padi di Daerah Pasang Surut: Hasil dan Effek "Hopperburn' dengan Penyemprotan EQ-748. (subyek : padi)
Nomor yand Dipilih :	III

Seminar Pembuatan Rencana
Penelitian
15 Desember, 1983
Greta A. Watson

Fikiran-Fikiran dan Ide-Ide Tertentu dalam Fokus Penelitian

Masalah apa yang berakibat terhadap lingkungan :

I Jenis Riset ________ "Basic" ________ "Applied".

II Judul "______________________________
______________________________"

III Subyek

A. 5 kata yang paling penting ('Key words') untuk pengertian subyek :

____

____

IV Penjelasan Singkat dan Tertentu Tentang Subyek dan Judul :

V Pengetahuan Latar Belakang Yang Sudah Diperiksa.

		penulis	tahun	judul singkat
teori bidang	1			
	2			
	3			

382

		penulis	tahun	judul singkat
metode	1			
	2			
	3			
daerah	1			
	2			
	3			
tanaman	1			
	2			
	3			
lain (pestisida, pupuk, socio-ekonomi)	1			
	2			
	3			
	4			
	5			

VI Dari Penelitian yang sudah diterbitkan tersebut, kita sudah tahu apa tentang subyek kita (singkat) ?

1

2

3

4

5

6

7

8

9

10

11

12

VII Kira-kira pengetahuan latar belakang apa yang masih harus dicari mengenai subyek :

1

2

3

4

5

VIII Bagaimana penelitian akan kita laksanakan menambah pengetahuan terhadap :

Prioritas Balittan ?

Pengetahuan disiplin/bidang ?

Keperluan petani ? (Misalnya, naiknya hasil tanaman, stabilitas hasil, diversifikasi, intensifikasi, pelestarian, rehabilitasi atau lain-lain) :

Mengapa penelitian ini lebih penting dibanding dengan (pestisida, pupuk, suku, daerah, lingkungan, pengelolaan) yang lain ?

IX Kalau diperkirakan, apakah petani-petani bisa mengangkat hasil penelitian ini dan memakainya di lapangan (extensi harus dibawa) :
_____ ya _____ tidak
Kalau ya, bagaimana ? Kalau tidak, apakah penelitian/percobaan bisa dirobah sedikit supaya sesuai dengan kemampuan petani ? Bagaimana? (mahal, murah, teknologi rendah-sedang-tinggi, dalam musim waktu tidak banyak pekerjaan).

Petani-petani yang bagaimana bisa menerima cara penelitian dengan mudah (tua, muda, laki-laki, wanita, kaya, miskin, dll)?

X Bagaimana penelitian ini akan menjadi dasar untuk penelitian yang akan dilaksanakan dalam tahun-tahun yang akan datang ? (Misalnya, bagaimana penelitian ini cocok dengan Perencanaan 5 Tahun? Bagaimana cepatnya hasil penelitian ini bisa dipakai dalam penelitian lain? dll).

XI Bagaimana arah penelitian masih bisa ditentukan ?

Catatan :

Faktor-faktor apa yang paling penting ('key words' dll), yang

I. Tetap sama dalam penelitian ?

II. Akan berobah dan harus diukur dalam penelitian ?

385

Untuk faktor-faktor yang berobah, kira-kira akan berobah bagaimana? (misalnya, pupuk K akan menaikkan hasil jagung; petani yang punya banyak tanah akan dapat hasil yang paling tinggi per ha, hama wereng akan berpopulasi rendah kalau disemprot pada waktu tempayak besar, dll).

Seminar Pembuatan Rencana Penelitian
15 December, 1983
Greta A. Watson

Konsep Penelitian : Apakah Yang Penting Bagi BARIF, Bidang dan Petani ?

Peneliti-peneliti di Balai Penelitian Tanaman Pangan di Banjarmasin mempunyai tanggung-jawab pada beberapa kelompok, yaitu : BARIF/Balittan, bidang peneliti sendiri, dan petani. Dalam hal ini, dapat kita bagi sebagai berikut :

I. BARIF : Penelitian pertanian mengenai daerah KALSEL dan Indonesia :

A. Mengembangkan nama BARIF dengan melihat hasil penelitian kita.

B. Menambah hasil dan stabilitas hasil tanaman pangan untuk petani-petani perseorangan yang pada umumnya dilaksanakan dengan,

1. intensitas pertanian,
2. diversifikasi pertanian,
3. rehabilitasi lahan pertanian,
4. sustainabilitas (mempertahankan hasil dan lahan selama-lamanya).

II. Bidang

A. Menambah pengetahuan tentang keadaan lingkungan untuk suatu daerah,

B. Menambah pengetahuan tentang metode-metode pelaksanaan penelitian dan metode-metode analisa, teori-teori.

III. Para Petani : Menaikkan hasil tanaman pangan dengan

A. Pengelolaan pertanian

1. input "low-cost" dan efektif
2. yang bisa dilaksanakan oleh setiap petani, atau golongan
3. yang sesuai dengan cara hidup dan pengetahuan, termasuk
   a. tenaga kerja semusim
   b. yang cocok untuk memperluas kemampuan yang ada
   c. yang dapat untung cukup tinggi

B. Bibit yang baru

Ada dua macam riset : "Basic" dan "Applied". Kedua-duanya dilakulah oleh BARIF.

I. Riset "Basic" adalah pelajaran atau penelitian dasar. Semua riset "applied" berdasarkan kepada riset "basic". Riset "basic" dipakai kalau :

A. Penelitian tentang subyek belum pernah dilaksanakan, misalnya,

1. Kalau pesticida baru atau pupuk baru atau pola tanam belum pernah dicoba atau terlihat adanya hasil penelitian, tetapi belum ada yang mencobanya.
2. Kalau keadaan lingkungan (tanah, social, pengairan, pola tanam) belum diperiksa sama sekali.
3. Kalau keadaan lingkungan, tanaman, pola tanam atau bibit padi sudah diamati, tapi belum direplikasi secara ilmiah.

B. Riset "Basic" tidak harus dilaksanakan kalau sudah cukup banyak peneliti yang telah melakukan mengenai hal tersebut, sehingga dapat diperkirakan :

1. Kira-kira berapa banyak pesticida atau pupuk habis dipakai selama melaksanakan riset terdahulu.
2. Keadaan lingkungan, hasil ataulain-lain supaya bisa mulai mengorganisir riset.
3. Kalau keadaan lingkungan apa saja sudah dibandingkan dengan penelitian terdahulu, walaupun belum diterbitkan.

Yang penting bagi riset "basic" bahwa kita tidak membuang waktu, uang dan fikiran dengan melaksanakan penelitian yang sudah dilaksanakan orang atau balai lain. Kalau begini, kita bisa terus-menerus menambah hasil bidang, kita sendiri, BARIF dan petanim secepat-cepatnya.

Riset "Basic" tidak bisa diberikan langsung kepada petani-petani. Kita harus mengembangkan cara-cara, maksud-maksud dan metode-metode dulu supaya penelitian dan percobaan kita bisa ditiru oleh petani-petani mengenai cara melaksanakan Riset "applied" ini.

II. Riset "Applied" adalah riset yang memfokus langsung pada perbaikan hasil tanaman, pengelolaan atau lingkungan (termasuk hama penyakit), pertanian. Kalau hasilnya bagus, pelaksanaan riset ini tergantung dan berdasarkan pada beberapa macam, yaitu :

A. Kalau kita sudah mengetahui semua referensi yang berhubungan dengan subyek, daerah dan bidang kita, memudahkan untuk membuat riset pada petani, teori bidang dan BARIF. Juga jauh lebih mudah menghindari riset yang sudah dilaksanakan, yang tidak cocok dengan daerah atau lingkungan.

1. Penting sekali menggunakan referensi yang memberi pengetahuan terdahulu dan yang baru.
2. Penelitian yang diterbitkan atau ditulis untuk pertemuan. Lokakarya, simposium atau konferensi biasanya dapat diterbitkan dalam kurang lebih satu tahun, artikel jurnal dalam dua tahun dan buku-buku dalam dua sampai tiga tahun. Jadi penerimaan informasi, tergantung pada penerbitan. Pada umumnya, lebih baru, lebih luas.
3. Artikel dalam jurnal atau buku biasanya punya bibliografi lebih luas dan panjang untuk pencarian referensi lain.
4. Artikel yang jadi 'standard'

B. Penelitian yang sudah atau sedang dilaksanakan di BARIF dan balai-balai lain, sangat baik dipakai untuk dasar penelitian kita.

1. Penelitian dasar atau 'basic'
2. Penelitian 'applied' yang menunjukkan arah baru
3. Penelitian yang sedang dilaksanakan.

Untuk penelitian yang belum diterbitkan, disarankan untuk mengunjungi para peneliti untuk mendiskusikan penelitian tersebut.

C. Pengalaman dan saran-saran petani : supaya kita bisa bercocok tanam :

a. tentang lingkungan dari musim ke musim, tahun ke tahun, dll.
   1. fluktuasi dalam kebanyakan hama penyakit
   2. keadaan air dan tanah.
   3. pendapatan, tenaga kerja dan potensi.

b. tentang kemungkinan penerimaan dan hasil metode-metode pertanian baru (kalau peneliti mau berkembang)
   1. faktor-faktor lingkungan, biologi atau fisik yang tidak sesuai dengan cara bercocok tanam, bibit, dll.
   2. masalah-masalah uang, tenaga kerja, atau lain yang sosial.
   3. lain-lain.

2. Jurnal-jurnal, konferensi-konferensi, bibliografi-bibliografi.

Referensi ini biasanya tertulis secara umum saja, walaupun seringkali berisi dengan ilmu yang bermacam-macam. Kalau kita ingin mencarinya, dapat dengan beberapa cara, yaitu :

A. Artikel jurnal-jurnal

1. Banyak artikel atau buku berisi referensi di bagian belakang. Maksudnya, kalau seluruh artikel sesuai dengan penelitian anda, biasanya referensi yang terlampir mempunyai hubungan juga.

2. Jurnal-jurnal yang berhubungan dengan penelitian atau ilmu tertentu yang bisa diperiksa sekaligus setiap bulan atau beberapa kali setahun. Dengan cara ini kita tahu penelitian apa yang paling sesuai dengan aliran zaman (up-to-date).

3. Dalam bibliografi terdaftar semua artikel yang dicetak atau diterima dalam waktu tertentu.

a) Yang terdapat di BARIF :

Indeks Biologi dan Pertanian Indonesia

Indonesian Agricultural Bibliografi

b) Yang terdapat pada Pusat Perpustakaan Biologi dan Pertanian

Daftar Tesis

Daftar Majalah

Daftar Tambahan Majalah Baru

Daftar Buku-buku Baru

Bibliografi Khusus, seperti : Tanaman Pekarangan

Tanah

Tanaman Talas, Ubi Jalar, Jagung, Pisang

Komoditi Padi

Pengawetan Ikan,

dll.

B. Bibliografi-bibliografi. Semua bibliografi yang terdaftar diatas datang dari Perpustakaan Biologi dan Pertanian Bogor. Setiap buku atau majalah yang didaftar dalam bibliografi-bibliografi bisa dipesan melalui perpustakaan dengan harga Rp 25,- sehalaman dan dengan ditambah ongkos kirim.

C. Buku-buku dan Catatan Konferensi Baru. Setiap minggu BARIF menerima banyak buku dari institut-institut, balai-balai dan kantor-kantor dari dalam negeri dan luar negeri. Kalau kita dengan pemimpin perpustakaan sudah kenal satu sama lain, dia bisa menunjukkan buku-buku atau hasil konferensi yang berhubungan dengan penelitian kita.

D. Artikel-artikel Yang Belum Tercetak. Yang ini bisa diambil dari kantor-kantor atau institut lain. Termasuk :

1. Seminar-seminar
2. Draf artikel
3. paper-paper yang diajukan dalam pertemuan
4. komunikasi perorangan (seperti surat-surat)
5. catatan tertulis tersendiri (tentang penelitian, pengamatan, dari seminar atau lain-lain).
6. Laporan lisan

390

Seminar Penyelidikan,
Organisasi, dan Penulisan
Artikel Untuk Publicasi - VI
11 Januari, 1984

Seminar Organisasi Perencanaan
Riset - III
22 Desember, 1983
Greta A. Watson

<u>Tinjauan Pustaka</u> : <u>Pengumpulan Data-Data Yang Diperlukan</u>

I. Agar penelitian kita dapat disesuaikan dengan aliran zaman di universitas-universitas dan institute-institute penelitian lain, maka kita akan tinjau tentang pustaka. Dengan cara ini penelitian kita sudah siap dan tersedia untuk menghadapi masalah-masalah lingkungan pertanian, dan menghargai tujuan-tujuan BARIF dan ilmu kita.

Tetapi tinjauan pustaka tidak bermaksud hanya untuk tinjauan di perpustakaan BARIF saja. Tetapi juga pada pustaka lain, termasuk :

1. Perpustakaan BARIF,
2. Perpustakaan institute dan universitas lain (UNLAM, Balai Proteksi Tanaman Pangan),
3. Perpustakaan Bogor, IRRI, dan lain-lain, atau menerima photo copy, dan buku-buku dari luar,
4. Konferensi-konferensi, pertemuan-pertemuan dan seminar-seminar yang penting,
5. Percakapan dan pertukaran pengetahuan dengan ahli-ahli, peneliti-peneliti dan orang-orang dari disiplin lain secara informal,
6. Peninjauan yang paling baik pada penelitian kita sendiri,
7. Berdirinya dan terpeliharanya metode-metode pengetahuan tersebut.

II. Tinjauan di Perpustakaan.

1. Kartu-kartu referensi di perpustakaan didaftar dengan cara berikut :

   A. Subyek. Subyek biasanya terdaftar secara singkat dan umum.

      1) Dapat mencari buku-buku yang terdaftar yang memakai nomor dan langsung bisa dicari.

      2) Dapat meninjau secara umum nomor-nomor yang dipakai untuk subyek-subyek buku itu. Seterusnya meninjau bagian papan buku tersebut, memeriksa buku-buku dengan subyek sama.

   B. Nama penulis. Akan terpakai kalau kita mencari 1) suatu buku oleh para penulis, lebih baik kita cari dulu nama penulisnya diantara kartu-kartu referensi. 2) Judul-judul atau tulisan-tulisan baru dari seorang penulis yang mana kita sudah tertarik dengan tulisan-tulisannya.

   C. Judul buku-buku, buletin-buletin, jurnal-jurnal, konferensi-konferensi.

   D. Bibliografi-bibliografi, atau buku-buku referensi.

Dengan memakai penelitian tersebut, kita menghindarkan penelitian yang sudah dilaksanakan, yang tidak sesuai dengan keadaan lingkungan, dan yang barangkali belum sesuai dengan cara hidup petani.

E. Konferensi-konferensi. Peneliti-peneliti sangat baik untuk menghadiri konferensi, untuk :

1. mendapatkan pengetahuan yang terbaru dan relevan
2. memberitahukan tentang penelitian apa yang sedang dilaksanakan di BARIF
3. mengevaluasi dan mengeritik paper orang lain pengikut konferensi, termasuk paper yang dibikin sendiri.
4. Mengorganisir atau memperkuat hubungan diantara ahli-ahli dan balai, institut atau kantor-kantor lain.

Seminar Organisasi Perencanaan
Riset - IV
29 Desember, 1983
Greta A. Watson

Cara Menentukan Hipotesa

Judul Penelitian :

Fokus Penelitian :

Teori Umum Penelitian :

Hipotesa-hipotesa Penelitian Kasar. (memakai contoh "kalau...lalu", "sebab....efek", "makin....makin....", dll) :

H_1 :

H_2 :

H_3 :

Dalam Hipotesa-2 ini, manakah yang disebut variabel yang berdiri sendiri (independent variable) ?

VBS_1 :

VBS_2 :

VBS_3 :

Memberi definisi yang lebih terarah dan yang dapat diuji :

VBS	Definisi terarah dan dapat diuji
1.	
2.	
3.	

Dalam Hipotesa-hipotesa ini, yang manakah Variabel terikat (dependent variable) pada VBS?

VG	Definisi terarah dan dapat diuji
1.	
2.	
3.	

Hipotesa yang lebih halus

Cobalah menulis hipotesa menurut contoh VBS VG dalam hipotesa, dan memakai definisi yang lebih terarah :

H_1 :

H_2 :

H_3 :

Apakah	ya	tidak (mohon ditulis kembali)
Hipotesa-hipotesa semua menurut contoh VBS VG?	____	____
VBS dan VG bisa diukur dan diuji/dianalisa?	____	____
Hipotesa-2 apakah yang yang langsung berhubungan dengan subyek, masalah atau pertanyaan yang penting pada vidang, BARIF dan petani?	____	____
Hipotesa-2 bisa diuji supaya kalau tidak ada hubungan diantara VBS dan VG bisa diperiksa dan dilihat benar dan salahnya?	____	____

395

Hipotesa Null

Untuk setiap hipotesa, selalu ada hipotesa 'null'. Hipotesa 'null' menyatakan "tidak ada hubungan diantara VBS dan VG". Tulislah hipotesa-2 null dibawah ini :

H_o (untuk H_1) :

H_o (untuk H_2) :

H_o (untuk H_3) :

Seminar Organisasi Perencanaan
Riset - IV
29 Desember, 1983
Greta A. Watson

Metodologi Penelitian Kwantitatif

1. <u>Menentukan batasan subyek atau masalah</u>

   Meninjau keadaan di lapangan dan mencari penelitian yang sudah dicetak di perpustakaan.
   Memeriksa data-data dari penelitian BARIF yang sudah dilaksanakan.
   Menulis atch percobaan.

2. <u>Menyusun hipotesa-hipotesa</u>

   Menentukan faktor-faktor penting. Membagi variabel-variabel yang berdiri-sendiri (independent) dari variabel-variabel yang tergantung pada hal tersebut (dependent). Menunjukkan cara pemakaian hipotesa-hipotesa dan hubungannya antara kedua macam variabel itu. Jelaskan bagaimana hubungan hipotesa dengan subyek.

3. <u>Membuat rencana penelitian</u>

   Rencana penelitian harus mengukur variabel-variabel dalam hipotesa-2. Rencana penelitian harus memberi data secukupnya sehingga dapat terlihat benar dan salahnya.

4. <u>Melaksanakan penelitian</u>

   Memakai contoh yang pada umumnya mewakili keadaan untuk semua populasi (tanaman, hama, orang, dll). Mengumpulkan data dengan penuh perhatian dan teliti.

5. <u>Menganalisa dengan memakai cara statistik</u>

   Analisa statistik yang dipilih harus sesuai dengan tujuan penelitian. Maksudnya, statistik harus dapat memerikan hasil penelitian variable-variabel supaya hipotesa bisa dipertahankan dan dibenarkan/disalahkan.

6. Menerangkan hasil penelitian.

7. Menunjukkan arti statistik-2 yang dipakai, menerangkan dan mendiskusikannya.

8. Menghubungkan hasil statistik dengan hipotesa-hipotesa dan teori umum.

9. Memberi rekomendasi praktis.

<u>Penelitian Kwantitatif harus</u> ;

1. <u>dapat dipercaya</u> (reliable) - Kalau penelitian yang sama dilaksanakan ulang, hasilnya akan tetap sama atau terdapat perbedaan yang sangat kecil.

2. <u>dapat dibandingkan</u> (comparable) - Penelitian sangat baik untuk dibandingkan dengan penelitian lain.

3. <u>dapat diuji kebenarannya</u> (falsifiable) - Hasil penelitian harus dapat dipertahankan dan dapat dibenarkan hipotesa-hipotesanya.

4. <u>teliti</u> (precise) dan dapat diukur dengan tepat.

5. <u>dapat dianalisa dengan statistik</u> - Agar bisa melihat arti dan hubungan tersebut secara ilmu pasti.

397

Seminar Organisasi Perencanaan
Riset - IV
29 Desember, 1983
Greta A. Watson

Hipotesa-2, Teori-2 dan Variabel-2

I. Teori

Apakah yang disebut teori ?

Teori adalah satu ide atau hal umum, yang tidak dapat diuji atau dianalisa dengan memakai statistik.

Misalnya,

> Semua petani ingin kekayaan

Untuk mendapatkan hasil atau jawabannya dan membenarkan atau menyalahkannya, kita harus bertanya dengan setiap petani di dunia. Lalu kita mencoba menyatakan,

> Semua petani di KalSel ingin kekayaan.

Masalahnya sama. Tetapi bagaimana kita mengetahuinya dengan pasti? Lalu dinyatakan lagi,

> Pada umumnya petani di daerah pasang surut ingin kekayaan.

Tapi, bagaimana cara mengetahuinya? Apa maksud kekayaan?

dinyatakan lagi,

> Petani di daerah pasang surut ingin punya rumah, sepeda motor dan TV.

Teori ini sudah cukup tertentu, tetapi masih tetap teori. Bagaimana kita bisa menentukan supaya terjadi suatu hipotesa?

> Kalau petani ingin kekayaan, lalu mereka akan ingin punya rumah, sepeda motor dan TV.

Kalimat tersebut bisa diperiksa dan diukur. Kalimat diatas berhubungan dengan teori umum. Kalimat memeriksa hubungan diantara keinginan petani dan konsep 'kaya', kalimat itu adalah suatu hipotesa.

Apa sebenarnya hipotesa?

II. Hipotesa dan Variabel

Hipotesa-hipotesa memberi satu cara untuk menguji.

Hipotesa adalah suatu dalil tentang hubungan antara variabel-variabel, faktor-faktor atau kesatuan-kesatuan yang dapat diukur.

Semua penelitian kwantitative yang mengusulkan hubungan diantara faktor-faktor harus memakai hipotesa untuk usul periksa. Sebab itu, hipotesa menjadi 'tulang punggung' penelitian : tanpa hipotesa, penelitian tidak bisa berdiri. Metodologi, analisa dan statistik semua dapat dipakai dan tergantung pada hipotesa yang disusun dengan baik.

A. Sifat-sifat Hipotesa-hipotesa

1. Dua bagian hipotesa, akan memakai model

   Kalau .... jadi ....

   atau

   makin .... lalu makin ....

   atau

   sebab .... effek ....

   atau

   A → B

2. Hipotesa menunjukkan bahwa ada hubungan atau "correlation" tertentu yang tidak random diantara dua atau lebih banyak variabel.

3. Benar-salahnya hipotesa tergantung pada "correlation" sebab dan effek yang berhubungan.

4. Menurut [illegible] hipotesa harus dapat diukur.

B. Sifat sifat Variabel dalam Hipotesa

Dari yang tersebut diatas, berikut hipotesa hanya sebaiknya memilih variabel-variabel, caranya kita dengan mendefinisi variabel dan bagaimana mudahnya variabel di hipotesa [illegible] dapat dianalisa.

Kalau kita tidak memilih hipotesa dan variabel dalam hipotesa dengan tetap, tertentu dan baik, maka metode-metode pelaksanaan dan metode-metode analisa tidak dapat digunakan dengan baik.

Apa yang dinamakan variabel ?

1. Variabel adalah sifat dari barang atau keadaan sesuatu yang berobah-robah. Variabel bervariasi, dan bisa merobah nilainya.

   Misalnya, kalau tingkat socioekonomi, berobah-robah tergantung keluarganya, ini adalah suatu variabel.

   atau, Kalau pemakaian pupuk bervariasi (50 kg/ha, 100 kg/ha, 200 kg/ha.), ini juga dinamakan variabel.

2. Variabel yang berdiri sendiri (Independent variable)

   Variabel yang berdiri sendiri mempunyai sifat "sebab" (cause) dalam hipotesa. (VBS atau IV).

   Misalnya, Kalau/sebab ..... VBS/IV ..... terjadi/effeknya ......
   atau, Makin .... VBS/IV ..... makin ....
   atau, Kalau unsur nitrogen dipakai akan terjadi ....
   atau, Makin banyak pestisida disemprot makin ....
   atau, A(IV/VBS) B

3. Variabel-variabel bergantung kepada variabel lain (dependent variabel)

   Variabel yang bergantung pada variabel lain VG/DV) dapat berubah sifatnya tergantung perobahan dalam variabel yang berdiri sendiri (VBS/IV).

   Misalnya, Kalau ...... terjadi VG
   atau, Makin ...... makin VG
   atau, sebab ...... terjadi para petani akan menanam lebih banyak macam sayur-sayur-an
   atau, Kalau ...... petani-petani akan memakai lenih banyak bertanam padi lokal.
   atau, Kalau ...... lalu bibit padi akan hidup baik, kalau terkena air asin.

Satu variabel yang berdiri sendiri (VBS) dapat mempengaruhi satu, dua atau lebih banyak variabel terikat (VG)

Misalnya, Kalau tingkat ekonomi petani rendah (VBS), para petani akan menanam lebih banyak macam sayur (VG_1) dan pendapatan akan lebih tinggi (VG_2).

Hipotesa ini bisa terjadi, contoh : VBS $VG_1 + VG_2$; tetapi Kalau ingin lebih mengerti,

VBS VG_1 (ekonomi rendah , banyak macam sayur)
VBS VG_2 (ekonomi rendah , pendapatan dari sayur lebih tinggi)

Ini juga bisa dipakai, kalau tidak mau memakai analisa multivariate.

4. Cara membatasi sifat-sifat variabel-variabel dan hipotesa.

   Hipotesa akan menjadi baik, kalau variabel-variabel yang dipakai baik.

Hipotesa-hipotesa tersebut diatas agak kasar sebab variabel-variabel belum mendapatkan cara untuk mengistilahkan atau mengukur.

Misalnya, bagaimana kita bisa mengukur "ekonomi rendah"?

Pertama kita harus menentukan variabel, supaya bisa mengukur.

Contoh :

Subyek : Tanaman Sayur-sayuran Tergantung Ekonomi.

Hipotesa kasar : Kalau tingkat ekonomi petani rendah, para petani akan menanam banyak macam sayur-sayuran.

VBS ∴ VG

VBS = tingkat ekonomi rendah

VG = banyaknya macam sayuran

Definisi-2 :

Apakah yang dinamakan tingkat ekonomi? Bagaimana yang rendah bisa dipisahkan dengan yang tinggi ?

Misalnya :

tingkat ekonomi didapat dari jumlah pendapatan uang keluarga petani dari hasil pertanian, perikanan atau lain-lain dan dari pekerjaan setiap anggota keluarga, sebagai buruh atau pegawai, dll.

tinggi	2	juta	rupiah	setahun
baik	$1\frac{1}{2}$-2	"	"	"
sedang	1-$1\frac{1}{2}$	"	"	"
kurang	$\frac{1}{2}$-1	"	"	"
rendah	$\frac{1}{2}$	"	"	"

Berapakah banyak macam sayur-sayuran?

Misalnya :

Kita tahu pasti berapa banyak sayur yang dihasilkan. Hanya kita akan menentukan dalam hipotesa bahwa petani rendah akan menanam lebih banyak sayur dari petani tinggi.

Berapa populasi petani ?

Misalnya :

Di KalSel di daerah pasang surut.

Hipotesa Diperbaiki :

I. Petani-2 di KalSel yang dapat kurang dari $\frac{1}{2}$ juta rupiah pertahun akan menanam lebih banyak sayur dibandingkan dengan petani dari tingkat ekonomi lain.

II. Lebih rendah tingkat ekonomi petani di tanah pasang surut di KalSel, lebih banyak ditanam sayur-sayur-an.

III. Dll.

Dengan definisi jelas tentang variabel-2, kita bisa mengukur variable dan menguji hipotesa. Hipotesa menjadi lebih tertentu dan lebih jelas maksudnya. Tanpa penjelasan, kita sendiri belum tahu apa yang harus diuji.

C. <u>Hipotesa "Null" (null hypothesis)</u>

Hipotesa null adalah hipotesa yang korelasi hubungan variabel-2 tidak bisa dijelaskan kalau memakai statistik ('no statistical significance') diantara variabel-2 dalam hipotesa. Artinya, tidak ada hubungan tertentu, dan hipotesa kurang cocok dengan keadaan yang ada. Kita memakai hipotesa 'null' sebab kalau kita coba membatasi hipotesa tetapi tidak bisa, berarti hipotesa tidak tahan untuk diuji.

Contoh :

Hipotesa 1 (H_1) = Makin rendah tingkat ekonomi petani di tanah pasang surut di KalSel, makin banyak sayur ditanam.

Hipotesa Null (H_0) = Tidak ada hubungan antara rendahnya tingkat ekonomi petani di daerah pasang surut di KalSel dgn banyaknya banyaknya macam sayuran ditanam.

Kita harus menguji untuk melihat benar-salahnya hipotesa null.

Appendix III.C

Quarterly Activity Report by Dr. Bernardo Gabriel
Entomologist
October 1 - December 31, 1983

A. Activities

a. Trips : Eight trips were made during quarter (see trip report enclosed). The trips were done mostly to start the conduct of crop protection experiments and consequent observation of these experiments. Trips were also made to the Balai Proteksi Tanaman Pangan at Banjarbaru for discussion on crop protection extension activities and to the University of Lambung Mangkurat with crop protection researchers for possible cooperative activities with these institutions.

A trip was also made to the Maros Research Institute for Food Crops at South Sulawesi, to observe and discuss primarily crop protection research and secondarily the RMI Maros administrative operations.

b. Review and Planning of Balittan Research Activities :

A more detailed plan for next year (1984-1985) and a five year plan for crop protection research in the Balittan were discussed with the staff for final implementation. Also assisted in discussing five year plan for Agronomy-physiology research.

c. Insect Collection (Pest and beneficial insects) :

Continued collecting, pinning, and labelling insect pests of crops for reference of Balittan Staff. More thân a hundred species and five hundred individual insects both beneficial and harmful have been collected. More than 70 percent of them were identified up to species. Other arthropoda like mites and spiders are also included in the collection. Mites have been observed to be important pests of crop plants, while spiders are beneficial arthropods in the rice ecosystem.

d. <u>Bibliography in crop protection</u> : Continued compilation in bibliography on crop protection pertinent to our research activities in the Balittan. The bibliography consists essentially of literatures on crop protection research in tidal swamps, related literature of pests also found in swamp areas and crops planted in South Kalimantan and unpublished research reports and Sarjana theses on crop protection found at the University of Lambung Mangkurat. Each title is annotated.

e. Attended all seminars of the Balittan, and continued taking language Lessons in Bahasa Indonesia.

B. Problems and Solutions

a. Lack of research funds and laboratory facilities. Hastening construction of laboratories at Banjarbaru and buying of locally available equipments that are needed should help.

b. Sustaining the research interest of young promising staff, so that they will remain in the Balittan and provide more significant contributions.

Young staff should be given more responsibility. Consultants and older staff try their best to work closely with them.

C. Future Plans

1. Conduct of Research projects in the coming season.
2. Presentation of a series of lectures on pest management.
3. Assist Balittan staff in the publication of research results.

No. : TR-047
To : AARP - GOI Project
From : Dr. Bernardo P. Gabriel
Subject : Trip Report to Lambung Mangkurat University, Banjarbaru
Date : 29 September, 1983

Purpose

To discuss BARIF crop protection research plan with Dr. Ir. G.T. Sarbini Professor and Plant Pathologist Lambung Mangkurat University, Fakultas Pertanian and affeliate staff of the Balittan.

Discussions

A five year research plan in crop protection for the Balittan was presented to Dr. Sarbini for comments and recommendations. Discussions centered on priority areas that the Balittan is able to perform in cooperation cooperation with UnLam staff including thesis students who may want to avoil of Balittan financial as well as logistic research support.

As per observations of Dr. Sarbini there is a growing tendency of using more and more chemical pesticides to control crop pests in Indonesia. According to him this is not ecologically sound in the long run and may result eventually in more serious repercussions. We are in agreement in trying emphasize research along the enhancement of biological controls or other non pesticidal methods.

Detail comments on the crop protection research plan will be forwarded to me later by Dr. Sarbini. Copies of the plan was also presented to other members of the staff of the Crop Protection Department, Fakultas Pertanian, Lambung Mangkurat University.

No. : TR-048
To : AARP - GOI Project
From : Dr. Bernardo P. Gabriel
Subject : Trip Report to Balai Proteksi Tanaman Pangan, Banjarbaru
Date : 25 October, 1983

Parties

Mr. Tomas Gula
Ir. Syaiful Asikin
Mr. Arif Budiman
Dr. Bernardo P. Gabriel

Purpose

To discuss with Balai Proteksi personnels about their activities and recommendations on rat control and insect pests.

Discussions and Recommendations

We were received by the chief of the Balai, Ir. Mad Rais Saubary. He showed us their records of the surveys on the different pests and diseases of crops in Kalimantan by month and year. Among the pests rats were the most destructive. He also went on to explain in detail how the monitoring of the different pests are being done.

A pest observer or scout is assigned 5000 to 10,000 ha. He observes the number of particular pests by means of actual visual counts of pests or their damage in selected sampling area. Then he reports his observation to the Balai Penyuluhan Pertanian (BPP) where the Penyuluh Pertanian Madya (PPM) who analyzes observations and then program the recommendations and relay this to the Penyuluhan Pertanian Lapangan (PPL) (16 persons). The PPL extends the recommendation to key farmer (kontak tani) which in turn extends this further into farmer's group.

405

There are 41 observers in South Kalimantan, 10 in Central Kalimantan, 9 in East Kalimantan and 33 in West Kalimantan.

The Balai personnels demonstrated a technology to the farmer. The farmers buy their on chemical from the PT. Pertanian at a subsidized price. The chemicals or fertilizers are usually bought in bulk through village cooperative unit.

Rats are controlled by using Klerat. But the farmer complained that the Klerat bait usually attacks rice weevil into the field which may attack the grains in field before harvesting. Klerat is sols as prepared bait (chemical mixed with milled rice). Sustained baiting is employed throughout all stages of the rice plants. Baits are placed in various containers such as bamboo, banana sheaths or paper .

Copies of the Balai graphic report on actual hectarage damage by the different pests were give to us and also record of the yield losses of various pests and diseases during the wet season from 1979 to 1981. The head of the Balai also suggested some cooperative work with them whenever and whichever is feasible.

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project :(BARIF)

TRIP REPORT
LAPORAN PERJALANAN

(TR-060)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name Dr. Bernardo P. Gabriel
Nama

Department Crop Protection
Kelompok

Date of Departure 1 November, 1983
Tanggal berangkat

Return 1 November, 1983
Tanggal kembali

Principal Locations Visited Binuang
Tempat-tempat yang dikunjungi

Accompanied by Ir. Mukhlis, Nurlaila, Bsc, Ir. Rosdiah, Ir. Muhrizal.
Pengikut

Purpose of trip
Maksud perjalanan
- Start of crop protection experiment on peanuts.
- Observe alternate hort plants of legumes pest in the vicinaty of experiment station

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Supervise the planting of peanuts for the experiment. Observe a number of plants in the viciniting or possible alternate host of peanut pests specially the peanuts leaf - folder Biloba subsecivella which increases in intensity as the plant grows but which cannot be precisely determine where they stay when peanuts are not available in the field. We also surveyed and collected insect pest and insect predators already present in the station for further study.

407

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project : (BARIF)

TRIP REPORT
LAPORAN PERJALANAN (TR-059)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name / Nama: Dr. Bernardo P. Gabriel

Department / Kelompok: Crop Protection

Date of Departure / Tanggal berangkat: 22 November, 1983

Return / Tanggal kembali: 22 November, 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Handil Manarap

Accompanied by / Pengikut: Ir. Mukhlis, Ir. M. Thamrin, Ir. Syaiful Asyikin, Ir. Arif Budiman.

Purpose of trip / Maksud perjalanan:
1. To examine pest problem on rice seedlings.
2. To recommends changes in crop protection research to circurrent present problems.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Rice seedlings intended for population dynamics study of insect pests on rice were completely devastated by rats. It was suggested to plant again although this is already late and to make comparison on incidence and abundance of insect pests between plants planted late and those planted at regular period in farmer's field or in other experiments.

Rice seedlings from different lines under plant breeding experiment were also initially observed for pest and diseases. Already some line showed some leaf diseases Further observation will be done periodically.

It was also suggested that sustained baiting for rats be continued to lessen further damage in the later stages of rice. Klerat seem to be the most offective rat poison although it does not will rats until 2-3 days as per observation by the station manager.

408

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project :(BARIF)

TRIP REPORT
LAPORAN PERJALANAN

(TR-058)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

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Name / Nama: Dr. Bernardo P. Gabriel

Department / Kelompok: Crop Protection

Date of Departure / Tanggal berangkat: 26 November, 1983

Return / Tanggal kembali: 26 November, 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Binuang

Accompanied by / Pengikut: Ir. Mukhlis, Ir. Thamrin, Ir. Arif Budiman

Purpose of trip / Maksud perjalanan: To observe crop protection experiment on peanuts.

To observe insect pest attacking secondary crops such as corn & cassava.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

The experiment on peanuts showed very poor germination. The planting has to be repeated but this time the viability of the seeds must be tested first before planting. The previous planting will remain as observation plots for pests and diseases.

As of this date of 26 days after seeding the only pest of peanuts observed were aphids and some leaf feeding grasshoppers. On corn there were leaf miner, leaf folder (Hesperiidae). There were apparently no serious damage.

APPENDIX

Banjarmasin Research Institute for Food Crops : (BARIF)
Applied Agricultural Research Project

TRIP REPORT
LAPORAN PERJALANAN

(TR-062)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name / Nama: Dr. Bernardo P. Gabriel

Department / Kelompok: Crop Protection

Date of Departure / Tanggal berangkat: December 1, 1983

Return / Tanggal kembali: December 1, 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: University of Lambung Mangkurat, Banjarbaru.

Accompanied by / Pengikut: Ir. Mukhlis, Ir. M. Thamrin, Ir. A. Budiman, Ir. Syaiful Asikin

Purpose of trip / Maksud perjalanan:

1. To meet the crop protection specialist at the University of Lambung Mangkurat and discuss cooperative research activities with them in crop protection research with the Balittan.
2. To check literature in crop protection at the agriculture library of Lambung Mangkurat University.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Meet Ir. Hanafiah and I. Belantik of discussed at length with Ir. Hanafiah on the possibilities of research in plant diseases. He is interested on the effect of silica on the incidence of rice blast. He said that silica is readily available in lowland rice field but not in upland area where blast usually becomes severe. Other rice diseases been also for possible research area.

The laboratory facilities at UNLAM specially in plant pathology is adequate to carry on simple studies in plant diseases.

We catalogued literature on crop protection at UNLAM specially student theses and faculty research report for our use in the Balittan.

410

APPENDIX

Banjarmasin Research Institute for Food Crops
Applied Agricultural Research Project : (BARIF)

TRIP REPORT
LAPORAN PERJALANAN (TR-069)

This report* must be typed or filled out neatly in longhand for all trips (field trips, meetings, congresses, etc), not exceeding 100-150 words.

Laporan* ini harus diketik atau ditulis tangan dengan rapi dan berlaku untuk semua laporan (perjalanan dinas, rapat, kongres dll.), tidak lebih dari 100-150 kata.

Name / Nama: Dr. Bernardo P. Gabriel
Department / Kelompok: Crop Protection

Date of Departure / Tanggal berangkat: 4 Dec. 1983
Return / Tanggal kembali: 8 Dec. 1983

Principal Locations Visited / Tempat-tempat yang dikunjungi: Maros Research Institute for Food Crops, Sulawesi Selatan.

Accompanied by / Pengikut: None

Purpose of trip / Maksud perjalanan:

1. To observe crop protection research at MORIF and establish cooperative activities between MORIF and BARIF on crop protection.
2. To observe and discuss RMI administration operation at MORIF for possible adaption at BARIF.

Observations (factors requiring action, new items, etc.)
Hasil pengamatan (factor-factor yang memerlukan penanganan, hal-hal baru, dll.)

Dec. 4 arrived at Ujung Pandang and met by Dr. Ignidio T. Corpuz, AARP consultant and Soil Scientist. Dr. Corpuz coordinated my visit at MORIF and was his house guest.

Dec. 5 with Dr. Anwar Risvi, AARP Consultant and Plant Pathologist. Dr. Rizvi first introduce me to the crop protection staff and some administrative officials at MORIF. He then showed and discussed various technique for screening of resistant varieties to a some important diseases of rice and peanut. These included screening for rice on blast, tungro, bacterial leaf streak and legume on mottle virus. The techniques appear simple and reliable. Dr. Rizvi and his Indonesian counterpart expects to visit us at BARIF in February for a continuing dialogue of our cooperative activities.

Dec. 6 with MORIF entomologists, Ir. Shagir Sama and later Ir. Mamet Slamet. Ir. Sama discussed his method of planting rice at the right time to avoid insect pest infestation. (cont......)

411

(TR-069)

He also showed the different colonies of green leafhopper reared on different rice varieties. Each colony is adapted only to a certain rice variety and not to others. In practical application for green leafhopper control one rotates the planting of these different varieties at different times to prevent excessive build-up of a certain green leafhopper colony.

Dec. 7 with Dr. Fritz Fleckenstein in his home. He showed the use of his personel computer. We also discussed RMI operation at MORIF and the computerized accounting and monthly reporting of RMI personel activities. He also gave some literatures in Agroeconomics for use at BARIF.

Dec. 8 field trips to Bontobili Experiment Station with Mr. Slamet (this is a well managed station about 1 hour drive from Ujung Pandang. It is planted to upland rice and secondary crops. Here we observe ecological studies on insect pests and diseases when such as rice, corn, soybeans are planted throughout the season at intervals ranging from one month to 10 days, Pests are monitored throughout this experimental period.

412

Appendix III.D

Quarterly Activity Report by Thomas Gula
October 1 - December 31, 1983

A. Activities

1. Consultations

26 Sept - 1 Oct	Mr. Boedi, Museum Zoologi, Bogor (rodent taxonomist). Reviewed rodent specimens from South Kalimantan.
1 October	Dr. Dandi Soekarna, LP3, Bogor. Discussed possibilities for rodent research in South Kalimantan, a received 24 snap-traps from Balittan Bogor.
25 October	Ir. Mad Rais Saubary, head of crop protection Balai, Banjarbaru. Discussed recommendations on rat control.

2. Trips

26 Sept - 1 Oct.	Bogor
25 October	Banjarbaru, Crop Protection Institute
25 - 26 October	Handil Manarap Research Station
29 - 30 October	Handil Manarap Research Station
21 - 22 November	Tilang, Sungai Buluh and Alabio
14 - 16 December	Barambai Research Station

3. Collection and Preparation of Rat Specimens :

Purchased materials needed to prepare rodent specimens; and constructed a drying chamber in Balittan laboratory. During field trips to Handil Manarap, Tilang and Barambai used snap-trap and live traps (5 purchased in local market) to collect rats. Of the approximately 20 specimens collected so far, there seem to be 2 predominant padi rats, *Rattus argentiventer* (The Sawah rat) and *Rattus exulans* (The Polynesian rat). More collections are needed to verify the status of *R. exulans*.

4. <u>Bibliography in rodent control*</u>

Continued to compile articles on rodent control at the Balittan, including a large group of publications received from the Crop Protection Center in the Philippines and Dr. B.J. Wood in Malaysia.

The articles are particularly valuable in detailing methods of studying rat populations and rodent control techniques, especially in Malaysia and the Philippines.

B. Future Plans

1. Continue to collect rodent specimens in various localities around South Kalimantan.
2. Instruct members of Balittan crop protection staff in methods of collecting and studying rodents. Pak Thamrin plans to study the rat problem next year in Sungai Buluh, and lacks any experience in this area.
3. Look at ways of estimating rodent abundance in fields, and methods of estimating percent of crop damage caused by rodents.

C. Problems and Solutions

1. Lack of research funds, especially more traps and other equipment needed to study rodent populations in the field, and for the purchase of rodenticides and bait needed to study control methods.
2. A need to interest members of the Balittan staff in studying the rodent problems, and of the need for these staff members to be devoted to field work. It appears that one or two of the new staff members are interested in studying rodents. It is hoped that in the future someone from the Balittan would be able to receive training at the Rodent Research Center in the Philippines.
3. Cooperation between Balittan Banjarmasin and other Indonesian research institutes (Balittan Bogor) is very important.

* Preliminary Bibligraphy included.

Preliminary Bibliography

on

Rat Control in the Tropics

by

Tom Gula

Ecologist/Zoologist

Volunteer, AARP - BARIF Project

Banjarmasin, Kalimantan Selatan

December, 1983

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4) compare chemical vs. mechanical control
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Appendix IV.

QUARTERLY REPORT

1 OCTOBER - 31 DECEMBER 1983

W.E. VANSTONE

GONDOL

GENERAL

A. HOUSING

Construction of our house in Gondol started on 10 October and my wife and I moved into the almost completed house on 28 November. Since then tail ends of construction have been completed, landscaping started, correction of a few errors in construction undertaken, and furnishing almost completed. Total construction and furnishing costs to end of December of the 8 x 10 m house and development of the 26 x 28 m grounds was Rp. 9,702,410,-.

B. PROBLEMS

1. Budget

From what I can asertain Rp. 50 - 60.000.000 was allocated as operational budget for Gondol for fiscal 1983/84 but most, if not all, of these monies were used prior to September 1983. At present Mr. Alie Purnomo is attempting to obtain a minimum operational budget for this station to carry us through to April or June of 1984.

2. Administration

Mr. Achmad Sarnita has been head of this station

423

for the past couple of years. For the past 6 months to 1 year he has been preparing to go on a 4 year study leave to university of Waterloo. During the last week of September Mr. Tadjuddin Daulay was transfered to Gondol and he was made acting station head in mid October. The fisheries section of AARD is being reorganized (mid December) and the Gondol station will come under the new Coastal Fisheries section. At time of writting this report (8 January) I have not been informed of the organization of the new Coastal Fisheries section or whether or not it has been finalized. Until I hear otherwise I assume that Mr. Achmad is station head of Gondol and that when Mr. Achmad is not present at Gondol that Mr. Tadjuddin is acting station head. Since I arrived on Bali 24 September Mr. Achmad has been here at Gondol for 1 day (5 December to be present for the laying of the comes stone for the new laboratory complex) and Mr. Tadjuddin has been commuting between Bogor/ Jakarta; Jepara; Gondol attempting to get the experiment underway and transfer equipment from Bogor and Ancol and to obtain operatinal monies. It will be most helpful when the Fisheries reorganization is completed and a resident, full time station head appointed for Gondol.

3. Vehicles

The red Jeep belonging to BBAP which was transferred from Bogor to Gondol was not operational during October/ November due to lack of budget to replace the battery and service the electrical system. Mr. Tadjuddin arrived 28 November with some monies and had it fixed Mr. Achmad used it 5 December and it broke down again. For lack of budget it has been sitting in a service station in Singaraja since that time.

The RMI Jeep is still running but it needs a tune up which I will have done in Denpasar while in route to Jepara in mid January.

As you already know these jeeps are not ideal for this type of project. They are expensive to operate and maintain, they leak badly everytime it rainsand they have no carrying capacity.

4. Electrical power

We are operating on a small diesel powered generator with a smaller gas powered generator as standby. Luckily we have had only minor breakdowns to date. A mechanic/ generator operator was supposed to be transfered from Ancol to Gondol mid October but he has not arrived as yet. Due to lack of budget I have been paying, from my own monies for fuel for the 2 generators (and minor maintenance) since 29 December. I expect to be reimbursed when Mr. Tadjuddin arrives from Jakarta in the next week or so with some budget monies.

425

EXPERIMENTAL

I. FINFISHES

A. MILKFISH

1. Gondol

In 1981 milkfish fry were stocked in 2 - 1 Hectare ponds rented from a private entrepreneur at the pond site about 15 km west of Gondol. These fish were intended as potential broodstock for Gondol once it became operational. On 30 November we went to the ponds to collect the fish and transfer them to the temporary fish shed errected at Gondol. Between 10.00 and 12.30 hours we drained the pounds and collected a dozen or so miserably thin small milkfish that were certainly not 2½ years old. It was stated that predation in the pounds was bad. "probably two legged predetors". Upon transfer to Gondol all but one of the fish died in the too small tanks that were available for them.

2. Jepara

Experiments designed to determine the effects of diet on sexual maturation of milkfish were initiated at Jepara (See attached Appendix A and B). It is to be hoped that these relatively old pond cultured fish were not stunted so much during their rearing that they will not mature.

B. RUNAH

On five occasion we have collected sexually mature

426

small fish that locally are called runah putih or just runah. Evidently a second type of runah, "runah trancan" is also present in Gondol waters. Runah putih appears similar to the guno from Filipino waters which is one of the silversides in English or Preneus pingis.

I was most interested in obtaining this fish for if it is the same as, or similar to, guno it is very easy to spawn and there is no problem in rearing the larvae. In fact it spawns throughout the year and I have used it in the past to train all new staff on : capture and handling of sexually mature fish; spawning; embryonc development; hatching; and larval rearing. It is a small easy to handle fish that usually spawns naturally in the evening of the day of capture and the eggs take approximately 30 hours to hatching.

We obtained: 30 runah on 3 December; 20 on 4 December; 70 on 8 December; 100 on 18 December; and 100 on 24 December. The fish were placed in spawning tanks 100 x 50 x 50 cm containing about 40 cm sea water and branches of artificial sea weed which I had had prepared from polyprorope, for the eggs to adhere to.

Catch at between 18.00 - 20.00 3 December - due to poor handling on the boat all but 6 dried during the might of 3/4.

Catch at 09.30 4 December were added to the 6 survivors of the 3 December catch. There was no spawning up to 09 00 12 December.

Catch at 08.00 8 December placed in 3 spawning tanks at densities of : 20; 20; and 30 fish/tank. Spawning occurred in 1 tank of 20 fish during night of 9/10 December but there

427

was no visible embryonic development or hatching by 09.00 12 December at which time 4 runah from the tank in which spawning had occured were presenved in 4% formalin for future identfication and the remainder, together with the fish of 3 and 4 December used as fish feed for other fishes.

Catch at 10 00 18 December were placed in 4 spawning tanks at a density of 25 fish/tank. Spawning occured in 3 of the tanks during night of 19/20 but again no embryonic development or hatching up to 08.00 22 December. Experiment terminated and the fish used as fish feed.

Catch at 0900 24 December were placed in 4 spawning tanks at a density of 25 fish/tank. Spawning occured during night of 25/26 in all 4 tanks. No embryonic development or hatching up to 28 December. Fifty of these fish are being retained to determine whether rematuration occurs.

Something is wrong but I haven't gotten to the bottom of it as yet. Either there is no fertilization or there is bad water management and the eggs killed during early embryology.

C. SADAR-SIGANIDS OR RABBIT FISHES

1. Jepara

Initiatal discussion were held to determine the possibility of starting experiments in Jepara to spawn and rear the larvae of : siganinds javis, S. canaliculatus; and S. verniculatus; (See attached appendix 3).

2. Gondol

From discussion with local fisherman we have learned that there are 4 group of rabbit fisher or sadar as they

are called here available from Gondol waters.
The 14 groups can be subsdivided into various types or species but the fishermen, although they know they exist, don't have local names for each type. They are :

SADAR BIASA OR PUTIH

TYPES 1

2

SADAR BULAK MATA

TYPES 1

2

SADAR BERONANG

TYPES 1

2

SADAR KUNING

TYPES 1

2

3

4

The fishermen are still discussing among themselves whether or not there are 1 or 2 types of biasa and 3 or 4 types of Kuning . All agree that are at least 8 types of sadar.

We have been collecting these fishes as broodstock with expected spawning in March or April and to date (8 January) have obtained:

Group	Type	Number
Biasa	1	13
	2	0
Bulak mata	1	3
	2	0
Beronang	1	2
	2	1
Kuning	1	27
	2	2
	3	1
	4	0

II. CRUSTACEANS

A. PRAWNS

On 28 November Mr. Tadjuddin and Mr. Karta arrived from Jakarta with about 20 adult prawns which appeared to be in excellent condition. These animals had been reared at Ancol. It had been a 36 hour trip by truck and a number of prawns had died in route. On 6 or 7 December the prawns were sexed and each sex placed in separate tanks. The following morning all females had died for some unknown reason.

B. ARTEMIA

Experiments have just commenced on the rearing of artemia under various experimental conditions.

III. PLANKTON

Plankton culture as feeds for larval fishes and crustaceans has been initiated and a plankton culture expert is being transfered from Ancol.

APPENDIX A

TRIP REPORT

BOGOR/JAKARTA/JEPARA

15 - 27 OCTOBER 1983

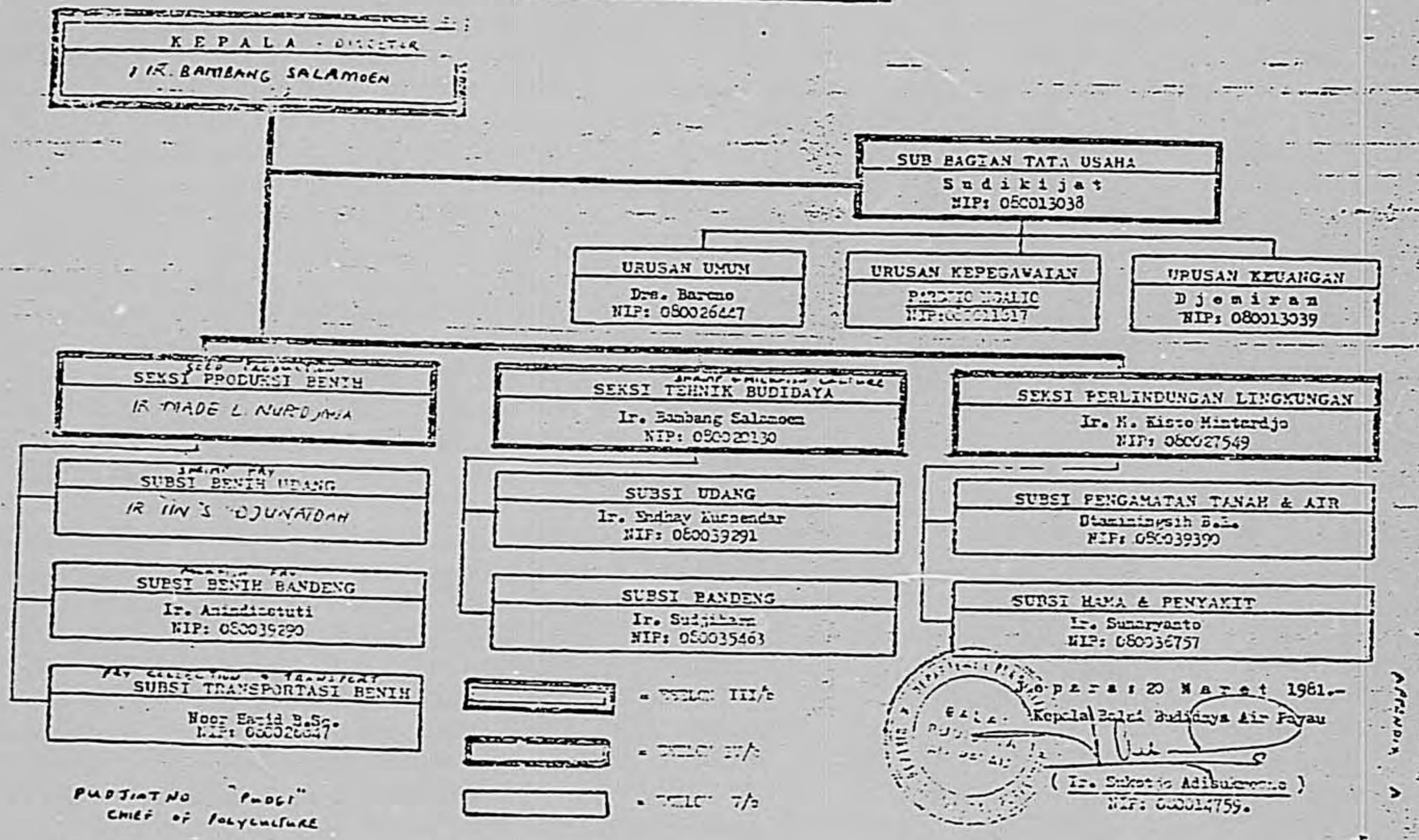
W.E. VANSTONE

GONDOL

ITINERARY

15	16.00 - 18.00	Lovina Beach to Denpasar by jeep . Booked into YASA SAMUDA BUNGALOWS
17	12.30 - 14.00	Denpasar to Jakarta GA 663
	14.00 - 15.00	Jakarta to Bogor by RMI Jeep
18		Bogor - RMI and BPPD
19		Jakarta - RMI
20		Jakarta - RMI
21		Bogor - BPPD
22		Bogor - BPPD
24	06.00 - 11.30	Bogor to Jakarta by Jeep; Jakarta to Semarang (GA 414); Semarang to Jepara by Balai Budidaya Air Payau (BBAP) station wagon accompanied by Dr. Chhorn Lim and Mr. Tadjuddin.
	14.00 - 19.00	Discussion with staff of BBAP (see attach organization chart) and examination of milkfish being held in one of their tanks.
25	08.00 - 12.30	Jepara to Pati and return for discussion with Mr. Sudjoko the district fisheries officer

STRUKTUR ORGANISASI BALAI BUDIDAYA
AIR PAYAU JEPARA



Jepara: 20 Maret 1981.-
Kepala Balai Budidaya Air Payau

(Ir. Sukotjo Adisukresno)
NIP: 080014759.

APPENDIX A

4

433

	15.00 - 19.00	Discussion with BBAP staff member
26	06.30 - 09.30	Jepara to Semarang by station wagon; Semarang to Surabaya by GA 300
	13.30 - 14.15	Surabaya to Denpasar and booked into Hotel Denpasar.
27	12.00 - 14.30	Denpasar to Lovina Beach by jeep.

The fisheries station at Jepara was designed and constructed in the early 1970's for research on fry production and pond culture of milkfish and prawns. It was originally under BPPD with Mr. Alie Poernomo as its director until mid 1978.

During 1974 and again at a later date (which Mr. Made L. Nurdjana will furnish) milkfish fry from the ocean were stocked in two - 1 hectare pounds. There is a connecting channel between the 2 ponds and water depth varies between 40 and 60 cm depending on height of the tides. Each pound measures 50 x 200 meters.

The pounds are dried every 6 months and fertilized with organic fertilizer at a rate of 1 tonne/hectare. The ponds are also fertilized monthly with: urea at 50 kg/hectare; and super phosphate at 50 kg/hectare. Salinity in the pounds ranges from 5 ‰ during the rainy season to 35 - 40‰ and higher during the dry season. It is estimated that there was 200 fish in the ponds system on 7 October 1983.

The fish in the ponds were normally fed artificial feeds daily but due to financial restraints they relied on natural feed in the pounds during 1982.

On 8 October 1983, 38 fish were tranfered from the pond system to a 10 x 20 x 2 m deep tank containing water at a depth of 1.85 m. Salinities in the pounds and the tanks at that time were 3‰ No fish died during transfer from the ponds to the tank and only 2 fish died in the tank between 8 and 24 October.

One third of the volume of water in the tank was exchanged daily and begining 9 October the fish in the tank were fed an artificial diet (pellets, with protein content of 36.5% and moisture 5 - 10%) at a daily rate of 5% body weight on the assumption that each fish weighed 3 kg.

On 24 October we anaesthetized (with Benzocaine) and examined 6 fish from the tank and killed 2 females for disection with the following results :

Fish	Sex	Total Weight	Fork Length cm	$\frac{W(g)}{(FL cm)^3} \times 100$	Gonad Weight (g)	Maturation
1	?	2500	56	1.42		Immature
2	?	2280	55	1.37		- " -
3	F	2400	58	1.23	5.4	Developing
4	?		52.5			Immature
5	?		54			Immature
6	F	1700	54.5	1.05	2.9	Developing

On 25 October we proposed to the Jepara staff, and in particular Mrs. Anindiastuti and Mr. Pujiatno . who will be working with us, that we return 14 November and start an experiment to try and determine the effect of diet on sexual maturation of these relatively old milkfish. In the meantime they will transfer 57-67 more fish from the pond system to the 10 x 20 m tank and commence feeding them their regular artificial diet at

435

a rate of 3% body weight based on an average weight of 2 kg.

On 14 November we will examine the fish and then divide the balance of itemsequally into 3 tanks. Each group will be fed one of the following diets :

1. Pellets
2. Trash fish @ Rp. 200 - 300/kg
3. Pellets + tash fish

We plan to return to Jepara at 2 - 3 month intervals to examine the fish and their state of sexual development.

APPENDIX B

TRIP REPORT

JEPARA 12 - 19 NOVEMBER 1983

W. E. VANSTONE

GONDOL

ITINERARY

12	09.00 - 12.00	Lovina Beach to Denpasar in Gondol Jeep. Tried to obtain Garuda flight to Surabaya/ Semarang but flight fully booked till PM 13 November. Obtained Merpati flight 341 for AM 13 November. Booked into YASA SAMUDRA BUNGALOWS.
13	11.30 - 12.20	Denpasar to Surabaya Merpati 341
	15.05 - 15.45	Surabaya to Semarang Garuda 305
	15.55 - 17.45	Semarang to Jepara by taxi. Met by staff member of BBAP and booked into guest house.
14	07.30 - 12.30	Discussion with Messers Bambang Salamoen and Made L. Nurdjana.
	13.00	Dr. Chhorn Lim and Mr. Tadjuddin arrived from Bogor via plane and then taxi from Semarang.
	14.00 - 17.00	Planning of milkfish maturation experiment and discussion with BBAP staff.
15	07.30 - 17.00	Sampling of and distribution of milkfish between the experimental tanks.
16	07.30 - 10.30	Care of milkfish in the experimental tanks
	08.30 - 09.30	Sampling of 2 milkfish from one of the 2-1 hectare ponds where these fish had been reared for years.
	14.00 - 16.30	Discussion with Mr. Murjani re siganid experiment

451

17	06.40 - 08.35	Jepara to Semarang in BBAP station wagon
	08.50 - 09.40	Semarang to Surabaya by GA 300
	15.10 - 15.50	Surabaya to Denpasar by GA 600 (Flight should have been at 13.20) Booked into Yasa Samudra Bungalows.
19	13.00 - 15.00	Denpasar to Lovina Beach in Gondol Jeep.

A. MILKFISH

On 28 October 1983 Mrs. Anindiastuti and Mr. Pudjiatno moved 80 milkfish from the 2 - 1 hectare ponds (Figs. 1 and 2) where they had been reared and added them to the 33 being held in the 20 x 10 m rectangular tank(Figs. 3 and 4). Since that time the 113 fish had been fed regular BBAP pellets twice daily at a rate of 6.0 kg/day - 3 kg in the movin; 3 kg in the afternoon. This is approximately 3% of body weight besed on 115 fish with mean weight of 2 kg. No death had occured in the tanks following transfer of the fish.

On 15 November we weighted and measured 11 from the tank and killed 3 of them with the following result.

Fish	Sex	Total Weight (g)	Standard Length (cm)	$\frac{W(g) \times 100}{(STD\ L(cm))^3}$	Total Length (cm)	Gonad Weight (g)	Maturation
7*	F	1744	50	1.40	62	6.6	Developing
8		2968	52	2.11	65		
9	F	1540	51	1.16	59	15.5	Developing
10		3000	54	1.91	67		
11		2540	54	1.61	65		
12	F	2840	55	1.71	68	12.9	Developing
13		1440	51	1.09	60		
14		1260	49	1.07	56		
15		3090	60	1.43	71.8		
16		840	51.8	0.60	61		
17		1440	53	0.97	63.6		

* Fish # 7 appeared to be sick.

432

20 fish were then placed in each of 3 tanks and 53 left in the large tanks (See also Figure 5 and 6).

Tank Size	No. of Fish	Proposed Feed
Rectangular 8 x 5 x 1.5 m deep	20	Pellets+trash fish (50 - 50)
Rectangular 8 x 5 x 1.5 m deep	20	Pellets only
Circular Ø 7.2 x 1.2 m deep	20	Pellets only
Rectangular 20 x 10 x 2 m deep	53	Pellets only

At 09.00 on 16 November we obtained 2 thin fish from one of the 1-hectare rearing ponds.

Fish No.	Sex	Total Weight (g)	Standard Length (cm)	$\frac{W(g) \times 100}{(STD\ L(cm))^3}$	Total Length (cm)	Gonad Weight (g)	Maturation
18	?	1710	50.4	1.34	63.3	1.20	
19	?	1917.3	56.0	1.09	66.2	0.49	

Proposed Experiment

Budget

BPPD has set aside Rp. 1.500.000,- or budget for the Jepara experiment to end of March 1984: '300.000 for protective netting and other materials and 1.200.000 for fish feeds and 1.100.000 for fish feeds.

Feeds

Pellets, 3mm Ø if possible, will be freshly prepared on site weekly with no antioxidants but containing : 3000 - 3600 kcal of methabolizable energy/kg; vitamins; minerals; minimum 50% fish oil ; maximum 50% corn oil etc.

Feeding

First 2 months at 3% body weight

1) Fish on pellets	08.00 - 1.5% pellets	15:00 - 1.5% pellets
2) Fish on pellets+ trash fish	08.00 - 1.5%	15:00 - 1.5% pellets

Perhaps feed will be reduced to 2% body weight after examining the fish in January.

Between actual sampling times the daily feed allowance will be increased each month assumsing that the fish grow at a feed conversion value of 2.5

Water Management

Daily - Temperature at 08.00 and 15.00
- Salinity at 08.00
- Disolved oxygen if possible at 08.00 and 15.00

There is to be a flow through system with flow regulated to exchange $\frac{1}{3}$ of the tank volume daily. The bottom of the tanks are to be siphoned off once weekly or even less. This will depend on experience.

4.15

Sampling

Initially fish will be examined every 2 months but this frequency may change later. At each sampling 20% of the fish in each tank will be anaesthetized and their total weights and 3 body lengths : Standard; Fork; Total, recorded. Attempts will be made to calculate each fish to determine their state of gondol development but if this is found to be impossible 2 fish from each tank will be killed and the weights and condition of their gonads determined. The gonads will be preserved in Bouin's solution for possible future histological studies.

Sexual Maturation

Hormonal induction will be attempted when and if the eggs reach a diameter of 0.8 mm. However will be HCG; Salmon pituitary powder (PREGNYL, DRGANON, HOLLAND at 1500lu/ ampule is available in Indonesia. Some fish should not be treated with hormones on the possibility that they spawn naturally.

Spawning, Incubation and Larval Rearing

Several studies including : egg quality; hatching rate; larval survival to 21 days; etc.

B. SIGANIDS

I am not certain but I believe that Mr. Murjani is in charge of siganid culture. During initial talks with Mr. Made and later with Mr. Murjani I learned that BBAP Jepara in very interested in spawning and pond culture of these fishes.

Three species of siganids are available in Jepara waters : S. javis; S. canaliculatus; and S. verniculatus as 2.5 to 4.5 cm fry/fingerlings which are caught by BBAP staff in a 30 m long 1.5 - 2 m deep seine net with catches of up to 1000 fry per set during the fry season.

There appear to be at least 2 fry seasons in that region, July and December with spawning probably occuring in June and November. The majority of the fry caught are S. canaliculatus but after 3 months in their pond system S. verniculatus predominates and has better survival rate but the reason is unknown.

In 1980, 81 and 82 siganids were stocked in the large grow out pond used for prawn and milkfish culture. In 1980 the salinity of these pounds reached 100% during the dry season and only milkfish and tilapia survived. All siganids and mullets died . In 1981 all siganids stocked in the ponds died but the reason is unknown. In 1982 siganids had a survival rate of 20 - 30% and 50 kg/hectare were harvested after 3 to 4 months in the ponds.

Supplementary feeding in the ponds was with filamentous algae and rice bran.

In July 1983 siganids were stocked in the large ponds together with shrimp and milkfish and after 3-4 months they reached a weight of 50 g and length of 15 cm. Also in July 1983 the 3 species of siganids were stocked in a ca 20 x 10 m by 80 cm deep pond (Figs 7 and 8) together with <u>Lates</u> and grouper fry. Pond depth of this pond varies from 60 - 80 cm and 50% of it is siphoned off and replaced weekly. Salinity to mid November has been approximately 30‰ and the fish have been fed pellets and filamentous algae. On 16 November @ 1000 hours we captured and measured and weighed 2 *S. javis* from this experimental pond with the following results.

Fish No.	Total Weight (g)	Standard Length (cm)	Total Length (cm)	$\frac{W(g) \times 100}{(STD\ L\ cm)^2}$
1	150.7	17.0	20.5	3.05
2	100.0	15.0	17.7	2.96

It is planed to design spawning experiments with these fish during our next trip to Jepara in January 1984.

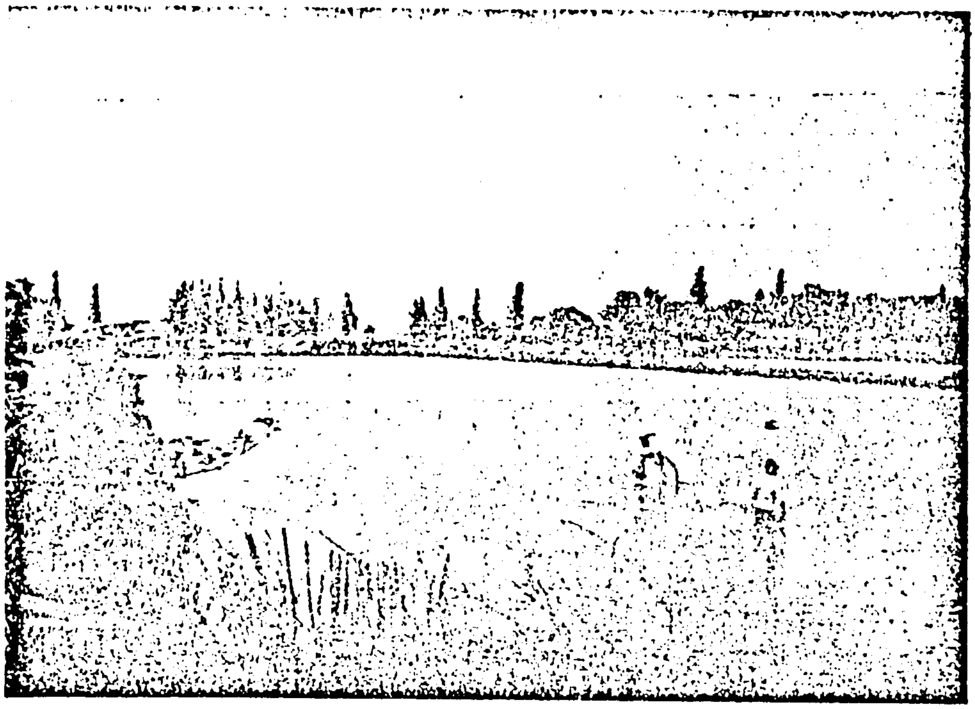


FIG. 1: One of the 50 x 200 m ponds where milkfish were stocked twice as fry and reared to present date. The first stocking was in 1974 (Konica OA-1/0830/ 16 November 1983).

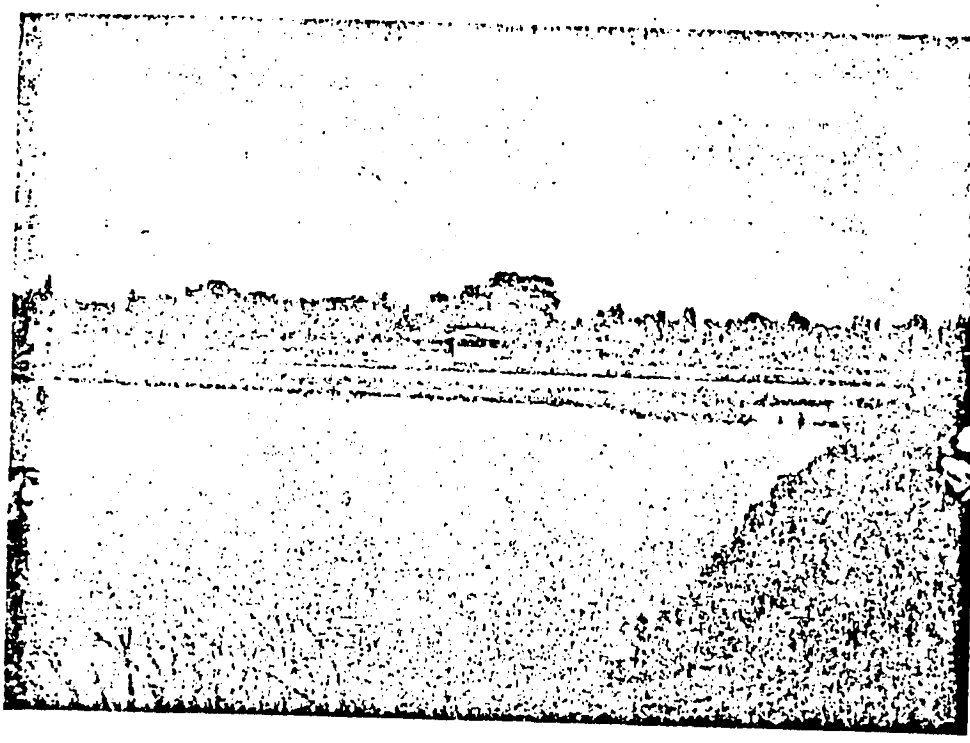


FIG. 2. The same ponds as in Fig. 1. in fore ground with the identical pond in the background. Note the connecting channel between them (Konica IP-2/0830/ 16 November 1983).

444

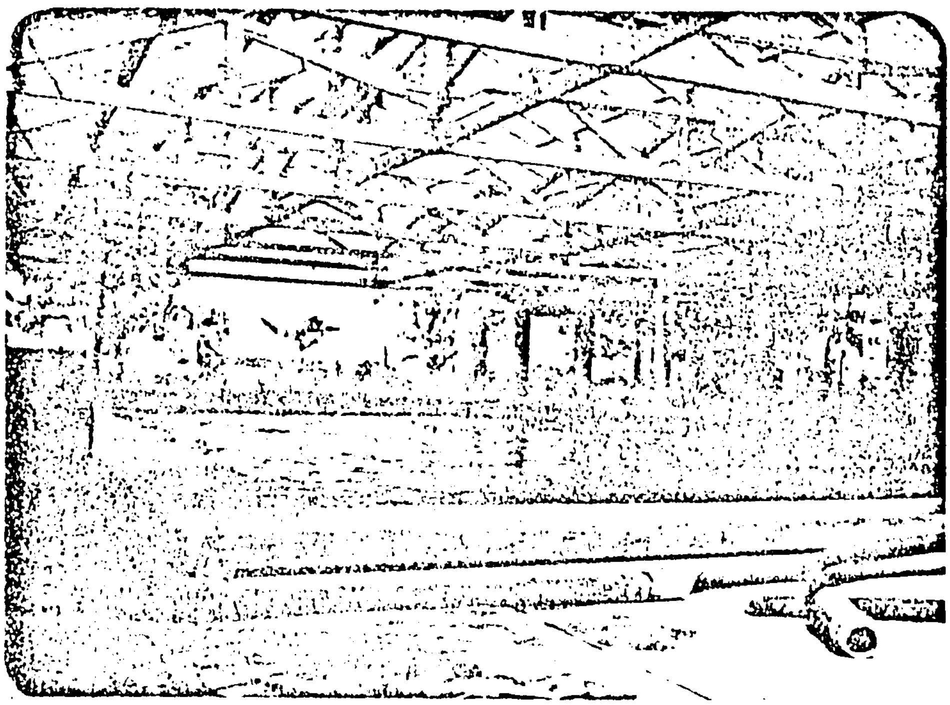


FIG. 3. The 10 x 20 x 2 m Deep experimental tank
(Monica 13A-14/1000 16 November 1984).

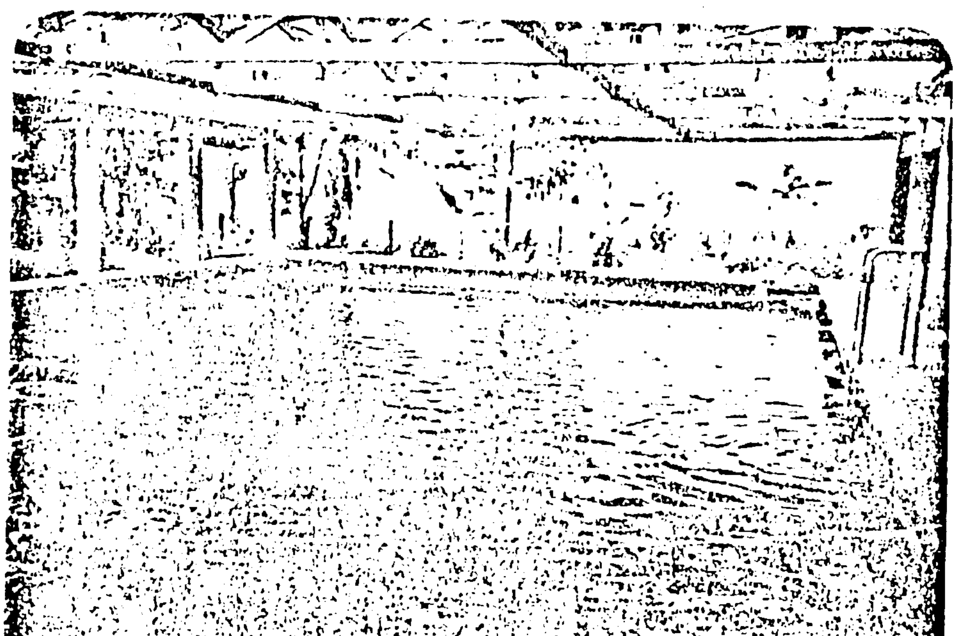


FIG. 4. Another view of the 10 x 20 x 2 m experimental
tank (Monica 14A-15/1000/16 November 1983).

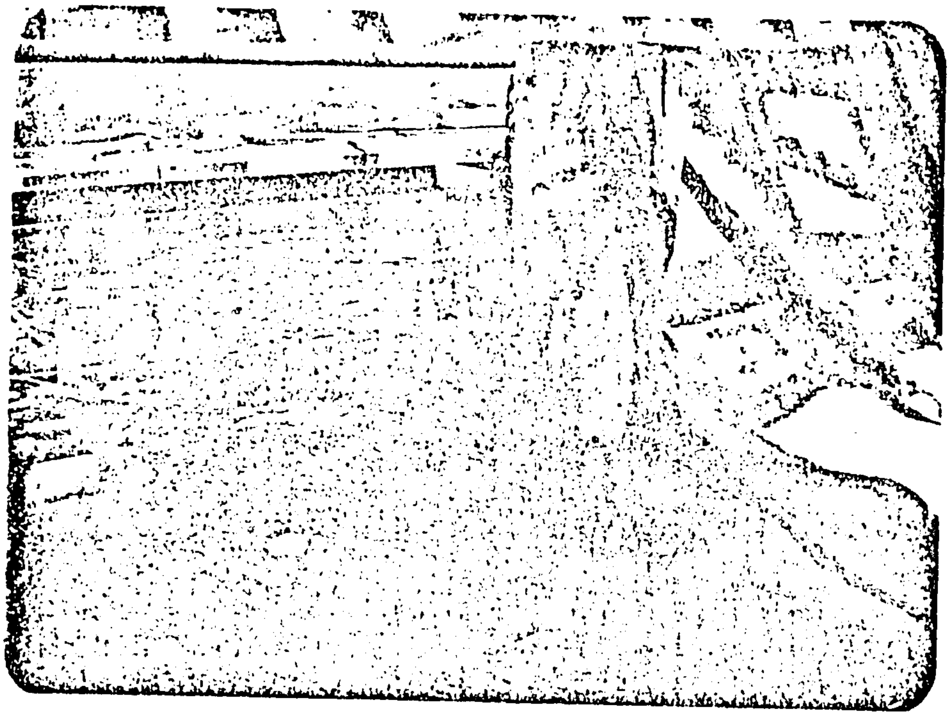


FIG. 5. End of one of the two identical 8 x 5 x 1.5 m deep experimental tanks (Konica 9A-10/0945/16 November 1983)

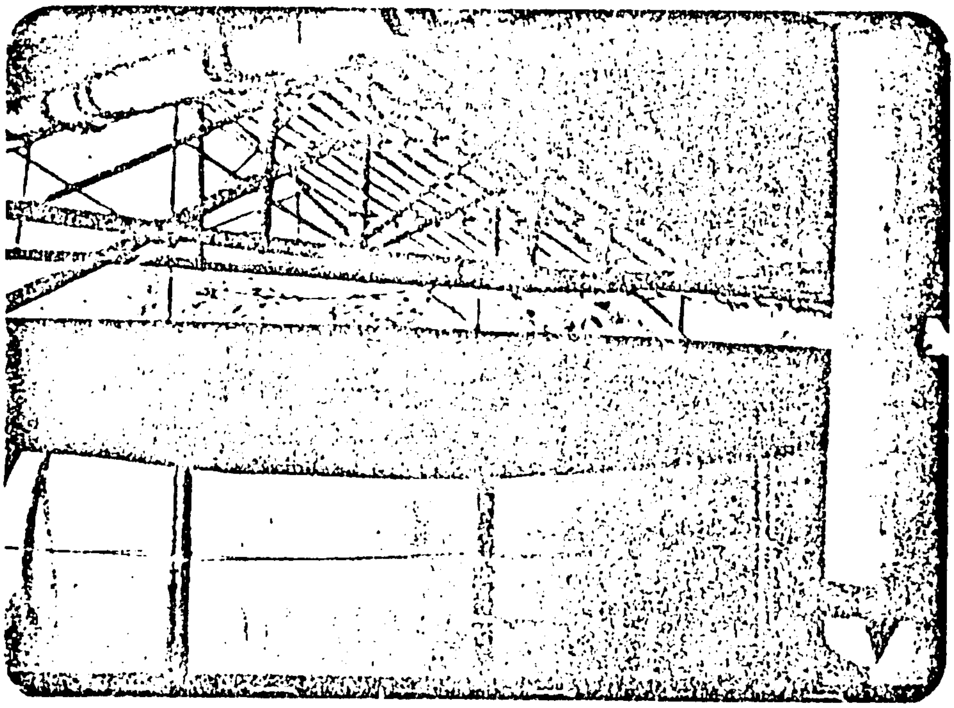


FIG. 6. The 7.2 m diameter 1.2 m deep experimental tank (Konica 10A-11/0950/16 November 1983).

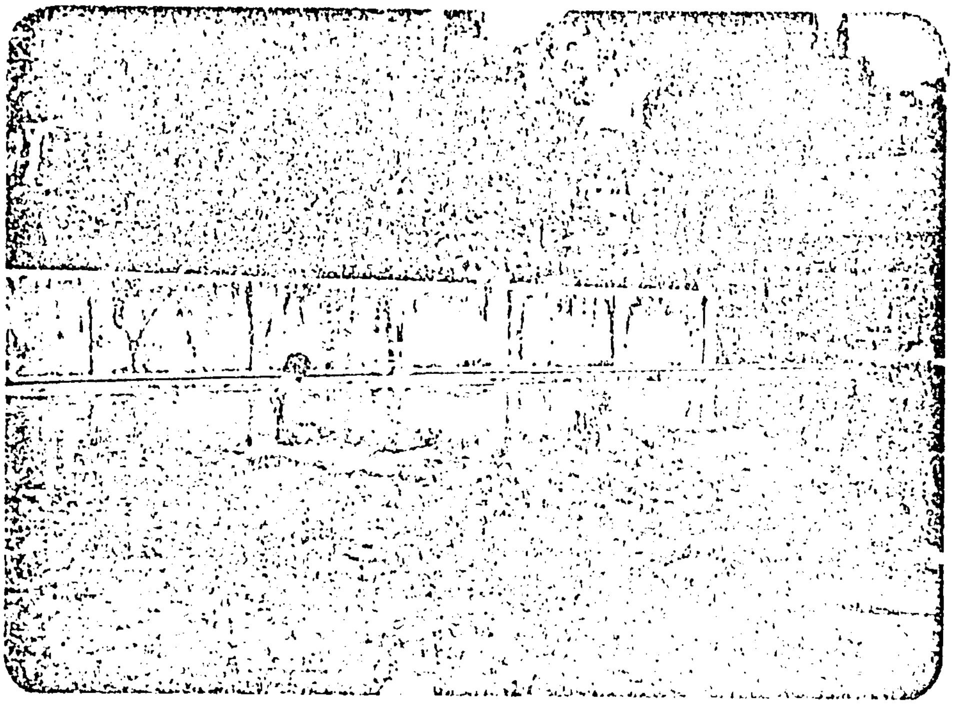


FIG 7. The 10 x 20 x 0.8 m deep experimental pond used for rearing siganids, Latus and groupers stocked as fry July 1983 (Konica 10A-11/0955/16 November 1983)

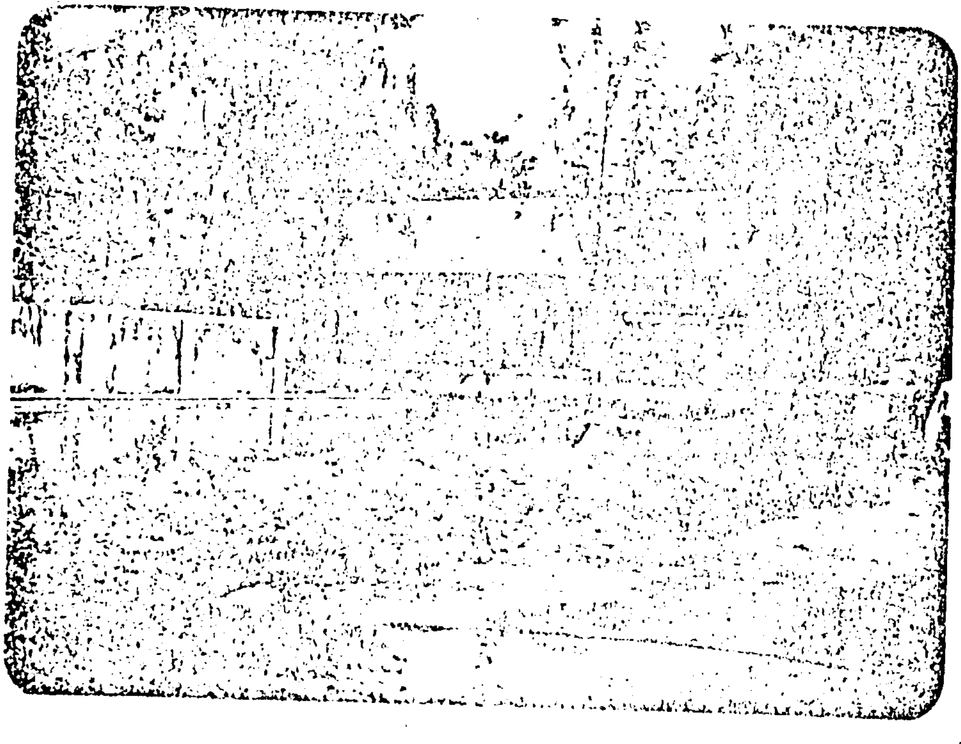


FIG 8. The same pond as in Fig. 7
(Konica 12A-13/0955/16 November 1983)

441

APPENDIX V

To : H. Achmad Abdullah, AARP Project Leader January 31, 1984

From : Carl R. Fritz, Administrative Specialist

Subject : MONTHLY FINANCIAL REPORT
APPLIED AGRICULTURAL RESEARCH PROJECT
as of December 31, 1983

The following data is submitted as requested :

I. Technical Assistance

1. Thirteen RMI experts were on duty as of December 31. George Manuelpillai, Soil Scientist, was expected to arrive January 1, 1984 for assignment to MARIF. Three livestock specialists for RIAP are expected in April.

2. Status of Technical Assistance, December 31, 1983

	Contracted	Supplied/ Expended	Committed*	Balance
a. Long term manmos.	630	169	395	235
b. Short term manmos.	24	3.9	3.9	20.1
c. Funding ($ 1,000)	6,468	1,493	2,854**	3,614

* To end of existing RMI employee contracts, including George Manuelpillai to begin January 1, 1984.

** Does not include miscellaneous items e.g. educational allowance, visa extensions, contingency for inflations, etc. for period beyond December 31, 1983

II. Training

1. Progress as of December 31, 1983

	RMI	Outside RMI	Total
Target			
No.	200	7	207
Manmonths	557	6.2	563.2
Funding ($ 1,000)	1,849.2	NA	NA
Completed			
No.	58	7	65
Manmonths	113.14	6.2	119.34
Funding ($ 1,000)	383.66	NA	NA
Balance Remaining			
No.	142	-	142
Manmonths	443.86	-	443.86
Funding ($ 1,000)	1,465.54		1,465.54

2. Immediate Plans

- About January 1, 1984 : - Two RIAP participants to Asian Institute of Technology, 3 months.
  - One Forest Products participant to University of Wisconsin, 6 months.
- About January 14, 1984: - Three CAER participants to USDA, 2 weeks.

III. Construction

1. Funds available in USAID Loan Agreement : $ 7,140,000.00
2. Expended as of December 31, 1983 (Prefinancing Rp 282,359,600.) ($1 = Rp 970) : - 291,092.37
3. Balance to be expended : $ 6,848,907.63

449

IV. Equipment

1.	Funds available in Loan Agreement	: $	6,061,000.00
2.	Expended as of December 31, 1985	:	----
3.	Balance to be expended	$	6,061,000.00

V. Vehicles

1.	Funds available in Loan Agreement (including 10% contingency and 30% inflation)	: $	1,423,600.00
2.	Expended as of December 31, 1983	: -	776,591.00
3.	Balance to be expended	$	848,225.00

Copy : Sadikin Sumintawikarta, DG AARD
A. Hurdus, USAID/Agric.
W. Collier
R. Saunders.

CRF/nf

450

Appendix VI.

LIST OF AARP/RMI PARTICIPANTS AS OF DECEMBER 31, 1983

NO.	NAME	EMPLOYING OFFICE	COURSE/OBJECTIVES	INSTITUTION/COUNTRY	DURATION	MAN-MOS
	CONTINUING IN TRAINING					
1.	Farid N. Sales	BARIF/Banjarmasin	Dissemination of Research Results	International Rice Research Institute	Nov. 1 – March 1984	2.0
	RETURNEES					
2.	Yanti Rina Darsani	BARIF/Banjarmasin	Techniques and Methodologies of Agric. Economics	do	Oct. 13 – Dec. 9, 1983	1.93
3.	Maria T. Anitawati	CAER/Bogor	do	do	do	1.93
4.	N. Mahrita Willis Abidin	BORIF/Banjarmasin	Integ. Pest Management	do	Aug. 15 – Nov.25, 1983	3.37
5.	Djajeng Sumangat	BORIF/Bogor	Determination & Prevention of Post Harvest Food Losses	Univ. of Idaho, Postharvest Inst. for Perishables, Falls,	Sept. 4 – Oct.14, 1983	1.36
6.	Dudung Muhidin	BORIF/Ps. Minggu	do	do	do	1.36
7.	Iis Syamsiah	SURIF/Sukamandi	Water Management	International Rice Research Institute	Aug.10 – Sept.16, 1983	1.27
8.	Nadjib Noor	MORIF/Maros	Training Computer	The Asian Inst. of Technology Reg. FARMAP Trg. Center for Asia & The Pacific	Aug. 8 – Aug. 26, 1983	0,56
9.	Hadijah A. Dahlan	do	do	do	do	0,56
10.	Sri Sumastri	RIIF/Bogor	Brackish Water Aquaculture	Taiwan Fisheries Research Keelung, Taiwan	July 9 – Sept. 9, 1983	2
11.	Amin Ismail	RIIF/Jakarta	do	do	do	2
12.	Agus Priyono	RIIF/Bali	do	do	do	2

457

NO.	NAME	EMPLOYING OFFICE	COURSE/OBJECTIVES	INSTITUTION/COUNTRY	DURATION	MAN-MOS
13.	Supriyono Eko Wardoyo	RIIF/Maros	do	do	do	2
14.	Tadjuddin Dalay	[illegible]/Bogor	do	do	do	2
15.	Tridjoko	RIIF/Bali	do	do	do	2
16.	Waluyo Subani	RIMF/Jaakarta	Library Training	International Center for Living Aquatic Res. Management in Manila	June 6 – July 6, 1983	1
17.	Endang Pratiwi	CRIF/Jakarta	do	do	do	do
18.	Rachkmat	NLAS/Bogor	do	do	do	do
19.	Tuti Sulasmi	NLAS/Bogor	do	do	do	do
20.	Novenny A. Wahyudi	RIIF/Bogor	Aquaculture Trg. Program	Auburn Univ. Alabama, USA	March 18 – July 15,1983	4
21.	Purwito Martosubroto	RIMF/Jakarta	R&D Management Consultancy Training	Denver Res. Inst. Denver	May 23 – July 1, 1983	1.3
22.	Ati Sri Duriat	LERIH/Lembang	Elisa Techniques	American Type Culture Center in Rockville Maryland, USA.	Feb. 20 – June 9, 1983	3.6
23.	Nani Sumarni	LERIH/Lembang	Interdisciplinary Research in Plant Breeding	Asian Vegetable Res. & Dev.	Nov. 7 – May 7, 1983	6
24.	Etti Purwati	do	do	do	do	do
25.	Yoyo Sulyo	do	do	do	do	do
26.	R. E. Suriaatmadja	do	do	do	do	do
27.	Kosasi Kadir	FPRI/Bogor	Woodworking & Drying & Research Project Planning & Evaluation	Forest Products R&D Inst. Los Banos, Philippines	March 7 – April 7, 1983	1
28.	Mas Ismunadji	BORIF/Bogor	Spec. trg. in Upland Crops Physiology	Asian Vegetable Res. & Dev. Center, Taiwan.	Nov. 11 – Dec. 1, 1983	0.[illegible]

452

NO.	NAME	EMPLOYING OFFICE	COURSE/OBJECTIVES	INSTITUTION/COUNTRY	DURATION	MAN-MOS
29.	Mochamad Sirdan	CAPP/Jakarta	Project Preparation & Evaluation in Ag. and Rural Development	Statistical, Economic and Social Research & Training Center for Islamic Countries Turkey.	Oct. 18 – Nov. 12, 1982	0,9
30.	Syafril Lamsayun	CAPP/Jakarta	Procurement Training	TransCentury Corp, USA.	Oct. 15 – Nov. 14, 1982	1
31.	Abdussamad Syahrani	BARIF/Banjarmasin	Procurement Training	TransCentury, USA.	Oct. 15 – Nov. 14, 1982	1
32.	A. L. Laponengi	MORIF/Maros	do	do	do	1
33.	Warsito Hitomo	CAQ/Jakarta	Agric. Proj. Planning & Analysis, Section II	USDA, Washington, DC	Sept. 7 – Nov. 11, 1982	2,2
34.	Mohamad Mansur	CRIIC/Bogor	do	do	do	do
35.	Hafni Zahara Syukri	CAPP/Jakarta	do	do	do	do
36.	Wahyadi Sosrowardoyo	CRIFI/Jakarta	Applic. and Diffusion of Agric. Res. Results to the Community Level.	Iowa State Univ. USA.	Aug. 25 – Oct. 1, 1982	1,3
37.	Sofyan Ilyas	RIFT/Jakarta	Determination & Post Preventation of Postharvest Food Losses.	Cornell University, USA	Sept. 6 – Oct. 13, 1982	1,3
38.	Achmad Hidayat	CAQ/Jakarta	Plant Quarantine	USDA, Washington, DC	July 19 – Sept. 17, 1982	2,3
39.	Dewa M. [illegible]	[illegible]/Bogor	Integrated Pest. Mgmt.	Purdue University, USA.	June 9 – July 23, 1982	1,5
40.	Sudiarto	CRIIC/Bogor	Agric. Research Method	Kansas State Univ. USA	May 31 – July 23, 1982	1,8
41.	Lalu Sukarno	BORIF/Bogor	do	do	do	do
42.	Siti Sufiani	MORIF/Maros	do	do	do	do
43.	M. Saleh Pandang	MORIF/Maros	do	do	do	do

453

NO.	NAME	EMPLOYING OFFICE	COURSE/OBJECTIVES	INSTITUTION/COUNTRY	DURATION	MAN-MOS
44.	Wafiah Akib	MRIF/Maros	do	do	do	do
45.	Tambak Manurung	CRIAS/Bogor	Agric. Research Method	Kansas State Univ. USA	May 31 – July 23, 1982	1,8
46.	Didi Suardi	CRIFIC/Bogor	do	do	do	do
47.	Yono C. Rahardjo	CRIAS/Bogor	do	do	do	do
48.	Budhojo Sukotjo	Prof. & Proj. Form Unit/Jkt.	Agric. Research Mgnt.	Washington, DC and Hawaii	June 6 – 12, 1982 June 18 – 21, 1982	0,4
49.	Tamburan S.M. Manungkol	BORIF/Bogor	Estab. Data Bases & Analist. Syst. for Econ. Decision Making in Agric.	University of New Mexico	June 6 – Aug.13, 1982	2,3
50.	Rachmat Kartapradja	LRIF/Lembang	Veg. Crop. Prod. & Market	Rutgers University, USA	July 12 – Aug. 20,1982	1,3
51.	Artaty Wijono	CRIFI/Jakarta	Ag. Comm. & Med. Strategy	Iowa State University, USA	July 12 – Aug. 20,1982	1,3
52.	Abisono	TARII/Tg. Karang	do	do	do	do
53.	Adi Widjono	CRIFC/Bogor	do	do	do	do
54.	T. H. Mangunsong	Reg. Ag. Qurrant/ Bogor	do	do	do	do
55.	Fathan Muhadjir	BORIF/Bogor	Wheat & Maize Phys.	CIMMYT, Mexico City	July 20 – Aug. 25,1982	1
56.	Nurlaila Hasbullah	BORIF/Banjarmasin	Rice Production	IRRI, Philippines	July 1 – Aug. 27,1982	1,9
57.	Nurul Aida	BORIF/Banjarmasin	do	do	do	do
58.	Achmad Dimyati	BORIF/Bogor	Tech. & Econ. Aspects of Soybean Production	University Illinois, USA	May 10 – Aug. 6, 1982	2,9
				TOTAL MANMONTHS OF TRAINING UNDER RMI CONTRACT		113,14

454

NO	NAME	EMPLOYING OFFICE	COURSE/OBJECTIVES	INSTITUTION/COUNTRY	DURATION	MAN-MOS
	TRAINING OUTSIDE RMI CONTRACT					
59.	Achmad Sarnita	RIIF/Bogor	Study Milkgisn Cultiv. Method	SEAFDEC/Philippines Inst. of Marine Biology & Gulf Coastal Fish. Center/USA SEARCA/Philippines	July 5 - Aug. 15, 1981	1.4
60.	Haniah	do	do	do	do	do
61.	Suningat	NIAS/Bogor	Regional Micrographic Training Course	SEARCA/Philippines	Jan. 10 - 23, 1982	0.5
62.	Sunardi Dahlan	do	do	do	do	do
63.	Azis Arifin	LERIF/Lembang	The Decimal Long ofCip. Comperative Study for TUBER crops Research Comparative for Wheat Research	Pery CIAR/Columbia CIMMYT/Mexico	Feb. 22 - 26, 1982 Feb. 29 - March 1, 1982 March 3 - 4, 1982	0.3
64.	Surahmat Kusumo	CRIFC/Bogor	do	do	do	do
65.	Sundaru	BORIF/Bogor	Management Agric. Organ.	USDA/USA	May 17 - July 9, 1982	1.8
				TOTAL MANMONTHS TRAINING OUTSIDE RMI CONTRACT		6.2
					GRAND TOTAL	119,34

435