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**REPORT OF THE**

**Held at Manila, Philippines  
2-6 November 1964**

**NINTH SESSION  
OF THE INTERNATIONAL  
RICE COMMISSION**



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Earlier reports of sessions of the International Rice Commission have been issued as follows:

First Session	Bangkok, Thailand	7-16 March	1949
Second Session	Rangoon, Burma	6-11 February	1950
Third Session	Bandung, Indonesia	12-16 May	1952
Fourth Session	Tokyo, Japan	11-19 October	1954
Fifth Session	Calcutta, India	12-19 November	1956
Sixth Session	Tokyo, Japan	3-4 October	1958
Seventh Session	Saigon, Viet-Nam	16-20 November	1960
Eighth Session	Kuala Lumpur, Malaya	10-14 September	1962

REPORT  
OF THE  
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INTERNATIONAL RICE COMMISSION

Held at

Manila, Philippines

November 2-6, 1964

Food and Agriculture Organization  
of the United Nations

Rome, Italy



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SUMMARY OF RECOMMENDATIONS AND RESOLUTIONS  
ADOPTED AT THE NINTH SESSION OF THE  
INTERNATIONAL RICE COMMISSION

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1. Recommendations of the Working Parties

The Recommendations incorporated in the Reports of the 1964 Meetings of the IRC Working Parties were approved by the IRC.

2. Weed Control

The Commission, recognizing the economic importance of the extent to which weeds can reduce rice yields, recommended that:

Cooperative studies be conducted to:

- (1) survey the extent of weed infestation;
- (2) estimate by suitable experiments the economic loss due to weeds;
- (3) evaluate old and new herbicides for weed control and report progress to member countries.

3. Blast Disease

The Commission, noting with satisfaction the cooperative efforts made by member countries in screening varieties for resistance to blast and the assistance given by the International Rice Research Institute in advancing research on this disease, recommended that:

The present studies be intensified and the establishment of a uniform set of differential varieties for identification of physiological races be promoted.

4. Varietal Resistance to Stem-borers

The Commission, recognizing the importance of varietal resistance in the control of stem-borers, recommended that:

Cooperative experiments using standardized procedures be conducted with varieties which the IRRI and other research institutions of member countries have found to be resistant.

#### 5. The Effect of Research Findings on the Average Yield of Rice

The Commission, having heard from various member governments the definite effect of research findings on the average yield of rice during recent years, and convinced that the yield can be much higher if a combination of related production factors is put into operation, as currently practised in several countries, recommended that:

Integrated pilot projects of a manageable size be conducted in the member countries, where production needs to be stepped up. (These projects can be used for demonstration and training purposes before embarking on a nation-wide program.)

#### 6. International Rice Research Institute

The Commission, having seen the research program being conducted at IRRI and having noted with appreciation and admiration the various improvements that have already been brought about in the cultivation of rice at the IRRI; and convinced that the useful findings obtained by IRRI can be adopted by member countries with beneficial results, recommended that:

The IRC, in its subsequent sessions, review the progress made in connection with the testing and adoption of the research findings of IRRI in member countries.

#### 7. Implementing the Findings of Research

The Commission, having noted that rice production, particularly in Asian countries, is not adequate and having heard the reports of the recent meetings of the three IRC Working Parties, and recognizing the urgency of increasing rice production and the necessity of active participation by the farming population, and also recognizing the importance of related social and economic conditions of production, such as paddy land tenure, agrarian structure, resources and financial aspects of the cultivators, technical level of the farmers, possibilities of purchase of equipment, fertilizers and pesticides, and taking into account what member countries have been doing along these lines, with FAO assistance,

Urges member governments to examine the effectiveness of their extension services, the thoroughness of their long-range



agricultural development programs and arrangements for the provision of the various production factors, such as credit, supplies, market facilities and cooperative organizations, with a view to ensuring that rice farmers will be encouraged and enabled to adopt the findings of research;

and Requests the Director-General of FAO:

- (1) to organize a Working Party on Agricultural Extension in the Far East Region for the purpose of accelerating the tempo of agricultural production with special emphasis on rice;
- (2) to continue FAO assistance in the matter of conducting more national in-service training centres;
- (3) to step up the publication program of the FAO Regional Office in Bangkok, so that more suitable training materials can be produced and distributed;
- (4) to convene the second regional meeting on agricultural extension in 1966 (the proposed International Rice Year); and
- (5) to organize the second agricultural extension study tour if and when financial conditions permit;

and Recommends to the Director-General that:

as provided by Rule II.2 (g) of its Rules of Procedure he include, in the Provisional Agenda of the next Session of the IRC, topics respecting extension on rice production.

#### 8. Regional IRC Rice Committees

The Commission, considering the increasing importance of rice in the Americas and in the African regions; and considering the importance of the assistance that the Commission can give to these regions; and considering the interest and usefulness of contacts between rice specialists in the different parts of the world and the mutual advantage their countries can derive from these contacts; and considering the necessity of generating increased interest in the international aspects of rice production in regions in addition to Asia and the Far East, recommends that the Director-General:

organize IRC Rice Committees composed of member states of the IRC in the Americas and in Africa respectively, with seats at the respective FAO Regional Office for Latin America and for Africa.

These two Committees would have the task, among others, of:

- (a) promoting the participation of the countries in each region in meetings and activities of the IRC and its Working Parties by various means, including:
  - collecting scientific, technical and economic information;
  - preparing working documents concerning each agenda item of the meetings of the Working Parties;
  - studying problems to be submitted to these groups;
  - urging member countries to send participants, at the national or regional level, to Meetings of the Working Parties of the IRC, and to Sessions of the IRC.
- (b) ensuring, where applicable, that the recommendations formulated by the Working Parties and approved by the IRC and the Conference of FAO be put into operation;
- (c) reporting their activities to the IRC or its Working Parties.

Further recommends that the Director-General:

study the possibility of organizing some of the Meetings of the Working Parties and Sessions of the IRC in rotation in interested regions.

## INTRODUCTION

The Ninth Session of the International Rice Commission was held in Manila, from 2-6 November 1964, at the kind invitation of the Government of the Republic of the Philippines.

A total of 47 Delegates representing 19 Member Countries, one Observer Country and one International Organization participated in the Session. The FAO Secretariat included nine Officers.

After an impressive Flag Raising Ceremony in front of the Philamlife Building, where the Session was convened, the Delegates were welcomed by Eugenio E. Cruz, Director of the Bureau of Plant Industry, on behalf of the Philippine Executive Committee in charge of arrangements for their reception and accommodation.

On behalf of the Director-General, the Deputy Regional Representative, Mr. Soesilo H. Prakoso, welcomed the Delegates and expressed deep appreciation to the Government of the Republic of the Philippines for being host to the Ninth Session of the International Rice Commission.

In referring to the meetings of the three IRC Working Parties held during March this year in Manila, he noted that problems requiring further attention and new fields which remained to be investigated would probably be brought forward by the delegates in the course of the discussion. The Deputy Regional Representative then referred to the present situation respecting world agricultural production which has only just kept pace with the population increases, without leaving any margin for improvement in nutritional levels and advancement in economic growth. He pointed out that, considering the limited availability of arable land, the alarming population increase and the trend toward increased consumption per caput, future increases in production must arise largely from advances in technology and research.

Mr. Prakoso stated that if the knowledge now available were extensively employed by farmers, yields would be more than doubled in the near future. He considered it to be most appropriate that the Ninth IRC Session devote much of its attention to this important subject.

He then referred to the declaration of 1966 as International Rice Year and the decision of the Director-General to associate his declaration with the Freedom-from-Hunger Campaign. He expressed confidence that the declaration will focus world attention on the fact that rice forms the principal part of the diet of more than one half of the world's population and that the declaration will

encourage national governments to put forth their best efforts to combat the scourge of hunger.

Mr. Prakoso also referred to proposed structural changes which would enable the International Rice Commission to operate more effectively on a worldwide basis.

He expressed satisfaction respecting the increasing collaboration between the International Rice Research Institute and the IRC and referred to the recent election of the Regional Representative to the Board of Trustees of the IRRI.

The Honorable Jose Y. Feliciano, Secretary of Agriculture and Natural Resources, Government of the Republic of the Philippines, added his own personal welcome to the delegates, observers and members of the FAO Secretariat. He declared that Asia, perhaps more than any other place, "holds the key to continued world peace and better prospects of prosperity".

Secretary Feliciano went on to state that the Philippines is exerting efforts, as far as its resources permit, to "increase our rice yields at a pace that will enable us to bridge the gap between production and national requirements".

The Administration was concentrating on improved production efficiency rather than expansion of hectarage, the Secretary said. It was the government's belief that "there is now available a great body of knowledge which would boost our production efficiency to unprecedented levels, if we are able to make such knowledge a part of the life of our farmers". To this end, the Administration was investing considerable funds "on an intensified and expanded extension program".

The Government's whole program in this respect, Mr. Feliciano said, was being pursued "with a sense of urgency... in order to achieve maximum results at the earliest possible time".

The Secretary observed that "the intensity and the ultimate success of the world effort to increase rice production as part of the global campaign for Freedom-from-Hunger will depend not only on national efforts but on international cooperation and assistance as well".

The IRC, he said, had "a very important place in this total scheme. The influence generated among member countries by the International Rice Commission could be tremendous".

Responding to Secretary Feliciano's address, the outgoing Chairman of the IRC, Inche Mohamad bin Jamil, Malaysia's Director of Agriculture, said that the Philippines Government had spared no effort to provide facilities for the IRC's Working Parties which

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Responding to Secretary Feliciano's address, the outgoing Chairman of the IRC, Inche Mohamad bin Jamil, Malaysia's Director of Agriculture, said that the Philippines Government had spared no effort to provide facilities for the IRC's Working Parties which

had met earlier this year in Manila and for this Session of the IRC. "These splendid arrangements", Inche Mohamad said, "must draw the gratitude not only of the delegates but also of all the rice farmers in this region and the world over for this contribution toward their well-being".

The outgoing Chairman continued by saying that "the progress we have been able to make, so far, is strong proof of the value and usefulness of the International Rice Commission as a technical forum for the exchange of experience and knowledge, the identification of common problems and the planning of programs for the solution of these problems".

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N. N. Bentley, Technical Officer, Technical Department, FAO Headquarters, Rome, Italy.

C. W. Chang, Regional Agricultural Adviser, FAO Regional Office, Bangkok, Thailand.

H. N. Mukerjee, Regional Soil Fertility Specialist, FAO Regional Office, Bangkok, Thailand.

Shao-er Ong, Regional Farm Management Specialist, FAO Regional Office, Bangkok, Thailand.

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Michael Keon, Regional Information Adviser, FAO Regional Office, Bangkok, Thailand.

AGENDA OF THE NINTH SESSION

The Agenda adopted by the Ninth Session of the International Rice Commission was as follows:

- | <u>Item</u> |  |
|-------------|--|
| I           | Election of Chairman and Vice-Chairman.  |
| II          | Adoption of the Agenda,<br>Appointment of a Drafting Committee.  |
| III         | Progress Report by the Executive Secretary on the Work of the Commission since its Eighth Session.   |
| IV          | Reports and Discussions on Meetings of the IRC Working Parties: <ul style="list-style-type: none"> <li>(a) Consideration of the Report of the 10th Meeting of the Working Party on Rice Production and Protection.</li> <li>(b) Consideration of the Report of the 9th Meeting of the Working Party on Rice Soils, Water and Fertilizer Practices.</li> <li>(c) Consideration of the Report of the 3rd Meeting of the Working Parties on the Agricultural Engineering Aspects of Rice Production, Storage and Processing.</li> <li>(d) Consideration of the Report of the Joint Meeting of the three Working Parties.</li> </ul> |
| V           | Problems respecting rice production and improvement which require urgent attention at national and/or international levels.  |
| VI          | The International Rice Year - 1966.  |
| VII         | The effect of research findings on the average yield of rice during recent years.  |
| VIII        | Making it possible for farmers to employ the findings of research.   |
| IX          | The program of research at IRRI and possibilities of collaboration with research institutions in the member countries.   |
| X           | The nature and scope of future IRC activities.   |
| XI          | Date and place of the 10th Session of the International Rice Commission and of the meetings of the Working Parties.  |
| XII         | Adoption of the Report.  |

OFFICERS OF THE COMMISSION

On the proposal of Thailand, seconded by the United States of America, the Commission elected the Honorable Isosceles Pascual, Under-Secretary of Agriculture and Natural Resources, Republic of the Philippines, as its Chairman. Mr. O.L. Schrader, Delegate from Brazil, proposed by the United Kingdom and seconded by India, and Lt. Col. Ye Goung, Delegate from Burma, proposed by the Philippines and seconded by France, were elected First Vice-Chairman and Second Vice-Chairman respectively. In accordance with the Constitution of the IRC, they will hold office until new officers are elected at the beginning of the Tenth Session of the Commission. Dr. N. Parthasarathy will continue to serve as Executive Secretary.

Delegates from France, U.S.A., Thailand, Philippines and India were named members of the Drafting Committee to prepare the report of the Ninth Session.

The following staff members of FAO served as Technical Secretaries of the Session when the subjects indicated below were under consideration:

<u>Agenda Item</u>	<u>FAO Officer responsible</u>
IRC/64/3      Progress report by the Executive Secretary on the work of the Commission since its Eighth Session.	N. Parthasarathy
IRC/64/4(a)    Consideration of the report of the 10th Meeting of the Working Party on Rice Production and Protection.	N. Parthasarathy
IRC/64/4(b)    Consideration of the report of the 9th Meeting of the Working Party on Rice Soils, Water and Fertilizer Practices.	H.N. Mukerjee
IRC/64/4(c)    Consideration of the report of the 3rd Meeting of the Working Party on Agricultural Engineering Aspects of Rice Production, Storage and Processing.	A.A.C. Huysmans
IRC/64/4(d)    Consideration of the report of the Joint Session of the three Working Parties.	H.N. Mukerjee
IRC/64/5      Problems respecting rice production and improvement which require urgent attention at national and/or international levels.	Shao-er Ong
IRC/64/6      The proposed International Rice Year.	N.N. Bentley
IRC/64/7      The effect of research findings on the average yield of rice during recent years.	N. Parthasarathy
IRC/64/8      Making it possible for farmers to employ the findings of research.	C.W. Chang

<u>Agenda Item</u>		<u>FAO Officer responsible</u>
IRC/64/9	The current program of research at IRRI and possibilities for collaboration with research institutions in the member countries.	N. Parthasarathy
IRC/64/10	The nature and scope of future IRC activities.	N.N. Bentley
IRC/64/11	The date and place of the next meetings.	N. Parthasarathy
IRC/64/12	Adoption of the Report.	N. Parthasarathy

#### ACKNOWLEDGMENTS

The Commission expressed deep appreciation to the following who contributed to the successful conduct of the Ninth Session:

1. The Government of the Republic of the Philippines for the generous support, excellent arrangements and facilities provided for the Ninth Session. Special reference was made to the spacious, attractive and commodious accommodation provided in the Philamlife Building where the Session was convened.
2. The Executive Committee and the Officers and Staff of the Bureau of Plant Industry for the many services and courtesies extended to the Delegates.
3. The Chairman, Vice-Chairman and the Technical Staff for the capable manner in which the Session was conducted.
4. The International Rice Research Institute for the hospitality extended in the course of a most informative and pleasant meeting of the Session and visit to its premises at Los Banos.
5. The information officers, interpreters, translators, typists and others for the effective performance of their duties in the course of the Session and preparation of its Report.
6. The Government of Japan for copies of the "Handbook on the Theory and Practice of Growing Rice" which were distributed to the Delegates.

SUMMARY OF REPORTS AND DISCUSSIONS RELATING TO  
AGENDA ITEMS

AGENDA ITEM III

PROGRESS REPORT BY THE EXECUTIVE SECRETARY

OF THE

INTERNATIONAL RICE COMMISSION (IRC)

1/

The Executive Secretary presented the Progress Report on the salient features of the work of the Commission since its last meeting. He drew attention to recommendations made by the IRC Working Parties concerning the intensive pursuit of physiological studies of the rice plant in relation to fertilizer response and to the criteria to be followed in the preparation of agenda for the future meetings of the Working Parties.

He referred to the meetings of the three Working Parties held during the period under review and the suggestion regarding the possibility of holding the next meetings of the Working Parties consecutively instead of concurrently to facilitate effective representation of the member governments at each of the meetings of the Working Parties.

It was noted that at present technical assistance funds for implementation of rice projects are being increasingly utilized and that during the two years' period under review two United Nations Special Fund projects relating to Soil Fertility Survey and Research had started operations. One of these is in Korea and the other is in the Philippines. Additional projects under United Nations Special Fund and under Freedom-from-Hunger Campaign are being prepared.

The Commission was informed of the election and appointment of Mr. Ahsan-ud-Din, the Regional Representative of the Director-General for Asia and Far East, as a member of the Board of Trustees of the International Rice Research Institute (IRRI). This arrangement has further strengthened the mutual relationship between the IRC and the IRRI.

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1/ Dr. N. Parthasarathy, Regional Rice Improvement Specialist,  
FAO, Bangkok

The IRRI has organized and conducted four symposia, viz.: (a) Rice Genetics and Cyto-genetics, February 4-8, 1963; (b) Rice Blast Disease, July 9-12, 1963; (c) Mineral Nutrition of the Rice Plant, February 23-28, 1964; (d) Insect Pests of Rice with special emphasis on Stem-borers, September 13-18, 1964 and a Conference on Agricultural Engineering, August 11-17, 1963. Actual workers in the respective fields from research institutions of national governments and universities participated. FAO was represented at each of these. Brief summaries of the proceedings of these symposia have appeared in the IRC Newsletter. Implementation of some of the IRC recommendations has been promoted by action taken at these meetings.

The FAO Catalogue of "Genetic Stocks of Rice - Supplement No.9" was published, and the number registered so far is 1366. An up-to-date list of rice workers in the world has been compiled and published by FAO. The IRC Newsletter entered its thirteenth year of publication with increased demand. A special issue of the Newsletter, in addition to the normal issues, was brought out with the help of a subsidy from the Pacific Science Association. This contained the articles contributed to the "symposium on rice problems" which was held under the auspices of the Tenth Pacific Science Congress.

A tabular analysis of the attendance at past meetings of the IRC and of its Working Parties was presented in accordance with the recommendation of the previous session of the IRC. It was noted that three more countries, Mali, Brazil and Sierra Leone, have joined the IRC since the last session, bringing the total membership to 32 countries. Tables presented showed that (a) out of the 32 member countries, 18 are from outside the Far Eastern region; (b) the meetings of IRC Working Parties have been held outside the Far Eastern region only once (at Vercelli, Italy); (c) with the exception of the U.K., France, the U.S.A. and the Netherlands, the attendance of countries outside the Far Eastern region has been very small; (d) the number of participants, both delegates and observers, ranged from 53 to 91 for the IRC, except at the first meeting, and from 31 to 53 for the Working Party on Rice Production and Protection and for the Working Party on Rice Soils, Water and Fertilizer Practices it ranged from 26 to 47. At the Engineering Working Party, which has had only 3 meetings, the attendance was 34, 38 and 40. The volume of technical papers presented at these meetings has been steadily increasing.



AGENDA ITEM IVREPORTS AND DISCUSSIONS ON MEETINGS OF THE IRC WORKING PARTIES(a) REPORT OF THE TENTH MEETING OF THE IRC WORKING PARTY ON RICE PRODUCTION AND PROTECTION 1/Summary

The Tenth Meeting of the IRC Working Party on Rice Production and Protection was held at the WHO Building, Manila, by the kind invitation of the Republic of the Philippines, from 3-10 March 1964, with Dr. Eugenio E. Cruz as Chairman, Dr. Roy Adair, U.S.A., and Mr. Doan Ninh Quan, Viet-Nam as Vice-Chairman; Drs. C. Logothetis and N. Parthasarathy were the Technical Secretaries. The meeting was attended by 42 delegates from 13 member countries and 11 observers from two non-member countries and the International Rice Research Institute.

During the meeting not less than 71 papers were contributed including key invitational papers relating to a number of the agenda items.

The Report of the Tenth Meeting has been published and copies have been dispatched to all member countries in the IRC.

Principal subjects considered and referred to the attention of the Commission were as follows:1. Breeding and Testing of Varieties with Wide Adaptability

The Working Party noted the importance of the trials of varieties with wide adaptability that have been conducted, and recommended that this work should be continued and expanded. It requested member countries to make seed of new promising material available to other members.

2. Breeding Procedures for Yield and Other Economic Characters

The Working Party recommended that (1) all member governments should initially examine their existing breeding methods in the light of modern techniques, and should revise these methods where necessary, keeping in mind their individual breeding objectives, the facilities available and other

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1/ Presented by Eugenio E. Cruz, Director of the Bureau of Plant Industry, Manila, Philippines, and Chairman of the 10th Meeting of the Working Party on Rice Production and Protection.

particular local conditions; (2) care should be taken in all member countries to preserve local varieties which may carry germplasm useful for future breeding programs; and (3) in all member countries where high fertility levels are possible, particular attention should be paid to breeding for suitable plant type.

### 3. Symposium on Rice Genetics and Cytogenetics, International Rice Research Institute

The aims of the symposium were to review research achievements in the field of rice genetics, cytogenetics and taxonomy, and to identify those problems on which future research is most needed.

The Working Party received a report on this subject and was pleased to note that a summary report on the symposium had been published in the March 1963 issue of IRC Newsletter.

### 4. "Upland Rice" - Its Culture and Significance

The Working Party noted the complexity of factors involved in this subject, and recommended that:

- (1) intensive studies be undertaken to distinguish the physiological and morphological characteristics of varieties suitable for lowland and upland cultivation; and
- (2) measures be taken to determine suitable rotations and fertilization to maintain the fertility of the soils and avoid the necessity for fallowing systems and shifting cultivation.

### 5. Rice Blast Disease

In view of the increasing prevalence of blast disease in the tropical areas of Southeast Asia and the need in a breeding program for rice varieties which are resistant to prevailing physiological races of the fungus and the necessity of identifying the physiological races of Piricularia oryzae, the Working Party recommended that:

member countries continue and intensify the uniform blast nursery tests with the modifications recommended by IRRI.

### 6. Control of Stem Borers

The varietal, chemical, biological and cultural methods of control were presented and discussed at the meeting. However, the Working Party urged that the work regarding varietal resistance initiated at the IRRI be continued and that promising varieties be made available for testing against different species of borers in the participating countries. It was felt that efforts should also be made for breeding borer populations under laboratory conditions. The Working Party was interested in the studies initiated at the IRRI which is now leading a cooperative project and it is hoped that uniform standardized procedures would be made available for evaluation of varietal resistance.

## 7. Rice Nematodes

The Working Party recommended that surveys should be carried out to determine the distribution of known nematode parasites of rice and to look for any other parasites which have not yet been observed. It was suggested that advantage should be taken of the offer of Dr. Ichinohe of the Nematology Laboratory, National Institute of Agricultural Sciences, Nishigahara, Kita-ku, Tokyo, Japan, to accept for identification, specimens collected from rice in various countries. FAO was requested to circulate instructions to member countries on methods of collection, preservation and dispatch of nematode specimens.

The Working Party endorsed the recommendation of the Fourth Meeting of the Plant Protection Committee for the Southeast Asia and Pacific Region, held in June 1962, in which it was resolved "that all participating governments or territorial administrations within the Region should endeavour to undertake in their respective countries and territories surveys of plant parasitic nematodes; and should, where these are not already available, train and secure the requisite specialists for such surveys". The Working Party expressed the hope that territories in the region would take the necessary action to implement this recommendation.

## 8. Virus Diseases of Rice

Considering the prevalence of virus diseases of rice in the Far East and South Pacific Region the Working Party recommended that surveys be undertaken and studies be initiated or intensified on the nature of the viruses and on the methods by which they are transmitted and may be controlled.

## 9. Epidemiology of Rice Diseases and Pests and their Forecast

In view of the importance of information concerning outbreaks of rice pests and diseases, the Working Party recommended that investigation be expanded or continued in member countries on factors associated with such outbreaks. It agreed that forecasting stations should be established in as many regions as possible in order to provide the required information for farmers to take timely and appropriate measures.

## 10. Plant Quarantine

With regard to plant quarantine, the Working Party recommended that:

- (1) As complete information as possible on the rice pests and diseases occurring in member countries should be compiled, if necessary by carrying out further pest and disease surveys, so that quarantine procedures affecting rice seeds may be liberalized.
- (2) Investigations should be intensified with the objective of developing methods of seed treatment which would be acceptable to quarantine authorities.
- (3) Regional plant quarantine organizations should encourage the establishment of efficient regional quarantine stations for the use of countries not having adequate facilities of their own.

DISCUSSION:

Rice Blast Diseases: In the matter of sending blast disease specimens for race identification to the addressees in the U.S.A. and Japan mentioned in the report, the member countries were informed that in order to meet quarantine regulations, they should first obtain permit tags from the respective addressees and attach them to the parcels before dispatch, so as to assure delivery of the specimens.

In response to recommendation 10[2] under "Plant Quarantine" in the report of the Working Party on Rice Production and Protection, studies were undertaken in the U.S.A. to develop more effective methods of seed treatment. It is expected that the results of these studies will be submitted for publication in the IRC Newsletter in the near future.

Stem Borers: In order to implement the recommendation of the Working Party on Rice Production and Protection in regard to "Resistance to Stem-Borers", it was suggested that steps be taken by member countries to establish a cooperative project to test resistant varieties from the International Rice Research Institute and other institutions. The testing method should be standardized in accordance with procedures developed by the International Rice Research Institute in collaboration with other institutions.

Varietal Adaptation: Some of the varieties included in the varietal adaptability trials in the U.S.A. were found to have rather unusual physical and chemical characteristics of the grain. In order to check further on this matter, it would be desirable to obtain samples of several of these varieties that are grown at different locations in 1964. The delegate from the U.S.A. will contact several of the cooperators about getting samples.

(b) REPORT OF THE NINTH MEETING OF THE IRC WORKING PARTY ON RICE SOILS, WATER AND FERTILIZER PRACTICES 1/

Summary

The Ninth Meeting of the Working Party was held at the WHO Building, Manila, by the kind invitation of the Republic of the Philippines, from 3-10 March 1964. Dr. Bhakdi Lusanandana of Thailand presided over the meeting with Mr. P.C. Owen of Australia, and Mr. Bui Huu Tri of Viet-Nam as Vice-Chairmen. Dr. J.J. Doyle of FAO, Rome, was Technical Secretary.

The Meeting was attended by a total of 38 participants, advisers and observers representing 16 governments and organizations. Forty-three working papers were presented including three key invitation papers.

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1/ Presented by Dr. Bhakdi Lusanandana, Chief, Technical Division, Rice Department, Government of Thailand, Bangkok, and Chairman of the Ninth IRC Working Party on Rice Soils, Water and Fertilizer Practices.

The Report of the Ninth Meeting has been published and copies have been dispatched to all member countries of the IRC.

The principal subjects discussed, and referred to the attention of the IRC are as follows:

### 1. Fertilizer Requirements

The twenty-one papers presented dealt with (a) response of crops to various combinations of N, P and K; (b) sources of plant nutrients; (c) time of application; and (d) placement.

The discussions revealed that there is still much to be learned about fertilizer requirements, and that the studies will continue. Time of application and placement received a great deal of attention which led to two recommendations:

- (a) That member countries should undertake investigations of the soil, climate, management conditions under which substantial losses of nutrients occur, with a view to making more of the nutrients available through improvement in the time and method of fertilizer application.
- (b) That member countries should request the assistance of FAO in cooperation with the IAEA in studying the time of application of nitrogen and phosphorus to direct-sown paddy and upland rice.

### 2. Soil Fertility Maintenance in Rice Double-Cropping and in Rotation with Other Crops.

Reports from several important rice-growing countries led to the conclusion that under good management, rotations and double-cropping can result in greatly increased total production per hectare, and even increase yields of individual crops above those obtained under single cropping. Crops successfully used in rotation with rice included legume pastures, wheat, soybeans and potatoes.

### 3. Simple Fertilizer Trials on Cultivators' Fields

In a review paper it was reported that simple fertilizer trials have been conducted in cultivators' fields since 1951 in 14 countries in the Middle and Far East, and that since 1961 the trials have been extended under FAO's FFHC program to as many more countries in the Near East, Africa and Latin America. These trials, conducted under actual farming conditions, provide information which can be used directly in making fertilizer recommendations and also provide background data for the more comprehensive experiments which are required as agriculture advances.

A lengthy discussion on this topic gave rise to the following recommendations:

- (a) That member countries adopt uniform procedures for the selection of experimental sites.

- (b) That reports of results of fertilizer experiments include cost of fertilizer, cost of harvesting, price of the crop, and other data which will assist the farmer in calculating the profit to be made through the use of fertilizer.
- (c) That as an aid to the interpretation of results of experiments, the reports should include information describing soil-water relations, hours of sunshine, cropping history, spacing, time of planting and grain yield per unit of N, P and K.
- (d) That yields be reported in the metric system and, as far as possible, in terms of dried unhusked rice.
- (e) That member countries make available to FAO the results of all fertilizer experiments conducted by them so that the data may be processed and summarized for the use of all rice-growing countries.
- (f) That FAO should prepare and distribute a standard form of presentation of the results of field fertilizer trials including units of measurements.

#### 4. The Role and Uptake of Iron, Manganese and Silicon

From the papers and discussions it was concluded that on the basis of criteria of essentiality, silicon is not an essential element, but that it is, nevertheless, required for the satisfactory growth of rice.

Occurrence of chlorosis in rice in the U.S.A. and its correction by means of iron compounds has given rise to a study of iron-carbon relationships in the rice plant.

#### 5. Analysis of Factors Responsible for Very High Yields of Rice

Two papers and a lengthy discussion on this topic led to the conclusion that high yields of rice can be achieved by (a) the use of large quantities of fertilizer, including compost; (b) providing for oxidative conditions resulting from drainage of the paddy fields during the growth of the plant; and (c) the adoption of lodging-resistant varieties.

It was considered also that further study is required and it was recommended that member countries undertake investigations of the factors responsible for high yields of rice, i.e. in the order of ten tons or more per hectare.

#### 6. Examination of the Characteristics of Soils on which Paddy is Grown under Flooded Conditions

A key paper prepared at the request of the IRC dealt with the feasibility of setting up a capability classification of soils on which rice is grown. It was concluded that it is not possible at present to develop a universally acceptable system and it was, therefore, recommended that member countries undertake studies, including oxidation/reduction relationships, with the object of establishing a system which will be generally applicable to lands on which rice is grown or is likely to be grown.

## 7. Drainage and Irrigation of Rice Soils

A key paper on this topic, prepared at the request of the IRC dealt with (a) optimum state of reduction; (b) drainage at proper intervals during the growth of the rice crop; (c) toxicity arising from decomposition of organic matter under anaerobic conditions; and (d) measurement of redox potential.

In the discussion it was concluded that the most favourable drainage and irrigation schedule varies widely between soils and must be studied for each soil.

The concept of an optimum state of reduction, however, received considerable attention and it was suggested that the development of a method of assessing the state of reduction would be an extremely valuable aid in determining the most favourable time for draining the soil.

## 8. Interpretation of Soil and Plant Analytical Data in Relation to Crop Responses to Fertilizer

A key paper prepared at the request of the IRC dealt with this topic under the headings of (a) soil sampling; (b) calibration of chemical methods of analysis; (c) interpretation of results of chemical analyses; and (d) recommendations to farmers. In the discussion it was learned that soil and plant analyses as a means of predicting fertilizer requirements have been highly developed in certain countries in the temperate zone.

The difficulties of adapting these methods for tropical conditions were, however, emphasized and discussed at some length. From the discussion several recommendations arose:

- (a) That member countries should make a comparative study of all existing methods including "quick tests" with a view to selecting methods which will have a high prediction value under specific soil conditions.
- (b) That because of the difficulty of establishing satisfactory correlation between soil test values and field response of rice to applied nutrients, member countries should attempt to develop a rapid biological method for the determination of the nutrient status of rice soils.
- (c) That member countries intensify their studies of plant and soil with a view to developing a crop-logging technique for assessing the fertilizer needs of the rice crop during the various stages of its growth.
- (d) That member countries should try to develop methods of collecting, storing and examining soil samples from rice fields, and that a special effort be made to study areas potentially suitable for rice growing.

9. Report on the Conference on the Development of the Fertilizer Industry in Asia and the Far East

This Conference, sponsored jointly by FAO and ECAFE was held in Bombay India, in November 1963. An estimate of fertilizer requirements based on food needs and crop response to fertilizer, was made for the Asia and Far East Regions, taking into account certain factors which impede the use of fertilizer. It was estimated that the region comprising Afghanistan, Burma, Ceylon, Hong-Kong, India, Indonesia, Japan, Korea, Pakistan, Philippines, Taiwan, Thailand and Viet-Nam would require 12 million metric tons of plant nutrients in the next 10-15 years.

The Conference also discussed the technical details of the manufacture of different fertilizer elements and examined the economic feasibility of producing them in the region. It was predicted that eventually as much as two-thirds of the fertilizer requirements would be produced within the region.

It was concluded that a program which will make farmers fertilizer-conscious and supply them with cheap locally-produced fertilizer is the key to increased crop production in the region.

DISCUSSION:

It was suggested that two or three important recommendations of each of the Working Parties should be selected for international cooperative action, with the help of member countries. In this connection, it was pointed out that a recommendation of the 1951 Working Party about starting fertilizer tests on farmers' fields has been implemented by most of the member countries. It was emphasized by the delegates that FAO should provide impetus to the member countries for the implementation of important recommendations.

Regarding the chemical analysis of soil as a means of predicting fertilizer requirements, it was pointed out that under greenhouse conditions a highly significant degree of correlation can be obtained between analytical data and responses of crops to fertilizers. However, under the more variable environment, pertaining in the field, a much larger number of experiments is required to obtain a significant correlation. The degree of correlation under these conditions may be so low as to be unsatisfactory for the purpose of making fertilizer recommendations. It was suggested that a higher degree of correlation could be obtained under field conditions only by means of multiple factor analysis which takes into account other factors contributing to plant growth.

It was also pointed out that more particular care should be exercised when interpreting the results of fertilizer tests in deltaic areas because of the uncontrolled water regime.



(c) REPORT OF THE THIRD MEETING OF THE IRC WORKING PARTY ON  
THE AGRICULTURAL ENGINEERING ASPECTS OF RICE PRODUCTION,  
STORAGE AND PROCESSING 1/

Summary

The Third Meeting of the IRC Working Party on the Agricultural Engineering Aspects of Rice Production, Storage and Processing was held at the WHO Building, Manila, by the kind invitation of the Republic of the Philippines from 9-14 March 1964 with Dr. Julian Bulanadi, Philippines, as Chairman and Dr. B.A. Stout as Technical Secretary.

Twenty-five delegates from 11 member countries attended the meeting along with 15 observers. Twenty-seven working papers and documents were distributed.

The Report of the Third Meeting has been published and copies have been distributed to member countries of the IRC.

The subjects on the agenda for the technical discussions included equipment for tillage, transplanting and drilling, plant protection and harvesting.

Tillage Equipment: The data available for comparing various implements are incomplete. Therefore, it is difficult to select the best implement for each operation. The importance of reliable information which can be translated into economic terms was noted.

A centre is required to organize trials and collect comparative data. Some countries already have establishments devoted partly to this work, but they are mostly in the temperate zone. The basic requirements for such a centre are land, labour and power units. It is possible that the equipment itself could be obtained on loan from various sources. A start could be made in a small way perhaps on a state-owned farm. Comparative data could be developed and a search initiated for overall improvements. After the centre becomes operative, simple workshop facilities would enable improvements to be made on the spot. A further development could perhaps involve the giving of courses to extension officers.

A systematic approach leading to new and improved machines involves the evaluation of present equipment to determine the types that will perform the various operations most effectively. A number of testing and research stations have been set up in Europe and other areas. Much progress has been made in standardizing testing procedures and the form of test reports in order that the data collected at one station can be compared with results

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1/ Presented by Dr. Julian Bulanadi, Philippines, Chairman of the Third Meeting of the IRC Working Party on the Agricultural Engineering Aspects of Rice Production, Storage and Processing.

from another station. Some of the established procedures are applicable to equipment used in rice production. Other tools and machines used in rice production no doubt have unique characteristics which will require modification and extension of existing procedures.

Careful planning will be necessary to ensure that the proper type of data is collected and that sufficient accuracy is maintained to permit valid conclusions to be drawn. Procedures must not be too restrictive or complex. Allowances must be made for variations in climate, soils and cropping systems used in various countries.

The Working Party recommended that national centres should be developed where attention would be focussed primarily on tillage operations and that standard procedures should be followed for the development of comparative data. FAO should indicate work on standards in this connection and act as a coordinating body for the information developed by the national centres.

The cultivator of rice in Asia often has little control over water. He waits for the rains to soften the ground and then must continue tillage operations under water. Under such circumstances the implement and power unit operate under very difficult conditions which are unique for rice.

The Working Party agreed that attention should be given to the simplification of mechanical cultivation procedures and that further experiments should be encouraged with the objective of adapting machines for operation under water.

Transplanting and Drilling: The objective of seeding or transplanting is to obtain a specified plant population and distribution of plants that will result in maximum yields per unit of land for maximum economic return. The decision on whether to plant seeds directly or to transplant seedlings is based on many factors including agronomic factors, water control, weather conditions, labour supplies and so on. As labour for transplanting becomes less readily available or more costly, direct seeding could become a common practice.

A number of experimental transplanting machines have an efficiency within the range for practical use, but all require too much time for filling the mechanism with seedlings. The machine-transplanted plots had a lower yield than the hand-transplanted plots because of fewer plants per unit area and lodging of seedlings. Although no rice transplanter has yet succeeded in displacing hand labour on a large scale, there is a great need for such a machine and every effort should be made to encourage further study to develop one.

The Working Party agreed that feasibility studies on transplanting machinery should be conducted at national centres as such centres develop.

As labour becomes less readily available for transplanting and if efficient transplanting machines cannot be developed, direct row seeding may become the immediate successor to transplanting. Direct row seeding of some varieties of rice under wet paddy conditions presents a number of problems. Indica varieties do not germinate successfully under water. 1/

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1/ See report of discussion on this topic.

The seeds must, therefore, be pre-germinated to prevent them from sinking below the surface.

The Working Party recommended that FAO be requested to obtain for member countries information on machines for drilling in rows under wet paddy conditions and that experiments on row seeding should be carried out in national centres.

Plant Protection: Although the limited application of dust by hand is a possibility, the application of liquid in high dispersion is impossible without some form of machine. The use of manpower is tiring and not very effective and is costly if labour is expensive. The internal combustion engine is suitable and can be made mobile. To permit application over a given area, proper access is essential. This may involve row spacing and the adequate control of water. Aerial treatment overcomes many of these problems but introduces other ones.

Harvesting: The engineering problems associated with the harvesting of rice vary considerably depending on the method employed, the extent of lodging, the amount of water in the field and so on. As with other production operations, the selection of the method of harvesting and threshing is guided by economic considerations. The cost of hand or animal powered harvesting and threshing must be compared with the costs of alternative methods. Where labour supplies are inadequate and costs are high, there will be an increasing demand for machines to perform the harvesting and threshing operations.

One approach is to miniaturize and simplify the conventional combines that have been so successful in the highly mechanized countries. Another approach is to develop an entirely new harvesting or threshing machine especially suited for small fields of rice. In this connection the Working Party agreed that studies should be made on the performance of hand tools and small powered threshers. Coordination is needed between agricultural engineers, rice breeders, entomologists and other agricultural scientists.

#### DISCUSSION:

Reference was made to the unsuccessful water seeding of Indica varieties of rice (p.22). It was noted that the statement was not entirely true as Indica varieties can be grown successfully when seeded in shallow water. It is, however, advisable to soak the seeds for 24 to 48 hours before seeding, so that the seeds will sink and thus reduce drifting, and to hasten emergence of the seedlings.

The delegate from France informed the conference that at the last meeting of the International Cereal Chemistry Association (Vienna, June 1964) it was decided, after consideration of the Report of its Rice Group, to undertake cooperative work on the methods of milling control, on grading of heads and broken kernels and on cooking quality.

The general assembly of the Association recommended to undertake this cooperative work in collaboration with FAO and the IRC.

The delegate from France stated further that his country had been requested along with two other countries to undertake studies and trials on the influence of methods of harvesting and drying in the field on the subsequent milled output and quality; but he noted that France could contribute very little in this respect. He would, however, be glad to assist in preparing a program for such trials and studies. The actual work could perhaps be carried out in one of the African countries.

The delegate from Thailand stated that Thailand has recently established a manufacturing plant for producing agricultural equipment for rice production in accordance with the recommendation made by the Third Meeting of the Working Party on the Agricultural Engineering Aspects of Rice Production, Storage and Processing.

The plant will come into production in 1965 and will manufacture mainly specialized equipment for rice production under conditions prevailing in Thailand.

Performance data will be kept on the various pieces of equipment and would be available for comparison with similar data gathered by other member countries according to standard procedures to be set up by FAO.

The delegate from the United Kingdom reported on a research program initiated by his country in South East Asia. The program is to be carried out in three phases.

In the first phase a team will study problems relating to drying of paddy and rice at farm and small mill level, including the drying of par-boiled paddy and rice.

The second phase comprises the analysis of the data collected in the first phase and the construction of prototype machinery to be tested in South East Asia. The second phase also includes studying and reporting on the feasibility of local manufacture.

In the third phase, improved milling and storage methods will be investigated and suitable machinery will be designed. The project is at present in the preparatory stage. The International Rice Commission will be kept informed about the progress of this project.

The delegate from the United Kingdom further reported that small portable paddy threshing machines are already in use in some member countries of the IRC.

A paddy transplanting machine has been developed and has already proven successful under test in South East Asia. With this machine, two workers can plant 2 acres per day. Local manufacturing cost is below £10.

At the time of this meeting, the report on this new transplanter was not yet available, but assurances were given that the IRC Secretariat would receive the report at an early date so that it could be distributed among the IRC member countries. Several delegates expressed keen interest in this transplanting machine.

(d) REPORT OF THE JOINT MEETING OF THE  
THREE IRC WORKING PARTIES

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Summary

The Joint Meeting was held on 9 March 1964 under an arrangement for it to follow the Tenth Meeting of the Working Party on Rice Production and Protection, and the Ninth Meeting of the Working Party on Rice Soils, Water and Fertilizer Practices, and to precede the Third Meeting of the Working Party on the Engineering Aspects of Rice Production, Storage and Processing.

The detailed report of this Joint Meeting was published as an appendix to each of the Meetings of the Working Parties referred to above.

Principal topics discussed and decisions taken at this Joint Meeting were as follows:

Prolonged Storage of Paddy and Milled Rice in Bags and in Bulk under Different Climatic Conditions

After discussing this subject at length, the Joint Meeting recommended that the problem of storage under different climatic conditions, and its importance in conservation, consumption and trade be considered again at the next Joint Meeting of the Working Parties, at which time adequate provision should be made for more thorough discussion.

Tillage and Sowing Practices and their Effect on Yield

Since tillage and sowing practices in relation to rice yields are usually affected by biological or climatic factors, it was suggested that evaluation and selection of tools for their efficiency in the various operations would be the best approach for linking sowing to harvest in terms of yields and costs. Under this title, sod-seeding of rice, and another practice relating to the use of DPA for barnyard grass control, in Australia, were described. It was also proposed that a report on work of this kind being done in the U.S.A. be secured for the next meetings of the Working Parties.

Rice Physiology with Special Reference to Nutrient Metabolism

The Joint Meeting received a Report on the symposium convened by the IRRI 23-28 February 1964 at which 27 participants and 53 observers from 19 countries had been in attendance.

The Meeting agreed that in view of the wide variation in the pattern of nutrient uptake by the rice plant under different conditions of climate, soil, variety, etc. more detailed knowledge is essential for enhancing rice yields. To this end, it strongly recommended international cooperative research in this field.

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1/ Presented by Dr. N. Parthasarathy, Executive Secretary of the IRC.

### Water Management in the Course of Crop Development in Rice

Water requirements during the different stages of rice growth and the critical stages when water shortages would cause serious loss in yield were discussed. It was noted that full documentation on this important subject was needed, especially on the quality and solid matter content of irrigated waters, and also on the legislative aspects of water use as well as on the amount of water required by rice plants under different climatic conditions. It was suggested that FAO compile information on these subjects.

The Joint Meeting recommended that the Member Nations submit reports to the next Joint Meeting of the Working Parties on the following subjects;

1. Experiments made on water requirements for wetland and for upland rice.
2. The qualities of irrigation water, whether from water courses or from groundwater wells, in respect of (a) the chemical composition of such water, and (b) the solid elements contained (turbidity measurements).

The Meeting further recommended that studies be undertaken to compare water requirements actually observed and those determined by the various formulae based on the calculation of evapo-transpiration formulae, taking into account percolation rates in the soil and loss by seepage in the irrigation canals.

### Variety-Fertilizer Interaction

This subject has been engaging the attention of the IRC and its Working Parties since the initiation of the Japonica Indica hybridization project.

The investigations have revealed that highly responsive selections within Indica crosses could be obtained and some of these are now actually in extensive cultivation.

The Meeting noted that research for fertilizer response should be restricted to early varieties and agreed that although field conditions are not duplicated in pot experiments, pot cultures could be useful for evaluating potential response.

### The Proposed International Rice Year     1/

This subject which also appeared on the agenda for the Ninth Session of the IRC was considered by the individual Working Parties and in the Joint Meeting.

Dr. Schickele, Director, Division of Land and Water Development, FAO, Rome, introduced the subject and suggested that the proposed International Rice Year offered a challenge to the Working Parties of the IRC because technical people are well aware of the urgent need to increase rice production. He expressed the opinion that an International Rice Year could stimulate attention and support by national authorities for needed rice improvement programs, and invited technical authorities to consider in quite

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1/ See page 32

specific terms just how much of what is now known could be put into general farm practice.

The Date and Place of the Next Meetings  
of the IRC Working Parties

Although delegates to the Working Parties were not prepared to make commitments concerning the place of the meetings, they urged that:

1. If the three Working Parties could meet in one country, they should meet consecutively and not simultaneously and, if possible, for a little longer.
2. The time and place of the Meetings should be determined as soon as possible to permit adequate programming and paper preparation. The Meetings should be held at the time when the rice crop is in head.
3. Arrangements should be made to have a greater number of "invitation papers" prepared for the occasion.

DISCUSSION:

The following points emerged during the discussion:

1. Cooperative studies on methods of milling control, on size grading of whole and broken rice and on flavour and cooking quality tests, should be undertaken as recommended by the Group on Rice of the International Association of Cereal Chemistry, Vienna.
2. In connection with the variety-fertilizer interaction, it was noted that the response to fertilizers in pot experiments could be considerably different from those obtained under field conditions, because of the competition factors associated with the field experiments. The results, therefore, from pot experiments cannot be assumed to be always applicable under field conditions.

AGENDA ITEM VPROBLEMS RESPECTING RICE PRODUCTION AND IMPROVEMENT  
WHICH REQUIRE URGENT ATTENTION  
AT NATIONAL AND/OR INTERNATIONAL LEVELSMAXIMIZING THE INCOME OF RICE FARMS1/

The primary objective of agricultural planning and development is to make efficient use of natural and human resources to obtain a higher farm income and betterment of rural living conditions.

Agricultural improvement requires the adoption of better farming techniques by individual farmers and their undertaking of timely adjustments in the organization and operation of the farm units to meet changing conditions and so to achieve greater efficiency. Without the farmers' actual participation, national plans and agricultural planning are futile.

New lines of production must also be explored in order to improve farming operations and increase production and income. The adoption of dairy farming in Japan and of hybrid maize in Thailand have tremendously increased the productivity and earning power of many farms in these countries and, more recently, the growing of mushrooms in Taiwan has also led to an increase in the net income of local farmers.

It must be realized that unless the managerial ability of farmers in the Region can be upgraded and the organization and operation of the farming units can be improved, no major increase in rice production and no satisfactory progress in agricultural development can be expected.

Therefore, member countries are urged to consider the following suggestions:

1. The recognition of the importance of management at the farm level, as a pre-requisite for the implementation of agricultural development plans.
2. The allocation of more funds for Farm Management Extension and for conducting research in Farm Management.
3. The establishment of short courses or training centres for farmers in different areas to improve their managerial ability in farm organization and operation.
4. The setting up of more pilot "Integrated Program" areas where, by concerted efforts, the development effects of farm planning and improvement can be fully demonstrated and more field personnel can be trained.

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1/ Summary of an FAO Secretariat Paper



### Discussion:

The delegate from Japan gave examples of how intensified land utilization has led to an increase in farm income in both the north and the south of Japan.

Intensification of land utilization in paddy fields has been achieved by shifting the culture of rice to an earlier or a later part of the season.

In the southern part of Japan, by adopting early season rice culture, various kinds of vegetables are grown in succession after the rice harvest and, as a result, an increase of farm income is obtained.

When late season culture of rice is adopted, tobacco or vegetables can be grown between rows of barley or wheat, thereby producing additional income.

In some parts of northern Japan, by adopting the early culture method, farmers grow feed crops after the harvesting of rice and keep dairy cattle to produce the additional income. In this case, the farmers may purchase small power tillers to replace draft animals and then employ the labor and feed which have been saved to keep dairy cattle.

Stable manure is thus available for the paddy fields and increased rice yields are produced. However, applications of manure must be accompanied by improvement of irrigation and drainage.

### BLAST CONTROL

The delegate from the U.S.A. stated that blast control in the U.S.A. requires increased attention when the fertility of soils is raised by high rates of nitrogen applications and the use of improved rotations. In some areas of Louisiana and Texas, where severe losses are caused by this disease, farmers are urging additional research on control methods.

Efforts to develop blast resistant varieties have been underway for about six years. They involve the following: identification of the prevalent races of Piricularia oryzae; studies of the susceptibility to these races by varieties in the U.S.A.'s World Collection and the mode of inheritance of reaction to each race; selection of breeding lines resistant to the prevalent races; and evaluation of these lines to determine other characteristics. Part of this work is coordinated with research in other countries.

Significant advances have been made and it is anticipated that useful varieties which are resistant to the principal races will be developed.

Research has been done on the chemical control of blast in the United States and additional research is planned. Chemical control is complicated by the fact that some of the chemicals used for this purpose leave a toxic residue in the grain, and some chemicals and antibiotics which control blast are phytotoxic. Chemicals will be screened in an effort to find one that will control the disease without leaving a toxic residue in the grain or damaging the plant.

## VIRUS AND PHYSIOLOGICAL DISEASES

It was suggested by a number of delegates that the so-called physiological diseases may be due to a number of causes, such as viruses, bacteria, nematodes, nutrient imbalance and toxicity, or a number of these occurring together.

The members were informed by the delegate from Japan that since the Tenth Meeting of the Working Party on Rice Production and Protection, held during March 1964, a great deal of information has been obtained on the damage caused to the rice plant by viruses and nematodes. The information obtained in Japan was quite incomplete and it was presumed that such diseases and pests are present in many rice growing countries where no surveys have yet been conducted. During the last symposium held in Japan on rice growing in Malaysia, the Penyakit Merah disease was discussed and many conflicting opinions on its cause were expressed. It was, therefore, suggested that joint investigations by plant physiologists, plant pathologists, soil chemists and entomologists are essential to recognize the causes of the disease. Similar opinions were expressed by the delegate from India regarding the leaf-drying disease associated with the presence of two species of bacteria. The exact knowledge of the influence of temperature and soil factors on the expression of this disease are still not clear. In this connection, the delegate from Indonesia informed the Session that there were many Dutch and Indonesian publications on investigations carried out by early Dutch and Indonesian scientists and that it would be useful if these publications were translated into English by the IRRI.

The delegate from Thailand emphasized the need for extensive studies on virus and physiological diseases. He suggested that the IRC should organize a Work-Shop to give training in methods of studying virus and physiological diseases. He also stated in this connection that damage due to leaf hoppers is increasing and that their effective control presents an urgent problem.

## WEED CONTROL

The delegate from the U.S.A. stated that the control of weeds becomes more important when attempts are made to increase average yields of rice through improved varieties and fertilizer practices. Experimental results have indicated that losses in yield caused by weeds are twice as high in plots with high fertility as in plots with low fertility. It is, therefore, very important for rice growing countries to study losses caused by weeds.

It was suggested that IRC should start a cooperative program to focus world attention on "weed science" with a view to reducing the enormous losses due to weed infestation. The program should include (1) obtaining data on losses due to weeds; (2) conducting cooperative experiments on the effects of weed infestation; (3) conducting cooperative experiments on the evaluation of herbicides; and (4) reporting progress on the results obtained.

The delegate from Indonesia informed the Session that weeds are assuming major importance in the Reclamation of 14 million hectares where upland rice will be grown in Kalimantan, Celebes and Sumatra. It was found very difficult to eradicate alang-alang (Imperata cylindrica) which is a noxious

weed in these areas and the suggestion of the U.S.A. respecting the cooperative program was welcome.

Weed problems are gaining greater attention in Thailand and, although the use of herbicides is becoming more popular among rice farmers, further investigations are necessary in order to find suitable herbicides for control of prevalent weed species.

#### AGRICULTURAL SUPPLIES AND INSTITUTIONAL SERVICES

The delegate from India said that, though considerable progress had been made in total rice production, it is not sufficient to meet India's requirements. Increased agricultural production requires development in the industrial sector to provide agricultural supplies like machinery, cement, fertilizers, chemicals, etc. and improvement in the institutional services like extension, the supply of credit to farmers, storing, grading and marketing organizations, etc.

Attention was also drawn to a number of areas in which research needs to be intensified. These include the technology of parboiling rice, bacterial diseases, nitrogen synthesis by blue-green algae, green manuring practices, soil chemistry under submerged conditions, etc.

#### SUGGESTED RESEARCH AREAS <sup>1/</sup>

In the Philippines rice production is not keeping pace with the consumption requirements of the increasing population. In spite of advances in research and technology in the field of rice production, the traditionally low standard of living of the rice farmers has not improved. The basic social and economic factors involved in the situation constitute an interesting and challenging area of research. In addition to technical studies on factors affecting rice yield, certain other problems relating to rice, such as economic incentives, price structure, marketing, transportation and communication, have been engaging the attention of economists.

Although it is generally recognized that the technical and economic aspects of rice farming are important, human factors are also very important. These include the attitude of the farmers toward work, their willingness to achieve progress and their determination to get themselves out of conditions of poverty, ignorance and isolation.

Differences in attitudes, values and other social-cultural patterns of rural living often tend to accentuate the difficulties of introducing technological changes among rice farmers. The basic problem, therefore, is one of inducing the relevant social changes to go hand in hand with economic programming. In recognition of the importance of the sociological aspects of the rice problem, the following areas of research are therefore suggested:

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<sup>1/</sup> Summary of paper presented by D. L. Umali, Dean,  
University of the Philippines, College of Agriculture.

(1) longitudinal studies on the process of transforming traditional rice culture; (2) farmers' response to different features of improved rice technology; (3) intensive and fairly detailed studies on what farmers know about rice; (4) a study of what extension workers know about rice and the practices they are promoting; and (5) studies of factors operating among agencies and institutions which facilitate or deter the generation, flow, acceptance and implementation of technical information.

Because of the differences in economic conditions, cultural patterns, religion, historical and political backgrounds, the research areas suggested above may not be the most urgent sociological problems of other rice producing countries. Each country has to establish its own system of priority in rice research based on what it considers to be the most limiting factor under the prevailing conditions and circumstances. However, one thing which still holds true for all the nations interested in rice research is the combination of technical, economic and sociological factors which are common to all the countries concerned.

#### AGENDA ITEM VI

#### THE INTERNATIONAL RICE YEAR - 1966

This subject was introduced by a statement by Mr. Soesilo H. Prakoso, the Deputy Regional Representative for Asia and the Far East, in which he referred to the decision that 1966 be declared International Rice Year. He reported that when this subject was discussed at the most recent Meetings of the IRC Working Parties, the general reaction of the delegates had been that for those who are engaged in the various aspects of the rice industry "Every year is International Rice Year". However, at these Meetings, it had been generally agreed that research workers engaged in plant breeding and other techniques relating to the development of improvements in rice production were concerned with the gap existing between the findings of research and the adoption of those findings by farmers. Consequently, the delegates had recognized that any action that would direct greater attention and attract a larger measure of support not only for their work but also for the implementation of improved production practices would be most welcome.

Mr. Prakoso then reported to the Session that at the most recent Session of the FAO Council it had been decided that 1966 would be designated as the International Rice Year.

The Council had agreed that the Organization should play a positive role in guiding and stimulating national action, but it was emphasized that the degree of success of the scheme would depend mainly on the efforts of the individual interested countries. The Council requested the Director-General to give all possible assistance and support to national programs, within the limitations of his Budget.

In his statement at the close of the Council's discussion of this subject, the Director-General was quoted by Mr. Prakoso as having stated that FAO would do everything possible within its budgetary limitations as imposed by the Conference in 1965 to support the Year. Subsequently, the Director-General had indicated that the International Rice Year would be specifically associated with the Freedom-from-Hunger Campaign.

In closing, Mr. Prakoso indicated that the International Rice Commission would no doubt wish to give special attention to the possibilities for supporting and highlighting the objectives of the International Rice Year in the programs of its technical Working Parties and in its own agenda for the Tenth Session which will be held in 1966.

This statement was followed by an outline by Mr. J. Kahane, Chief of the Grains and Rice Branch of the Commodities Division, FAO, who stated that "the International Rice Year is not an invention of FAO; its parents are governments here represented ..."

The purpose of declaring an International Rice Year is "to encourage governments and the rice industries to make a concerted effort to promote, where appropriate, production, consumption, marketing and trade, as well as economic and technical research on rice; to focus world attention on the role that rice could play in furthering the aims of the Freedom-from-Hunger Campaign; and to improve international understanding of the rice economy".

Mr. Kahane referred to specific suggestions for national action in support of the International Rice Year and referred in particular to those of Ceylon, Iraq and Sierra Leone as examples of the kinds of projects which were being planned by national governments. He stated that the principal burden of financing national programs will fall on national budgets, but the existence of the International Rice Year may assist Ministers of Agriculture to gain additional support for activities relating to improved rice production and distribution. Possibilities for aid from outside include the EPTA program, the United Nations Special Fund, the Freedom-from-Hunger Campaign and various bilateral programs.

Regarding action which may be taken by FAO in support of the International Rice Year, Mr. Kahane listed: a series of basic rice studies, special articles and publicity in regular periodicals including the FFHC News and the IRC Newsletter, meetings and seminars and overall news coverage through contacts available to the Organization.

There were several interventions by delegates, all of which were in general support of the plans for the International Rice Year as had been set forth by the members of the FAO Secretariat.

The delegate from Japan reported that his country intends to participate actively in the International Rice Year - 1966. Its intention is to declare a certain fixed period as "International Rice Week" and to enhance the recognition by the Japanese people of the importance of rice in regions of Asia and the Far East through the media of radio and television broadcasts, newspapers and the issuance of postage stamps.

He stated that Japan wished to further its international cooperation in this field and is willing to promote research on rice and to accept trainees for work on rice. Any other projects which could contribute to the success of the International Rice Year will be given sympathetic consideration.

The delegate from India listed a 10-point program being planned in support of International Rice Year in 1966, including a National Rice Week and ten fellowships for nominees of certain countries including the African region for training in rice research at the Central Rice Research Institute, Cuttack. Other proposals included special rice publications, accelerated work on improved varieties, national seminars and special news coverage. The delegate also reported in this connection that FAO may be invited to hold the Tenth Session of the IRC in India in 1966.

The delegate from Indonesia stated that his country supported the International Rice Year because the year comes within the period of the Indonesian National Food Production Campaign. However, Indonesia also supported the view of other delegates that the International Rice Year should be carried out within the budgetary limits referred to by the FAO Council.

#### AGENDA ITEM VII

#### THE EFFECTS OF RESEARCH FINDINGS ON THE AVERAGE

#### YIELD OF RICE DURING RECENT YEARS

Several member countries reported on available data respecting yield increase obtained as a result of the adoption of various research findings in the farming practices in their countries.

The following are the summaries of their reports:

##### Malaysia

Immediately after the war, improvement of rice varieties urgently required attention. The work consisted of finding suitable varieties for the various ecological regions by extensive country-wide variety trials followed by pure line selection of varieties found to be best for individual regions and the recommendation of a few widely adaptable lines to facilitate the seed multiplication and distribution program.

There was a total of 931,000 acres under paddy in 1963. This was an increase of 19 percent in cultivated areas since 1941. The growing of recommended varieties resulted in raising the average yield of rice in Malaysia from 1511 lbs. per acre to about 2240 lbs., representing an increase of nearly 50 percent.

##### Japan

For some time after the end of the war, no increase in the yield of rice had been made because of various adverse conditions such as shortage of production materials. However, the unprecedented good crop of 1955 favoured by good weather marked the start of the increase in yield which

has progressed continuously since then. The present yield of brown rice is nearly 4.5 metric tons per hectare (paddy 5 tons). Compared to the average yield of rice in the post-war period of 1949-1954, the yield in 1954-1963 registered an increase of 22 percent. This increase is attributed to the following:

- (a) Land improvement assisted by investment by the government which covered 950,000 hectares during the last 10 years; this included provision of irrigation and drainage facilities and land consolidation.
- (b) Early maturing blast resistant varieties of rice which respond to heavy applications of fertilizers. (Recently almost all the rice areas were saturated with these new varieties).
- (c) Improved cropping methods such as early season culture made possible by the use of protected nurseries. In the cold region the crop ripened before the onset of low temperatures and in the warm areas rice was harvested one or two months earlier, thus escaping damage by typhoon or akiochi. Further, this practice made it possible for an additional crop to be grown after the rice harvest.
- (d) A nation-wide survey of low productivity areas such as those affected by akiochi helped in finding remedial measures such as the application of silicates, use of fertilizer free from sulphate, and the splitting of applications of fertilizers. In the volcanic ash soil, mostly in the cold regions, a heavy application of phosphatic fertilizers helped in getting significant increases in rice yields.
- (e) Extensive use of DDT and BHC and organo-phosphorus compounds for the control of blast.
- (f) Popularization of highly efficient machines such as power tillers promoted efficiency and timeliness of farm operations. Migration of farm labor to urban industries gave further impetus toward mechanization.

Other factors which assisted in this remarkable progress included (1) the farmers' zeal generated by post-war land reform; (2) progress in the industrial sector which made fertilizers, chemicals and machinery more available; (3) improved extension services, which broadened the knowledge and skill of the farmers; and (4) high support price for rice.

### Thailand

The average yield of rice in Thailand during the past five years has been encouraging. In terms of absolute yield, the national average yield of rice in Thailand has been increasing at an annual rate of about 60 kilograms per hectare. During the period from 1960-1964, average rice yield increased from 1.2 to 1.5 metric tons per hectare. This was an increase of about 25 percent or 5 percent each year. The average rice yield in Thailand is very low compared with some other countries. However, when research findings in various phases of rice culture were employed in small rice areas of the cultivators' fields by farmers themselves, they often obtained yields of 6 metric tons per hectare, which is 3-4 times

the national average yield.

This was especially true when the farmers used higher rates of fertilizer application, improved varieties, seed treatment, proper cultivation practices, and effective pest and disease control.

#### U.S.A.

The five-year average yield of rice increased from 2247 to 4000 kilograms per hectare during the 19-year period from 1945-1963. The increase during the last 9 years was almost twice as much as it had been in the previous 10 years.

This increase is due to the adoption by farmers of improved cultural practices using better varieties, higher rates of fertilizers, better weed and insect control and good irrigation practices. The use of efficient machinery for the preparation of seed beds and leveling of the fields to facilitate control of irrigation water and harvesting are also of great importance. Better types of machinery were produced as a result of combined cooperation between manufacturing firms and agricultural experiment stations.

#### Pakistan

The trend in rice production is encouraging. Annual imports of rice prior to 1960/61 was as much as 386,000 tons. In 1963/64 production not only met home consumption requirements, but provided an exportable surplus of 232,000 tons. While the area under cultivation has increased by 3 percent, the production has increased 11 percent, and the present average yield is about 1.5 tons per hectare. The daily consumption per caput has also increased from 396 grams in 1960/61 to 462 grams in 1963/64.

To a great extent, although the result is not marked, this progress is attributable to the production of high yielding, good quality rice in West Pakistan and a gradual shift from direct seeding to transplanting in East Pakistan, distribution of improved varieties and the start made in extensive aerial application of pesticides by fleets of planes to eradicate pests and diseases. The present area covered under aerial application is about 10 percent. Also, there is an increase in the acceptance by the farmers of the growing of high yielding Japonica varieties. The consumption of fertilizers has increased by 400 percent, and the Government is giving a subsidy of 50 percent to the farmers for fertilizers.

#### Indonesia

On the national basis, the increase of rice production per hectare is still low. For the last 3-4 years, the yield increased from 2.15 tons per hectare to 2.4 metric tons per hectare. However, in the pilot projects (100 hectares each) established by the government, the average yield may have reached up to 6-9 metric tons per hectare, although the results are still subject to statistical analysis. The acceptance of improved practices depends entirely upon the farmer and the problem now is to analyse the human and social aspects for the development of the rural welfare.



## Korea

The most important contribution of rice research has been the development of improved varieties in central and southern regions. Progress is now being made to evolve additional rice varieties suited to central and southern regions. Other phases of the program include the production of varieties adapted to rain-fed paddy areas, to tidal land and to a high level of fertilizer use.

Improved cultural practices relate to early season culture by the use of protected nurseries, deep ploughing and heavy fertilization. Yield increased to as much as 28 percent by ploughing twice the usual depth and application of twice the normal dose of fertilizers. The effect of this cultural practice on yield was more significant in the loamy soils than in the sandy soils.

During the period 1959/63, rice production increased from 2.39 million metric tons to 2.765 million metric tons and the registered increase in yield is from 2,148 to 2.39 metric tons. The Government is planning to push irrigation programs and to give greater emphasis to rice research.

## Philippines

A considerable wealth of information has been made available through the cooperative rice research program conducted by the Bureau of Plant Industry and the UP College of Agriculture. The Philippine Seed Board created in 1955 released 7 improved varieties for uplands and 12 for lowlands. Fertilizer studies have shown that the application of complete fertilizers 12/12/12 at the rate of 135 kilograms per hectare as a basic dose, and 90 kilograms of ammonium sulphate as top dressing is suitable for most of the Philippine rice soils. Several insecticides have been found to be effective for the control of stem-borers and the development of rice varieties for resistance to blast is still in progress. Recent experiments in water management have shown that intermittent irrigation with 15 days submergence at 5 to 10 centimeters depth and 5 days drainage in areas with adequate irrigation facilities is better than continuous submergence.

Though it is difficult to separate the individual effects of research findings, the result of all the factors of production put together, including weather conditions, could be evaluated on the gross yield obtained. Data obtained in the area covered by the Rice and Corn Program launched in 1958 have given a reliable index on the impact of the program in increasing rice yields. The Rice and Corn Program covers 300,000 hectares every year by project action teams consisting of plant pest control officers as team leaders, agricultural extension officers, soil technologists and agricultural credit administration officers as members. Each action team supervises one thousand hectares. The data on the production of the land before and after its inclusion in the program from 1958 to 1963 indicate that over an area of 1,913,391 hectares the average increase in yield amounted to 36.45 percent.

One of the highlights of the Rice and Corn Production Program is the incentive given to the farmers by way of prizes for the highest yield obtained. From 1958-62 the total number of entries in the rice production contest was 6695 and in the 1963 contest, there were 5371 farmers who participated, out of which 1214 were finalists from the different rice regions. There are three categories of contests: production contests on one hectare, five hectares and ten hectares. These contests revealed that,

by applying all the improved methods, an average yield of 8800 kilograms per hectare could be obtained. The highest yield so far registered in this contest is nearly 11,700 kilograms per hectare.

### India

Crop cutting experiments during the first five-year plan showed an all-India increase of an average of 45 kilograms per hectare and in the Madras and Andhra Pradesh States maximum yield increases of 161-175 kilograms per hectare were obtained. During the second five-year plan which ended in 1960-61, the all-India figures showed an increase of 90 kilograms and in Madras State increases of 180 kilograms per hectare were registered. The greater increase in Madras is due to the larger area under irrigation. The Government of India is, therefore, giving high priority to increasing the area under irrigation through major and minor irrigation projects. It was pointed out, however, that in the State of Assam, where the annual rainfall is 2,500 millimeters, no increase in yield has been registered.

### France

Yields of 4 metric tons, or more, per hectare are obtained regularly due to the application of research results, particularly with regard to breeding, fertilizer use and weed control.

## AGENDA ITEM VIII

### "MAKING IT POSSIBLE FOR FARMERS TO EMPLOY THE FINDINGS OF RESEARCH"

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### Introduction

This was one of the major topics for discussion at the Ninth Session of the Commission. It has particular significance for Asian countries, where the food production has in recent years lagged behind the population growth. It was gratifying to learn that a similar topic would be featured at the Seventh FAO Regional Conference, due to follow immediately after the IRC Session. This was an intentional effort on the part of those who planned the agenda to meet the wishes and needs of member governments in their drive for an increase in food and agricultural production.

In the final analysis, it is the farmer who must employ the findings of research to produce more and better food. The farmer should therefore be the central figure in any agricultural development plans. Whether he can

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1/ Summary of an Introduction by C.W. Chang, Regional Agricultural Adviser, FAO Regional Office, Bangkok, Thailand.

employ the findings of research, or to what extent he can employ them, depends on two major factors. One is the farmer himself, and he must be given the necessary training so that he is able to put new ideas and new methods to work. This can be accomplished by the establishment of effective extension services, which aim at the development of people through various educational means. Unless people are changed, no permanent improvement can be achieved. Physical and economic accomplishments become sterile without the development of people. These accomplishments are only a result of people's development. This, of course, is a tremendous task, because in any developing country, there are millions of people engaged in farming. However, there is no short-cut. The sooner the country starts the farmers' training program, the better will be the chance for agricultural improvement.

The other factor is concerned with the conditions within which the farmer carries on his operations. These conditions include production supplies, marketing and credit facilities, irrigation and drainage installations, land consolidation, land tenure systems and transportation means. All these conditions will determine to what extent the farmer can employ the findings of research to improve his farm operations. Production supplies, for example, include such things as improved seeds, improved farm implements, fertilizers, insecticides and sprayers. Are these supplies made available to the farmer in time, in suitable amounts, on reasonable terms and within easy reach? What about the produce? Is there a ready market for it? What about credit? Is it readily available? These and other related questions must be answered to his satisfaction, before the farmer will make a decision on improvement. This led the Government of India in 1960 to launch an Intensive Agricultural District Program in selected areas for accelerating agricultural production. It is beyond doubt that this is a correct approach, and that it will have a far-reaching effect in the due course of time toward increasing agricultural production in areas covered by the program.

#### DISCUSSION:

The delegate from France said that, unless the findings of research were put into general use by the farming population, the effort of the three Working Parties of the Commission would be in vain.

The delegate from Malaysia stressed the importance of the division of responsibilities between the government and the farm people, although they should work together as partners. He gave an outline of his government's plans for the development of extension education at the farm level and vocational education at the intermediate level. He also informed the Session that his government was strengthening farmers' organizations so that they could do the things they should do themselves.

The delegate from the U.S.A. described demonstrations as an effective means of extension. Such demonstrations were carried out on experiment stations as well as on cultivators' fields and farmers were brought there to see the demonstrations. The delegate from Japan emphasized the importance of using subsidies in some cases, as an incentive to agricultural improvement. Examples were given on the extension of protected rice nurseries and insect and disease control measures.

The delegate from India gave further explanation on the Intensive Agricultural District Program and the Intensive Cultivation Program on Paddy, which had been launched in the country in recent years. In essence,

these programs consist of a "package of improved practices" and a "package of services". This was an effort on the part of the government to create favourable conditions for the farmer to improve his farm operations. Considerable improvements in the yield of rice have been obtained.

The delegate from the Philippines informed the Session about the transformation of the former Bureau of Agricultural Extension to the present Commission on Agricultural Productivity, with its headquarters in the office of the President, for the purpose of coordinating various government agencies in the matter of assisting farmers in their agricultural improvement. He also explained the relative merits of the "team approach" and the "individual approach" to village problems.

The delegate from Burma reported on the use of the state farms not only for the multiplication of improved seeds but also for demonstration and training purposes. Short-term training courses for farmers were held at these state farms throughout the year. He also referred to improvements in marketing facilities.

The delegate from Pakistan emphasized the wide gap between knowledge and application and suggested that this was due in large measure to the low literacy rate of subsistence farmers and insufficient training of extension workers. He then explained how improved seeds were multiplied by "certified farmers"; and such multiplied seeds were purchased by the government at a premium and sold to farmers at a reduced rate through "Service Cooperative Societies".

The delegate from Indonesia reported that his government had set up a National Council on Production in 1962, with authority to mobilize all government and private bodies concerned with the increase of production. One of the many activities of the Council was to assign all graduate students of agricultural faculties in the country to live in pilot project areas for six months and to work with farmers, advising them on the use of proven practices. These pilot areas range from 50 to 100 hectares each, and serve as centers of information on agricultural improvement and pure seed multiplication. The result so far had been most encouraging.

The delegate from Thailand reported that his government had adopted, among others, the following measures for increasing agricultural production: emphasizing research of a practical nature, intensive field training of extension workers, small trials in cultivators' fields, establishing comparatively large pilot demonstration areas, and organizing progressive farmers into farm improvement clubs.

The delegate from Viet-Nam stressed the importance of the sociological approach to agricultural and rural problems. This is especially important for those who are to work in remote areas. Technical know-how is needed, but it must be rendered in such a way so as to be acceptable to the people.

AGENDA ITEM IX

THE RESEARCH PROGRAM OF THE INTERNATIONAL RICE RESEARCH  
INSTITUTE, AND POSSIBILITIES FOR COLLABORATION WITH  
OTHER RESEARCH INSTITUTIONS IN MEMBER COUNTRIES

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Located 40 miles south of Manila in the Philippines, the International Rice Research Institute derives most of its financial support from the Rockefeller Foundation and the Ford Foundation. The Institute is a registered, non-profit Philippine corporation with an international Board of Trustees.

A rice breeding program, parts of it now in the F-4 generation, shows promise of developing within the next two years, high-yielding, nitrogen-responding varieties that are short, stiff-strawed, early maturing, non-photoperiod sensitive, and resistant to the rice blast disease. It is expected that these varieties will have wide adaptability on well-managed soils throughout the rice-growing regions of the tropics and, if generally used, could contribute greatly to the total production of rice.

Remarkable control of the rice stem borers is being obtained with the gamma isomer of benzene hexachloride applied to the irrigation water as a systemic insecticide. This chemical has low mammalian toxicity, and two applications seem sufficient in a single growing season.

Studies in plant physiology have definitely shown that the early lodging and low yields that occur in the cloudy, monsoon season are associated with a deficiency of carbohydrates within the rice plant. This deficiency appears to result from the low light intensity caused by clouds and by the mutual shading of the plants. Nitrogen responsiveness seems to be positively correlated with light intensity.

Institute scientists are steadily gaining information on spacing, crop rotations, and fertilizer requirements of the rice plant. They are studying chemical weed control, water losses, drought tolerance, photo-periodism, the carbohydrate and nitrogen metabolism of the rice plant itself, and the cooking, eating, and nutritional value of the grain. Extensive studies of the chemical and microbiological aspects of flooded soils are under way. Plant pathologists screened more than 6,000 varieties for resistance to the rice blast disease, helped establish blast nurseries in more than 15 countries, expanded work on viruses, and initiated studies of bacterial diseases.

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1/ Summary of a report by Robert F. Chandler, Jr., Director, I.R.R.I., Los Banos, Philippines

The statistician is studying sample size, sample number, plot size and shape for efficient data collection, and the agricultural economist is studying the cost of new technologies and other economic problems associated with rice production and marketing. The agricultural engineer is developing more efficient tillage and threshing machinery, and the communication specialist is working on procedures and studies for the effective dissemination of the research results to national agencies and through them to rice producers.

Principal activities in the international program include the residence training of 65 scholars and fellows, five international symposia (on genetics and cytogenetics of rice, the rice blast disease, the agricultural engineering aspects of rice production, the mineral nutrition of the rice plant, and the major insect pests of rice), a growing program of cooperative research throughout the rice-growing world, and extensive staff travel in connection with these projects and future cooperative efforts.

The cooperative program is being extended to other countries through existing research and educational institutions concerned with rice. The sort of cooperative experiments vary greatly from country to country and can involve any research problem which is of importance in a given country. Some of the cooperative programs which are now in full swing include the establishment of over 40 uniform blast test nurseries in more than 20 rice-growing countries. This work was formerly handled by FAO but is now supervised by the Institute, in cooperation with FAO. More than 4,000 samples of rice varieties have been sent to over 50 institutions in 30 different countries for testing. At the present time, these varieties are from the Institute's world collection of over 10,000 varieties. In the very near future, however, considerable genetic material will be sent out from the Institute which will have been developed by plant breeders on the IRRI staff. This, undoubtedly, will be the most important single cooperative program which the Institute will conduct during the years ahead.

This statement is made because it seems apparent that, unless there is a drastic change in the type of rice plant grown in Southeast Asia, there is no hope that yields can be greatly increased. The Institute, through its plant physiologists, has established uniform rice trials in many countries in Southeast Asia in an attempt to determine the influence of environment on rice yields when the plants are managed in the same way. This work was conducted during the past year. Now a similar study is being conducted employing the practice considered to be the best in each country, to determine under what conditions maximum yields can be obtained.

The Institute provides the extra funds needed to conduct such experiments while the cooperating institution provides the personnel and land. Other cooperative projects now being conducted include studies of the suffocating disease in Taiwan, studies of yield levels under different management conditions and with improved varieties in the Philippines, and studies of the chemical and physical properties of rice soils in Southeast Asia in cooperation with the Southeast Asian Studies program of Kyoto University. Actually, many other isolated cooperative projects are in existence at the present time and new ones will be started as the current ones are finished.

During the years ahead, it is the expectation of the Ford Foundation and the Rockefeller Foundation, in cooperation with the Institute, to station a few specialists in each of several Southeast Asian countries to further promote the extension of varieties and cultural methods into the

other countries and to establish a two-way flow between the various countries and the Institute so that there will be a better understanding of the many special problems which face the various rice-growing regions of the world.

During discussion, the Commission commended the IRRI for developing short duration non-photosensitive rice varieties with a high yield potential. It was, however, noted that such varieties have not yet been tested in other countries. The Institute assured the Session that it will cooperate fully in assisting the experiment stations of member countries by supplying to them seed of the new varieties.

Apart from assisting the Southeast Asian countries, the Institute intends to assist countries outside the Asian area by sending scientists there from time to time. It was generally agreed by the delegates that member countries have been receiving fullest cooperation from the IRRI. Through the collection of germ-plasm and its maintenance, the Institute would help substantially in rice production in the region, provided similar results could be obtained at stations in other countries.

It was also pointed out that apart from high yields, the quality of rice for consumption in different areas was important and the Commission was informed that the Institute was taking this into consideration in its breeding program. It was further recognized that the new high-yielding varieties could only perform satisfactorily under high-fertility conditions, and might even show inferior yields under conditions of poor soil fertility. It is, therefore, necessary to grow these with the application of higher doses of fertilizers, and if the full potential of these high-yielding varieties is to be exploited, member countries might have to consider the possibility of giving incentives to farmers, through adequate fertilizer supplies, subsidies, credits, price supports, etc.

The Commission also commended the IRRI for research aimed at the development to more efficient machines for preparing the seed bed and for harvesting and threshing rice. Although this phase of the research has not progressed to the same extent as the research on breeding, pest control, and fertilizers, promising research is under way.

#### AGENDA ITEM X

##### THE NATURE AND SCOPE OF FUTURE IRC ACTIVITIES

###### Introduction

Reference was made to the Secretariat Working Paper designated as IRC/1964/X-a which had been transmitted to all IRC member countries in a Circular State Letter numbered G/A-X/773 (TE). Copies of the Working Paper had also been provided to all delegates on the opening day of the Ninth Session.

It was pointed out that notes on the Provisional Agenda, transmitted to the IRC Member Countries as document G/A-X/756 (TE) indicated that establishment of Regional Committees of the IRC would be proposed to the Session.

It was noted that participation in IRC activities had been concentrated quite naturally in the Far East.

The comment was offered that the functions of the IRC would be well served if measures were taken to encourage more active participation by countries lying within regions where some considerable quantities of rice are being produced and/or where there are real prospects for developing significant increases but which -- through the realities of geography -- are simply too remote from the IRC activities currently in operation. On various occasions, the establishment of one or more such committees has been proposed as a realistic measure to enable more active participation in IRC activities by such groups of countries.

The Seventh FAO Regional Conference for Latin America in November 1962, at Rio de Janeiro, approved a suggestion that a Sub-Commission of the IRC be located in Latin America. In a communication to the Director-General, dated 12 August 1964, the Government of Brazil requested that this matter be put before the Ninth Session of the IRC and recently the Director-General had been notified of support for Brazil's proposal by the Governments of Venezuela, Mexico and the Dominican Republic.

The delegates were advised that the proposal to establish regional committees within the structure of the IRC was supported in the Secretariat paper under discussion and that this paper went on to propose that provisions also be made for the establishment of two regional committees - one for the Americas and one for the FAO African Region.

It was noted that the Brazilian proposal employed the term "Inter-American Sub-Commission". However, because the IRC is empowered by its Constitution only to establish Committees and Working Parties and in order to avoid any possible confusion with other established bodies, it would be preferable to employ the term "The International Rice Commission Inter-Regional Committee for the Americas".

Attention was drawn to the fact that should the Commission wish to amend its Rules of Procedure in order to provide that Spanish be a working language of the International Rice Commission, 24 hours notice and a two-thirds majority of the membership in the Commission is required for such an amendment.

#### DISCUSSION:

The delegate from Brazil referred to his country's proposal for the establishment of an IRC Regional Committee for the Americas and enumerated a number of problems concerning rice which a more active participation in IRC programs might help to solve.

His presentation included the following:

- (a) Agreement with the name of the Committee as proposed by FAO.
- (b) Recognition of the financial limitations and the suggested provisional solutions as set forth in the Secretariat paper.
- (c) The view that any special provisions regarding the use of the Spanish language could be postponed at the present time.



- (d) The view that the seat of the proposed IRC Regional Committee for the Americas should be located at the same place as one of the FAO Regional Offices for Latin America.

Considerable discussion followed in the course of which the objectives of the proposed Committees were recognized and views expressed that such Committees would stimulate, encourage and coordinate rice research and improvement activities in the countries to be served by them.

There was, however, a warning that establishment of regional Committees could lead to fragmentation of the IRC as an international body and that countries within regions having their own rice Committees might be even less inclined to participate in IRC Sessions or Working Party Meetings convened elsewhere. They could thus lose one of the main benefits of the IRC - that of contacts with world rice specialists.

Finally, in recognition of the strong representations for the establishment of a coordinating link between the IRC and rice producing countries in the Americas and in Africa, there was general agreement to the following recommendation:

#### The International Rice Commission

Considering the increasing importance of rice in the Americas and in the African regions; and

Considering the importance of the assistance which the Commission can give to these regions; and

Considering the interest and usefulness of contacts between rice specialists in the different parts of the world and the mutual advantage their countries can derive from these contacts; and

Considering the necessity of generating increased interest in the international aspects of rice production in regions in addition to Asia and the Far East -

Recommends that the Director-General organize IRC Rice Committees composed of member states in the Americas and in Africa respectively, with seats at the respective FAO Regional Offices for Latin America and for Africa.

These two Committees would have the task, among others, of:

- (a) promoting the participation of the countries in each region in meetings and activities of the IRC and its Working Parties by various means, including:
- collecting scientific, technical and economic information;
  - preparing working documents concerning each agenda item of the meetings of the Working Parties;
  - studying problems to be submitted to these groups;

- urging member countries to send participants at the national or regional level, to meetings of the Working Parties of the IRC and to sessions of the IRC;
- (b) ensuring, where applicable, that the recommendations formulated by the Working Parties and approved by the IRC and the Conference of FAO be put into operation;
- (c) reporting their activities to the IRC or its Working Parties;

and further recommends that the Director-General study the possibility of organizing some of the meetings of the Working Parties and sessions of the IRC in rotation in interested regions.

After the unanimous adoption of this recommendation, the delegate from Brazil congratulated the Drafting Committee and the Session for having prepared and adopted a very satisfactory, useful and meaningful recommendation which had his full endorsement.

#### AGENDA ITEM XI

#### DATE AND PLACE OF THE TENTH SESSION OF THE INTERNATIONAL RICE COMMISSION AND OF THE MEETINGS OF THE WORKING PARTIES 1/

#### Meetings of the Working Parties

The delegate from the United States of America reported that his government may issue an invitation for the next Meetings of the IRC Working Parties to be held in the U.S.A. in 1966. He said that his government would advise the Executive Secretary as soon as a decision was taken. If the invitation were issued, the date of the Meetings would probably be in August or September 1966 and they would be held in a rice growing area just prior to harvest.

#### The Tenth Session of the International Rice Commission

The delegate from India similarly reported that his government was considering the possibility of inviting FAO to convene the next Session of the International Rice Commission in India in 1966.

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1/ See page 27

CONCLUSION OF THE SESSION

Following the adoption of the Acknowledgments listed elsewhere in the Report, several delegates gave expressions to their sincere appreciation of all aspects of the Session and the arrangements which had been made for the convenience of the delegates.

The delegate from Nepal, who had been welcomed as an observer at the Session, while noting his interest in and the usefulness of the information gathered in the course of the Session, reported that his country would probably become a member of the IRC in the near future.



DOCUMENTATION

PAPERS PRESENTED TO THE NINTH SESSION OF THE  
INTERNATIONAL RICE COMMISSION  
BY DELEGATIONS FROM MEMBER COUNTRIES  
AND BY THE FAO SECRETARIAT

- IRC/64/2      Provisional Agenda --- FAO
- IRC/64/3      Progress Report of the Executive Secretary on the Work of the Commission since its Eighth Session --- FAO
- IRC/64/4-a    Report of the 10th Meeting of the Working Party on Rice Production and Protection of the IRC --- FAO
- 4-b      Report of the 9th Meeting of the Working Party on Rice Soils, Water and Fertilizer Practices of the IRC --- FAO
- 4-c      Report of the 3rd Meeting of the Working Party on the Agricultural Engineering Aspects of Rice Production, Storage and Processing of the IRC --- FAO
- 4-d      Equipment for Rice Production --- Thailand
- 4-e      Identity of the Diseases and Abnormalities of Rice Crop of Unknown and/or Doubtful Causes --- Japan
- 4-f      Report and Discussion on Meetings of the Working Parties - Korea
- 4-g      Theory and Practice of Growing Rice --- Japan
- 4-h      Working Party on Rice Production, Storage and Processing --- Philippines
- 4-i      Suggested Research Areas on Rice --- Philippines
- 4-j      Drying Registered Rice Seeds --- Philippines
- 4-k      Available Comparative Data on Tillage Equipment --- Philippines
- 4-l      Scheduling Irrigation and Drainage to Increase Rice Production --- Philippines
- IRC/64/5-a    Maximizing Income of Rice Farms --- FAO
- 5-b      Weeds in Rice - an International Problem --- U.S.A.
- 5-c      Blast Control, a Problem Requiring Urgent Attention in the United States --- U.S.A.
- 5-d      Reporting of the Meeting of the Committee on the Preparation of Farm Management Manual for the Use of Agricultural Research Workers in Asia and the Far East --- FAO

APPENDIX A

- IRC/64/5-e Rice in Pakistan --- Pakistan
- 5-f Farm Management Manual --- FAO
- IRC/64/7-a The Effects of Rice Breeding on the Average Rice Yields in Malaya --- Malaysia
- 7-b The Effects of Research Findings on the Average Yield of Rice in Recent Years --- Philippines
- 7-c The Effects of Research Findings on the Average Yield of Rice in the United States --- U.S.A.
- 7-d Average Hectare Yield of Rice in Japan as a Fruitful Result of Research Works in Recent Years --- Japan
- 7-f Effects of Research Findings on the Average Yield of Rice During Recent Years --- Korea
- IRC/64/8-a Making it Possible for Farmers to Employ the Findings of Research --- FAO
- 8-b Malinja - A New Rice Variety for Double-Cropping in Malaya --- Malaysia
- 8-c Observational Rice Variety Plots Help Convey Research Findings to Growers --- U.S.A.
- 8-d Some Examples Where the Research Findings Have Fully Been Utilized by Farmers --- Japan
- 8-e Farmers' Associations and Their Contributions Toward Agricultural and Rural Development in Taiwan --- FAO
- 8-f Extension Education for Agricultural and Rural Development - FAO
- 8-g Present Status of Agricultural Research Development in Asia and the Far East --- FAO
- 8-h Director of Agricultural Research Institutes and Experiment Stations in Asia and the Far East --- FAO
- 8-i Supplement to 8-h --- FAO
- 8-j Making it Possible for Farmers to Employ the Findings of Research --- Philippines
- 8-k Technical Services of the Bureau of Soils --- Philippines
- IRC/64/9 The Research Program of the International Rice Research Institute and Possibilities for Collaboration with Other Research Institutions in Member Countries --- IRRI
- IRC/64/10a The Nature and Scope of Future IRC Activities --- FAO
- IRC/64/Gen-1 Abstracts of Researches on Rice at the Central Luzon States University, 1963 and 1964 --- Philippines



