INTERNATIONAL RICE COMMISSION

Report of the Second Session
Rangoon, Burma, 6 - 11 February 1950

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Bangkok, Thailand.
February 1950

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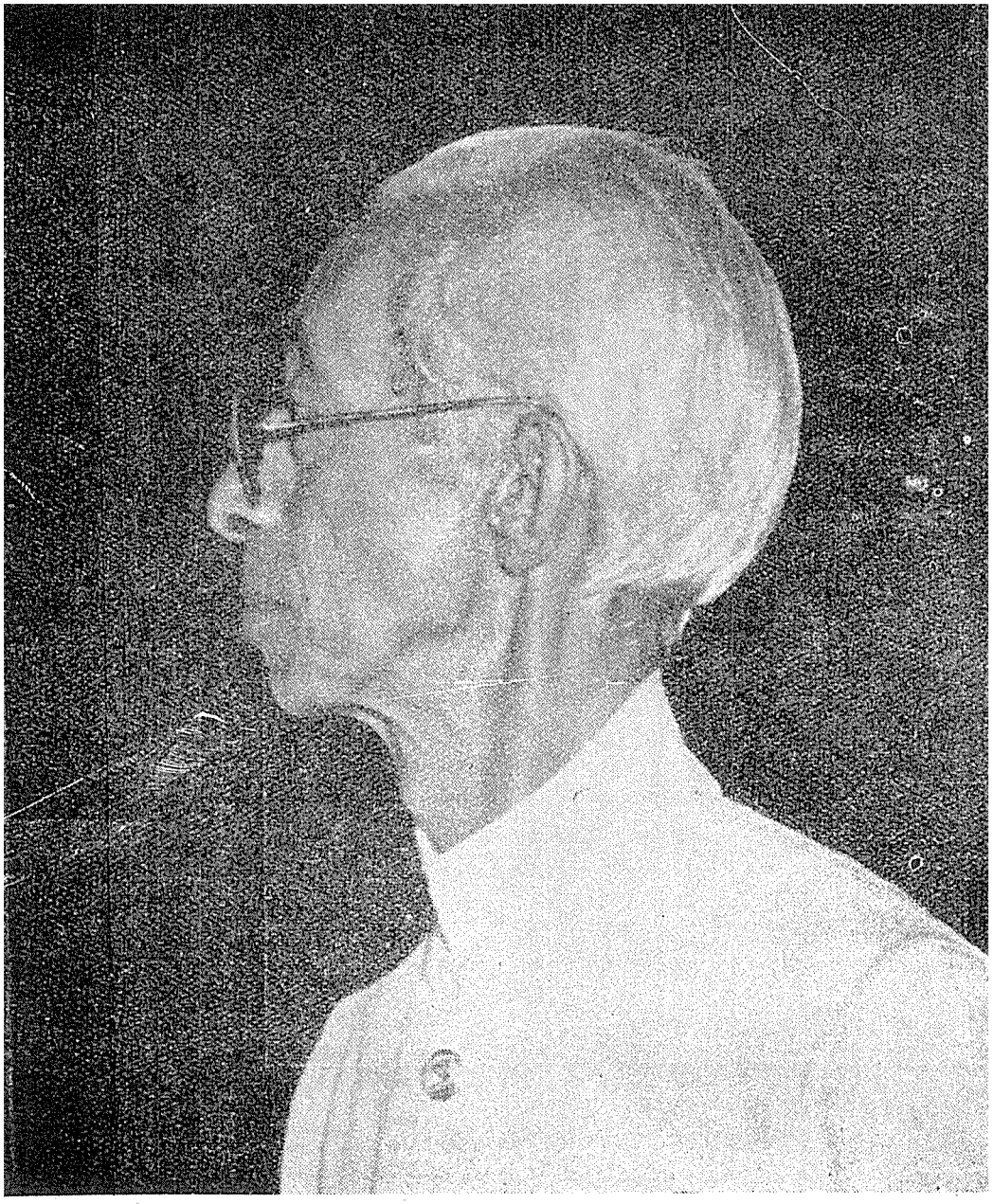


H.S.H. Prince Sithiporn Kridakara of Thailand,
Chairman of the International Rice Commission

FOREWORD

HAVING been again highly honored by my colleagues in reelecting me as their Chairman, it falls upon me once more to write a foreword to the report of the second session of the International Rice Commission.

The second session was able to complete its deliberations in six days, instead of eleven as it was originally planned, due to the following three reasons :

(1) As recommended by the Commission at the first session, 1949, the second meeting of the FAO Nutrition Committee for South and East Asia was held at Rangoon just prior to the Commission's second session and so the nutritional aspects of rice were thoroughly covered by the Nutrition Committee, whose Chairman introduced and tabled his report for the information of the Commission.

This report was fully endorsed by the Commission and now becomes a a part of the report of the Commission.

(2) There was a considerable amount of what may be called "unfinished business". That is to say, many of the projects undertaken by the Commission for 1949–50 were in the nature of gathering information on the various aspects of rice production. Information gathered from different countries was to be summarized and distributed to member countries of the Commission for discussion at the following sessions.

In practice it has been found that the interval of less than one year from one meeting to the next does not give enough time to gather, summarize and distribute the information sufficiently far in advance for the thorough study necessary for effective discussion. This difficulty should not occur in the future, as the Commission has decided to hold it's future sessions biennially.

(3) The Rice Breeders' Working Party, which met just previous to the second session, had thoroughly prepared the ground for the most important part of the work of the session, and had submitted comprehensive recommendations to the Commission for consideration and action. (See Appendix A for the full report.)

The most important recommendation of the Working Party was to initiate rice hybridization work at a central station as a cooperative undertaking by the member countries.

The Commission wholeheartedly approved the recommendation. Since the sum of money required for the first three years of the work is modest, I want to urge that all member Governments quickly respond to the appeal for contributions so that there may be no delay in initiating work this year.

In this connection, I would like to summarize some of the remarks I made during the second session.

Since the first session of the Commission, I have constantly felt that we should be doing something to justify our existence. I am sure that this feeling was shared by many other Delegates who hoped that the second session would not end only in some more reports.

The reason for this feeling was the usual criticism that these meetings are nothing but talk. Whilst it is true that at the meeting itself all we can do is to talk, what is required is that something worth-while should come out of the talk, that will benefit the rice farmers of the world, and of Asia in particular, in view of the fact that 90% of world rice production is due to the labors of Asiatic farmers.

With this point in view, the Rice Breeders Working Party was called into being. It consists of some of the best rice breeders of the world. It would be a great disappointment to them, should its most worth-while recommendation bear no fruit. We must do our best to translate it into action and not waste another year in vain.

The results of plant breeding may be slow but they are sure. Wheat breeding has achieved spectacular results. If we work on rice breeding to a similar extent, there is no reason to believe that we cannot in due time produce new varieties of rice, which will give high yields. It is the high yield that appeals to farmers all over the world. Improved varieties can yield as high as 20–30% more than native varieties. It is an urgent necessity for our rice farmers to increase their production, if they are to improve their standard of living.

The planting of high yielding varieties is the cheapest method of increasing production, but it takes time to produce these varieties. That is why it is so important to start as soon as possible work on a central hybridization station, in order not to lose a whole year.

It will be interesting to note that the hybridization work recommended

by the Working Party is the crossing of the indica and japonica types of rice. Broadly speaking, the indica type which is the long grain rice is adapted to hot climates and has the ability to produce a fair crop on soils with low fertility, but is unable to make good use of applied fertilizers over and above a certain point. For instance in my own country, no amount of fertilization will give yields higher than 2,500 kgs. per hectare, and similar results have been experienced in Burma and some other countries growing the indica type.

The japonica type is the short or round grain rice, adapted to cool climates. It gives very poor yields on soils with low fertility but is able to make full use of fertilizers to get very high yields, as in Italy and Japan.

The aim of crossing these two types is to combine their good qualities in order to produce a new strain which will give high yield and respond well to fertilization. In other words we cannot hope to get the highest yields from use of fertilizers in tropical regions, until we get varieties of rice which can make full use of them.

Therefore it is my earnest hope that Heads of Delegations will do their best to prevail upon their respective Governments to contribute the required amount of support to the project.

Increased yields from fertilization will be the next problem to be taken up by the Commission. Consequently, it has been agreed to set up a working party on fertilizers.

It will be noted that whilst the Commission will in the future hold its sessions biennially, working parties will meet at least once a year, since, in the words of the report of the Working Party, "experience indicates that frequent opportunities for collaboration are not only desirable but essential for the conduct and effective prosecution of scientific investigations."

At the first session it was agreed that the Executive Secretary be requested to issue newsletters at appropriate intervals from material to be submitted by member countries. Unfortunately no material was submitted, so the newsletter never materialized.

I am well aware that "rushing into print" is frowned upon by scientists, and rightly so, if the subject matter pertains to the results of research work. But a newsletter need not be confined to the proved results only; it can give information on work done, projects undertaken, or matters of interest, especially since the Commission will meet only once in two years. During the intervals, we do need some means for the exchange of information to keep up interest.

For instance, at this last session, we learned amongst other things that

biological control of rice stem borer was giving hopeful results in India; the chopped leaves or better still the extract of the fruit of a tree (Milletia ichthyochtona) is being used successfully in Viet Nam to control crabs in paddy fields; in Surinam, a project is under consideration to drain swamp land for conversion into "polders", as in Holland, on which mechanized rice cultivation will be undertaken; under the auspices of the Philippine Government, mechanized rice cultivation on a large scale is already in full operation in Mindanao; but in contrast to the Surinam project, it is being carried out on high land and upland rice is being grown without flooding; and in private conversation I learned of an interesting project in Indonesia to start a number of experimental or demonstration farms for mixed farming, in which upland rice would be one of the crops grown.

As a matter of fact one of the projects of the Commission for 1949/50 was the undertaking by the Government of the Philippines of experimental work on the economics of mechanized rice culture, and we could have got a full report of the work at Mindanao for discussion, but unfortunately the Philippine Delegation did not arrive until the last day of the session, owing to the lack of suitable plane connections to Rangoon. Whilst the report will be mimeographed and distributed to member countries, a discussion has not been possible, and, as things now stand, we may not be able to hear more about this interesting project for another two years.

I suggest that further developments of the project would form very suitable material for a newsletter; the subject is surely "newsworthy" as are the other matters I have mentioned. Besides giving information on interesting developments relating to rice production and utilization, newsletters will help to keep us in touch and maintain interest in what should be a "going concern."

Growing upland rice on a big scale as in the Philippines and "mixed farming" in the tropics as projected in Indonesia are certainly interesting developments, and on thinking it over it appears to me that the problem of crop rotation for upland rice has been passed over rather too cursorily by the Commission. Whilst crop rotation is an accepted practice in agriculture, it may be out of place to grow lowland rice in rotation, especially in the tropics where lowlying lands with plentiful supply of water produce the highest yields of rice. But it is questionable whether upland rice can be grown continuously without rotating with other crops.

Moreover, world population is increasing at such a rate as to call forth grave warnings from the conservationists. Agricultural science may achieve increasing yields per unit area and thus perhaps produce sufficient food to keep up with the population increase, but the latter must find more space to live in.

It would be highly undesirable to see further fragmentation of agricultural holdings, which, in Asiatic countries at least, are already small and in some countries even too small for the well being of the farm family, so that increases in the lowland rice farming population must be accommodated elsewhere than in the present cultivated area. Expansion of area in lowland rice is taking place and will continue to take place, but there is a limit to the amount of suitable land, and the general understanding is that in Asia this limit is not so far off. The consequence will be that the area in upland rice will tend to increase, by the traditional method of forest clearings and shifting hand hoe cultivation, which I need hardly say, would be disastrous if carried too far, as under the circumstances it will inevitably be.

The alternative is that on the upland farms, crop rotation and soil conservation will have to be practiced to keep up the fertility of the soil. In short, instead of forest destruction and shifting cultivation on barely a subsistance level, the aim should be a permanent form of upland agriculture, which will provide a living comparable to a lowland rice farm.

The same idea may be behind the mixed farming project of Indonesia, which should therefore merit our attention, if there is any truth in what I have said above. It may be that this is looking so far ahead as to be visionary. But if we are to believe the conservationists, we shall have to begin to consider the matter seriously sometime, so why not now?

The problems to be solved are many, and they can only be solved by trials and experiments, which in their very nature must take a long time before we can acquire the knowledge necessary to formulate policies for the well being of the increasing rural populations of the future.

I must admit, that as my own farming is with upland crops I may be biased and attach undue importance to the subject, so I shall await with interest the outcome of the International Meeting on Land Utilization in Tropical Regions due to take place in Ceylon in August next. If a farmer's views are shared by experts and scientists, then I think the subject may well be taken up again at the next session of the Commission.

Sitthiporn Kridakara

CHAPTER I

INTRODUCTION

THE International Rice Commission held its second session in Rangoon, from February 6 to 11, 1950, at the invitation of the Government of the Union of Burma. Prior to this meeting, the Rice Breeders Working Party met for the first time from February 1 to 4 in the same place to formulate a comprehensive program for rice improvement for the consideration of the Commission at its second session. The second meeting of the Nutrition Committee for South and East Asia also took place in Rangoon from January 30 to February 4 to discuss the nutritional aspects of rice. In conjunction with all these meetings there was an exhibition of rice milling and processing machinery, in accordance with the recommendation of the first session of the Commission.

The purpose of the second session of the Commission was to review the work of the past year and to make plans for the future. At the opening meeting, Mr. W. H. Cummings, Executive Secretary of the Commission, reviewed the work of the previous year, while Dr. Ralph W. Phillips, Deputy Director, Agriculture Division, FAO, commented on the planning of work for the future.

At the first session of the Commission, a year ago, forty-six recommendations and suggestions were made of which thirteen were made to the member countries and all the rest to the Commission and FAO. Those recommendations which were intended for the improvement of rice production, storage and utilization were for the most part incorporated into a questionnaire of twenty-six pages, divided into ten sections covering standard varieties; control of pests and diseases; machinery, implements and equipment; general conditions of cultivation; fertilizers; forage and green manure crops; crop rotation of upland rice; storage of rice; rice milling and processing; and rice by-products. The questionnaire was mailed to the member countries from FAO Headquarters in Washington in June, 1949. As of the first of January, 1950, two out of seventeen member countries had answered all the ten sections of the questionnaire, while seven countries had answered four or more sections and the rest had failed to send in any replies. Therefore no complete summaries or representative statements could yet be made on the basis of information received on

these subjects. However, the first issue of the World Catalogue of Genetic Stocks of Rice was now ready for distribution, containing 322 varieties of rice, provided by 16 countries and territories. It contains all the basic information about each of these varieties in a tabulated form that plant breeders will find useful. Following the recommendation of the first meeting of the Commission, the Rice Breeders Working Party was set up and held its first meeting. The Working Party now becomes a regular arm of the Commission.

Regarding making plans for work for the future, Dr. Phillips urged that during the current session serious consideration be given to the methods by which the Commission, as an international organization, could achieve its objectives. The methods used by an international organization, are necessarily somewhat different from those used by national governments and institutions. He outlined five different methods which were used by FAO and could be used by the Commission, as the latter is an arm of the former. He further illustrated how a program of maize improvement in Europe which was initiated at relatively little cost to FAO and to the governments concerned had resulted in a substantial increase in production. "We must plan activities which yield large returns in agricultural improvement for each dollar spent by the Organization and countries have an equal interest in getting substantial returns for funds expended on agricultural improvement. .....It is only by the development of programs such as this that either FAO, or the Rice Commission, can justify their continuing existence for service in the field of agricultural production," he continued. It seems both necessary and desirable at this early stage of development of the Commission to reproduce the full text of the statement he made at the opening meeting of the Commission as Appendix B to indicate how FAO or the Commission has been assisting or shall be assisting the member countries.

In his message to the second session of the Commission, Director-General N. E. Dodd emphasized the potential increase in yields by greater use of improved varieties. He said, "The ability of plant breeders to develop improved varieties has outstripped the ability of governments to influence farmers to use them. This must be corrected." He further added, "We in FAO stand prepared to assist you in every possible way that we can."

The substantive work of the second session was divided between two Committees, the results of which were reviewed by the Commission as a whole. The committees were:

A. Rice Production, Storage and Processing.
U. Khin (Burma), *Chairman*.

B. Rice Statistics, Terminology and Internal Distribution.
Phra Nararaj Chamnong (Thailand), *Chairman*.

For the first time in the history of rice improvement, a cooperative program for breeding, selection and seed exchange has been worked out on an international basis. Plans for seed multiplication and distribution have also been made and they can only be handled by the individual countries themselves. The most encouraging project is a joint undertaking by the member countries to work on hybridization between varieties of the Indica and Japonica groups of rice as a means of securing better varieties. At present, one central station has been chosen to initiate the program. Toward the support of this joint project, the member countries will be asked to make contributions. This project, together with the publication of the World Catalogue of Genetic Stocks of Rice, will help step up the work of rice improvement in the region very considerably.

To follow the precedent of the Rice Breeders Working Party, the Commission decided that a Fertilizer Working Party should be set up, providing the Commission with another working arm.

It was moved, seconded and decided by the Commission that the third session should be held in 1952, but the next meeting of the Rice Breeders Working Party and the first meeting of the Fertilizer Working Party should be held in 1951. The delegate from Indonesia extended an invitation to the Commission to hold all these meetings in Indonesia and the invitation was accepted by the Commission with appreciation.

The officers elected for the ensuing year were:

Chairman: H.S.H. Prince Sithiporn Kridakara, Thailand.

Vice Chairmen: U. Khin, Burma.
Stanley Andrews, U.S.A.

CHAPTER II

RICE PRODUCTION, STORAGE AND PROCESSING

THE Commission, at its meeting in Bangkok, Thailand, in 1949, decided upon projects to be undertaken during the ensuing year, and made certain recommendations to member governments. The actions taken on each of those projects, or as a result of each recommendation to governments, were discussed during the second meeting of the Commission, and decisions were taken concerning further work to be undertaken. The results of actions taken, and decisions made are summarised below.

Seed Improvement Promotion

The Commission heard the Report of the First Meeting of the Rice Breeders Working Party and approved all the following recommendations concerning seed improvement promotion:– (See Appendix A for the full report).

1. That all countries participating in the rice improvement program should permit the seed of rice varieties and breeding materials to be exchanged freely between plant breeders in the several countries and should facilitate such exchange of seed as much as possible.

2. That the plant breeders in each of the participating countries should continue to co–operate with FAO in a further development of the World Catalogue of Genetic Stocks for rice.

3. That India, Indonesia and Japan be requested to designate one centre in their respective countries for the maintenance of genetic stocks of rice as a service to plant breeders.

4. That each country which has not already done so should collect, as time and facilities permit, the seed of indigenous varieties of rice, including wild forms from different habitats, and grow them under observation in nurseries for 2 to 3 years as a means of securing valuable genetic characters for future use in breeding projects. Such material and races which show promise of exceptional value should be listed in the World Catalogue of Genetic Stocks and samples of seed supplied to those stations where collections of genetic stocks are being maintained.

5. That a comprehensive project of hybridization and selection with varieties of the Indica and Japonica groups of rice be undertaken jointly by the plant breeding stations of all participating countries as a promising means of securing varieties combining the most valuable qualities which are characteristic of each group. This project involves extensive crossing of the two groups, the Indica and Japonica parents being chosen with reference to the special requirements of the participating countries. Because of lack of facilities at several stations, it would not be possible to initiate this project at the present time unless the hybridization work is largely undertaken at one station. This station would also grow the F 1 hybrids and distribute the F 2 seed to the other participating stations. Such a procedure has other advantages including considerable economy. The second generation seed (the basis material for selection) would not be available for at least two years so that participating stations would not be taxed unduly until they are better able to undertake the work of selection. The project does involve, however, considerable effort on the part of the station which undertakes to make the necessary crosses and for this reason additional personnel and facilities would have to be provided.

6. That FAO be requested by the Rice Commission to arrange for technical courses of several months duration to provide advanced training for technical workers in rice breeding, preferably in cooperation with a member government, and that scholarships or fellowships if possible be granted when necessary to enable qualified students and technical workers to take these courses. That FAO should award grants of travelling fellowships where found necessary to deserving young men engaged in rice research to visit centres of work in countries of the same region where similar work is in progress.

7. That the activities of plant breeding stations which are urgently in need of technical assistance and laboratory equipment from outside sources, be strengthened by making available to them for limited periods the services of highly qualified plant breeders or investigators in cognate sciences, and that Governments be urged to supply such stations with much needed equipment. Certain types of equipment are essential in the conduct of plant breeding investigations, but the equipment required is not elaborate and is relatively less expensive compared with what is required in physical and chemical laboratories.

The Working Party desires to state with special emphasis that little or no progress in plant breeding can be expected unless the staff members engaged in this work are permitted to devote full time to plant breeding investigations. Multiple duties of the technical personnel responsible for plant breeding are regarded by the Working Party as one of the main reasons for lack of progress in several of the stations in participating countries.

8. That the Working Party be continued as an active organization for rice breeding in member countries, and that its efforts be made as effective as possible by:–

(a) including in the membership one or more specialists in cognate sciences;

(b) provision for frequent meetings (at least once a year) to provide opportunities for consideration of the results of current investigations, the exchange of information, and the planning of new work. *Experience indicates that frequent opportunities for collaboration are not only desirable but essential for the conduct and effective prosecution of scientific investigations*;

(c) inviting a limited number of specialists to address the Rice Breeders Working Party at its regular meetings, as a means of bringing to the group the most up-to-date information on breeding techniques and other pertinent topics;

(d) providing opportunities whenever possible for junior men who are actively engaged in rice breeding to attend meetings of the Working Party.

9. That FAO be requested:–

(a) to continue the World Catalogue of Genetic Stocks of Rice;

(b) to make available to plant breeders, as far as possible, all literature on rice improvement and related subjects;

(c) to make available the full-time services of an experienced plant breeder to assist and coordinate the comprehensive rice improvement program outlined above.

The Commission, having adopted the above recommendations, gave attention to methods by which support could be obtained to put the program into effect, and particularly those aspects requiring assistance from outside a participating country. It was suggested that an inter-country project could appropriately be assisted under the proposed Expanded Technical Assistance Program, and that all governments should be prepared to participate in such a cooperative undertaking. Certain delegates stated that their governments are not prepared to agree at this time to the making of contributions to a special fund to implement this program but, in view of the importance of the project and since the costs involved for the first year or two are likely to be modest, the Commission recommends that all member governments should consider the draft scheme for hybridization work without delay and offer financial contributions to the extent of their ability before the end of May,

1950. Also, that the Government of India be requested to make available the facilities of the Central Rice Research Institute at Cuttack for this work. Contributed funds would be administered in accordance with Article VI of the Constitution of the Rice Commission and of Rule XIV 6 of the Rules of Procedure.

Promoting the Use of Improved Seed

The Commission heard the Report of the First Meeting of the Rice Breeders Working Party and approved all the following recommendations concerning promoting the use of improved seed :— (See Appendix A for the full report).

1. That member governments, either directly or through government sponsored or approved Seed Associations, initiate, promote, and support an improved seed production and distribution plan to ensure :—

(a) an adequate supply of pure seed of the best existing varieties, and

(b) adopt effective means of inducing farmers to use improved seed in substantial quantities.

2. That consideration be given by member governments to the development of seed production and distribution plans and policies, to the applicability and adoption of those features outlined above which have been so successfully applied in several countries.

3. That members of the Working Party be requested to supply FAO with an outline of such systems of seed multiplication and distribution currently in use in their respective contries and that FAO supply mimeographed copies of these statements to all members of the Working Party.

The Commission recommended that the next meeting of the Rice Breeders Working Party be held early in 1951, the exact time and place to be determined by the Director-General of FAO.

Pests and Diseases of Rice

The commission at its first meeting recommended the study of several subjects related to the control of rice pests and diseases. These included the preparation of a note on seed disinfection as a means of reducing seed-borne diseases, the preparation of a review on recent developments in the control of rice stem borers, the assembling from member countries of information concerning pests that are of economic importance, and on varieties available in each country that are resistant to stem borers, blast (Piricularia), or other pests

and diseases. Limited information was supplied by certain governments on these subjects and summaries of that information were before the Commission for consideration. After discussion of the various aspects of problems of pest and disease control, it was agreed that :–

1. A resume be prepared of the present position of knowledge concerning major diseases affecting the rice crop as follows :–

   (a) Sesame (Brown) spot (Helminthosporium oryzae);

   (b) Blast (Piricularia oryzae);

   (c) Bacteria leaf blight (Bacterium oryzae);

   (d) Seeding blight (Fusarium Spp., and Sclerotium rolfsii); and

   (e) Nematode diseases.

   It was agreed that, in preparing this resume, FAO should consult the Commonwealth Bureaus of Mycology and Helminthology. The resume is to be made available to member governments of the Commission when ready for distribution and will be discussed at the next regular meeting of the Commission.

2. The collecting of material concerning important insects attacking the rice crop should be continued with emphasis on the following :–

   (a) the stem borers (Schoenobius incertellus)
   (Scirpophaga innotata)
   (Chilo oryzae)
   (Chilo simplex);

   (b) rice bug (Leptocorisa acuta);

   (c) army bug (Cirphis unipuncta);

   (d) rice hispa (Hispa armigera);

   (e) gall fly (Pachydiplosis oryzae); and

   (f) swarming caterpillar (Spodoptera mauritia).

   In addition to material of the type requested in questionnaires sent to governments during 1949, it was agreed that information should also be assembled on the methods of estimating losses from large scale insect attacks. It was further agreed that, during the coming year, countries should give particular attention to the locating of varieties and types showing resistance to stem borers and that any such varieties should be carefully propagated and tested.

In connection with the discussion on pests and diseases, the Vietnamese adviser to the French Union delegation presented some information concerning

damage to rice fields by fish in Viet Nam. It was reported that a type of fish (Gobioides anguillaris) makes tunnels through the bunds of rice fields in the process of migrating from lower to higher fields and this, in many cases, resulted in draining of the fields and hence severe damage to the rice crops. It was reported that finely chopped leaves of a tree (Milletia ichthyochtona) could be placed in the water and a substance contained in the leaves kills the fish. A small amount of an extract (piscidine) of the nut of this tree, placed in the water of a rice field, is even more effective in killing the fish. The dead fish, bloated from accumulation of gas, stop up the tunnels and help prevent further loss of water from fields. It was reported that this lethal substance also killed crabs. In this connection, the delegate from the United States of America pointed out that ten pounds per acre of copper sulphate had been found effective in killing shrimps which invaded rice fields in California, and he suggested that this might be tested as a means of killing the fish in question.

Fertilizer Investigations and Practices

The Commission heard a review of the work being undertaken in this field by FAO which included the publication in recent months of a comprehensive document dealing with "Efficient Use of Fertilizer" and a second document concerning "Fertilizer Manufacturing Projects-Their Planning and Financing." The Commission was also advised of FAO's current work on a manuscript dealing with soil fertility practices which will be a sequel to the document on "Efficient Use of Fertilizers." The soil fertility specialist of FAO's Agriculture Division will give special attention to soil fertility problems in the rice-producing countries during 1950. Following consideration of various important aspects of fertilizer use, the Commission agreed that there should be set up a Working Party on Fertilizers. It was agreed, further, that this Working Party should give particular attention to problems such as:—

(a) the combinations of organic and inorganic fertilizers which are most effective in increasing rice production;

(b) the effects of single and continued applications of ammonium sulphate and ammonium phosphate and other fertilizers on soils of various types;

(c) the possibilities of using minor elements as a means of increasing yields, particularly in areas where fertilizers are already being used extensively;

(d) the type of field tests which should be carried out as a means of confirming experimental results before making recommendations to farmers;

(e) the relation between cost of fertilizers and increases in rice production resulting from their application; and

(f) the reactions of varieties of rice to fertilizer treatments and the necessity of finding varieties which can give maximum response at different levels of fertility.

The Commission recommended that the first meeting of the Working Party be held early in 1951, the exact time and place being decided by the Director General of FAO.

It was suggested that a joint meeting might be desirable between the Working Party on Fertilizers and the Rice Breeders Working Party, on occasions when they are meeting concurrently, at which problems of common interest should be considered.

Attention was also given to the problem of treating seed with chemical solutions, for example, phosphate solution, as a possible means of increasing production. Papers on this subject had been submitted to the Commission by India and Burma, and Ceylon reported that a similar paper was in process of publication. Ceylon agreed to make copies of its paper available to the members of the Commission.

General Conditions of Rice Production in Various Countries

Relatively little information had been supplied by governments in response to the questionnaire on this point sent out during 1949. Even this limited material had been received only shortly before the meeting and the delegation from India, which had agreed at the first meeting of the Commission to prepare a summary of this material, had not been able to make any progress. It was agreed that as further material was received, an Indian specialist should prepare a summary and have it available for consideration at the next meeting of the Commission.

Forage Crops for Livestock Feed and Green Manure

The Commission noted the limited material which had been supplied by countries on this subject and heard a statement on the work being undertaken by FAO to catalogue information on legumes which are adapted to tropical and sub-tropical conditions. It was agreed that this was a problem of major importance to which all countries should give attention and to which FAO should be urged to devote as much attention as its budget and available personnel permit. No special action by the Commission was proposed at this time.

Crop Rotations for Upland Rice

The Commission noted the limited material which had been supplied by a few countries on this subject and agreed that no further action was required at the present time.

Pumps and Windmills for Lifting Water for Irrigation

The Commission had agreed at its first meeting that material on this subject in member countries should be submitted. Thailand agreed to summarise this material. No countries had submitted information, hence a report was heard from Thailand only on the work being undertaken in that country with water wheels, the "rahad" or "Chinese dragon wheel" which could be operated either by man power, motors or windmills, and the "naga boats" which are used for pumping water from rivers to supplement normal irrigation in cases of drought. The delegate from Thailand indicated that his government had assembled some material from other countries and would be glad to prepare a summary of it if desired. It was agreed that such a summary should be prepared in cooperation with an agricultural engineer on the staff of FAO's Agriculture Division.

Availability of Draft Animals for Export

Certain countries asked for information at the first meeting of the Commission concerning possible sources of draft animals. It was reported to the second session of the Commission that draft animals were available from Paraguay but that the costs were too high to make this an economic source for the interested countries in South East Asia. It was also reported that Thailand had recently concluded an agreement for the export of 200 water buffaloes to the Philippine Republic and that in the coming year Thailand might be able to export a larger number of draft animals. The delegate from the French Union stated that water buffaloes are available for export from Cambodia. No further action was taken by the Commission.

Storage of Rice

The Commission heard a summary of the activities which had been undertaken in this field by FAO. These included :—

(a) An international meeting in London in the summer of 1947 at which the extent of losses in stored grains and possible methods of reducing these losses were considered ;

(b) A meeting in Italy in the summer of 1948 at which problems of grain storage in Southern Europe were considered and demonstrations given on methods of proper storage and insect control ;

(c) A meeting in Colombia early in 1949 at which the problems of grain storage in the Americas, and particularly in tropical and sub-tropical areas, were examined. At this meeting, a Committee was set up consisting of one representative from each of the North, Central and South American countries to implement the recommendations of the meeting in Colombia and promote research on, and the development of, safe grain storage; and

(d) A demonstration project which is being carried out for one year in cooperation with the government of Costa Rica, and a technical meeting which will be held in Costa Rica near the end of this demonstration period, at which representatives of all North, Central and South American countries will have an opportunity of seeing the improved facilities and techniques being used.

In addition to these activities, the Organization has issued a publication on drying and storing grain and has rendered advisory assistance to several countries. Various delegations indicated that the question of reducing loss in stored grains was a major concern to their governments; the government of Pakistan had already requested assistance from FAO in examining its grain storage problems and the delegates from Thailand and Ceylon indicated their interest in receiving similar assistance. The delegate from India expressed a desire to receive information on the methods of storage employed in Japan. The Commission noted the material submitted on this subject in response to the questionnaire circulated in 1949 and agreed that the problem should receive further consideration at the next regular meeting of the Commission.

Mechanization of Rice Cultivation

As agreed at the first meeting of the Rice Commission, experimental work on mechanization of rice was carried on during the past year by Thailand and the Philippine Republic. Unfortunately, the Philippine delegate was unable to attend the meetings of Committee A, and, therefore, no report was presented by him. The Member from Thailand, however, presented an interesting report covering experiments conducted in 1948 and 1949. This report concludes, among other things, that the success of mechanization depends to a very large extent on conditions, and particularly on complete control of irrigation water and drainage; also that it is adapted mainly to relatively large farms where seed is broadcast. The cultivators of relatively large farms in Thailand have found that the cost of production, under favorable conditions, and at prevailing prices, is low enough to yield good returns, and the demand for tractors is increasing. The Chairman of the Commission, however, expressed

the view that mechanization of rice cultivation in Thailand as a whole shows little economic advantage because of the small area of most of the holdings, the high overhead expenses, and the foreign exchange involved. This view was endorsed by the other delegates with regard to their respective countries.

Several representatives from other member countries made substantial contributions on the subject of mechanization of rice cultivation based on experience in their respective countries. It was apparent that there exists a lively interest in this problem. The Commission heard statements on the work of FAO in this field having a bearing on the mechanizing of rice production. These activities include the preparation of a publication on essential points which must be considered when a mechanization problem is undertaken, and the sending of an agricultural machinery specialist to Asia and the Far East to examine at first hand the problems encountered in mechanizing rice production. FAO is also preparing a publication on hand tools and implements and animal drawn implements which will include an outline of the principles that should be observed in evaluating the efficiency of implements of new design.

The problems involved in the mechanization of rice grown in monsoon areas are far from final solution. While the trials in Thailand have given some information, they refer to complete mechanization as in the United States and Australia. Such complete mechanization is however, not possible over large areas where transplanting is practiced because no satisfactory transplanting machine has yet been invented. In large compact rice areas as in the river valleys and deltas in Asia, the time available for the preparation of the land does not exceed one to two months and the crop that is seeded or transplanted late does not give satisfactory yields. Under such circumstances the use of tractors for the initial preparation of the land would be desirable and information is needed on the type of machinery suited to such condition. The Commission therefore requests FAO to sponsor under the Technical Assistance Programme a comprehensive investigation in one or more member countries of the I. R. C. of the problem of complete and partial mechanization under a variety of soil and climatic conditions, with machinery of many types and especially those designed for work in several inches of water and in fields of comparatively small size. The project should include a test of the use of power machinery (i) in turning in heavy green manure crops that can be grown in the off-season; and (ii) in handling the soil under wet conditions. In these investigations detailed records of costs should be maintained.

Rice Milling and Processing

The Commission was informed that FAO is preparing a publication on small scale equipment for the processing of agricultural products which will

include material on small engines for driving such equipment and examples of the kind of equipment that is already available for cleaning of grain, milling, etc.

Utilization of Rice By-Products

The Commission was informed that FAO had sent to all governments a bibliography of publications on this subject. As a fruitful source of information FAO was requested to supply mimeographed copies of an article recently submitted to FAO on the utilization of rice by-products in Japan.

Review of Certain Recommendations

Several recommendations to member governments which were approved at the first session of the Rice Commission were briefly reviewed. Of these the use of hormone weed killers was discussed at some length. It was pointed out by the representative from Italy and others that many of the most harmful weeds in rice belong to the Cyperus family and the Grass family, and while hormone weed killers are partially effective against the former, they are not so against the grasses that occur in rice fields. There was general agreement that hormone weed killers are effective in eradicating water hyacinth, but that there are various subsidiary effects that must be taken into account and which require further study.

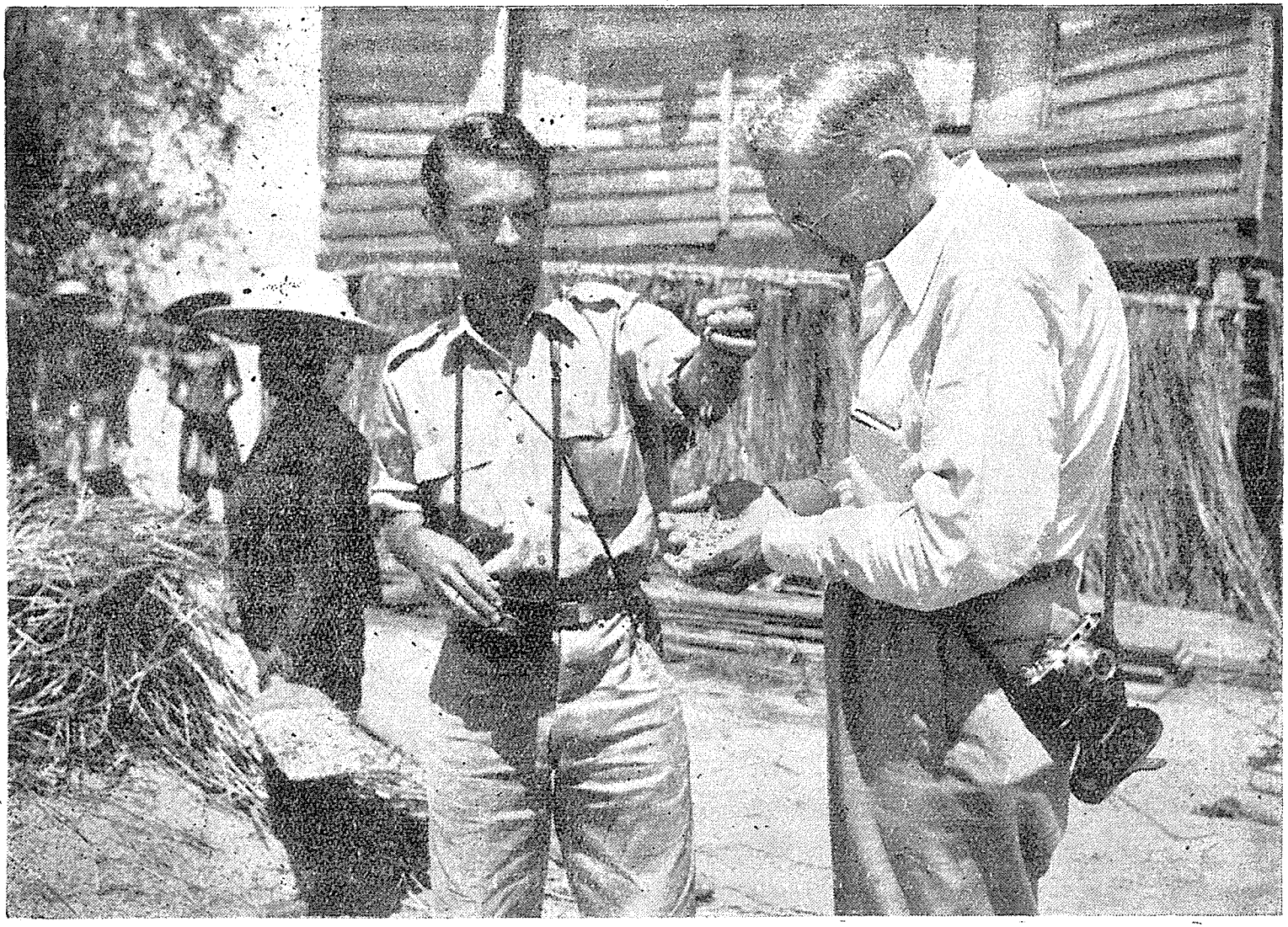
The Commission was informed that FAO is preparing a publication on hormone weed killers and their use for different purposes under a wide variety of conditions.

Exhibition of Rice Milling and Processing Machinery

A special feature of the meetings of the Rice Commission was a display of rice milling and processing machinery, including an exhibit of small implements and hand tools used in rice cultivation. A few other exhibits relating to methods of rice processing could also be seen. The Exhibition was officially opened by the Prime Minister of Burma on the first day of the meetings, and the Committee on Production, Storage and Processing devoted an additional half day to a detailed study of the exhibits.

Plans for Meetings of Working Parties In 1951

The Commission took note with appreciation of the invitation extended by the delegate from Indonesia that the next meeting of the Rice Breeders Working Party and the first meeting of the Fertilizer Working Party might be held at Bogor (Buitenzorg), Indonesia, in 1951. The second half of March was suggested by the delegate from Indonesia as the most desirable time for these meetings.



Mr. NORRIS E. DODD, Director-General of FAO, examines rice seeds on a farm in Thailand.

CHAPTER III

RICE STATISTICS, TERMINOLOGY AND INTERNAL DISTRIBUTION

HAVING reviewed the relevant recommendations of the Report of the First Session of the International Rice Commission, the Commission at its Second Session heard reports from member governments regarding the implementation of the various recomendations, and discussed points that need further action.

The following topics were discussed :

Rice Terminology :

The Commission noted with appreciation the fact that FAO is using in its publications and statistics the terms and definitions of the International Rice Terminology as outlined in Appendix F of the Report of the First Session of IRC and further expressed the opinion that member governments should adopt this terminology in their English and French publications and reports. It was felt that a list of comparable local terms and definitions for each country is not practicable, since local terms would be expressed in numerous languages and dialects and such a list would, therefore, serve no useful purpose from an international point of view.

Standard Conversion Rates :

The Commission was informed that FAO is conducting an inquiry concerning conversion rates, and that a handbook is expected to be published by FAO after examination of detailed reports from member governments. During the meeting member governments presented information on the conversion rates as attached to this report (See appendix D). It was urged, however, that member governments submit before July 1950, more detailed information on the analytical and technical basis for such established rates.

Rice Balance Sheet :

The Commission took notice that a few governments have adopted the Recommended Rice Balance Sheet, and it felt that more members should adopt this procedure.

It was pointed out that in the caption of Column III, "Milled rice equivalent", the word equivalent is misleading because figures for actually milled rice should be entered in this column, and therefore the word equivalent should be deleted.

It was further noted that item (i) under the Utilization column should have a foot note explaining that figures for rice processed from paddy to husked and/or to milled rice should be entered in this space.

Forward Estimates of Rice Production, Consumption, and Trade:

The Commission noted that representatives of member governments had studied in detail forward estimates of rice production, consumption and trade at the FAO Pre Conference Meeting in Singapore in September, 1949; and expressed its interest in the revised rice figures now available in the supplementary publication, Food and Agricultural Targets and Outlook for 1950/51 (C 49/23).

The 1950 Census Program:

Several delegates indicated that preparations for the 1950 census of agriculture were under way or even completed. The Commission was of the opinion that a census of agriculture would provide basic information for improvement of rice statistics and therefore urged member governments to report their progress in this field to FAO at an early date.

It was pointed out that information concerning the suitability of areas for major crops, particularly rice, cannot be collected by means of an agricultural census. The Commission therefore felt that the recommendation as incorporated in item 2 of the section dealing with 1950 census program of the Report of the First IRC Session should be dropped.

Emphasis was laid on the importance of a Pilot Census for countries that are taking an agricultural census for the first time. Much money and effort can be saved by checking of the questionnaires and enumeration methods in the field before launching a full-scale census. As governments can profit from the findings of other countries when taking a Pilot Census, the member governments are urged to report these findings promptly to FAO in order that FAO may disseminate them for reference of all interested members.

Statistical Advisory Services:

The Commission viewed the establishment of a statistical unit in the Far East Regional Office with great satisfaction and took note that direct technical assistance to governments of rice-producing countries in the region in connec-

tion with statistics can now be provided by FAO. The Commission expressed its desire that recommendations included in the Report of the First Session of IRC would be taken up by this statistical unit.

Active participation by many member governments in the International Training Center on Censuses and Statistics at New Delhi sponsored by U. N., FAO., and the Government of India, has important bearing on the success of the 1950 Census of Agriculture. The Commission noted this participation with satisfaction.

Standardization of Grades and Qualities of Rice:

The Commission noted that only Burma and Thailand have submitted descriptions of their commercial grades and expressed appreciation of the paper on rice grading standards of specified countries prepared by the Secretariat. It was urged that each country submit to the Executive Secretary descriptions of commercial grades, as soon as possible, if they have not already done so. These should include pertinent information regarding the factors on which grading is based such as: variety of paddy, degree of milling, percentage of brokens, moisture content, coloration, and foreign matter. It would also be desirable to indicate, if possible, the proportion of all rice produced in different grades and their respective milling yields.

The Commission was of the opinion that more complete information on rice grading needs to be collected before the question of standardization can be discussed.

Rice Marketing:

Development in the field of co-operative marketing of rice in various member countries was reported by each delegation. It was noted that some countries had taken commendable steps both in organization and in financing to encourage co-operative marketing as recommended by the First Sessions of IRC. The Commission felt that more detailed information in regard to successful measures taken by governments should be sent to the Executive Secretary for circulation to interested member governments.

Transport Equipment and Storage Material:

Although certain governments reported improvement of transportation facilities, the problem of transportation remains an obstacle in the development of rice economy in many countries. The principal problem in securing equipment and material lies in the inadequacy of foreign exchange. Aside from this, technical difficulties in obtaining transport or other equipment and

material can be solved to a great extent by close co-operation among member governments and International agencies. It was felt that member governments should state their requirements as clearly as possible to the agencies concerned. The Commission was very glad to note that close co-operation in this respect between FAO and ECAFE is being maintained.

Methodological Study of Cost of Production of Rice:

The Indian delegation proposed that the International Rice Commission recommend investigation of the cost of production of rice in different countries, and thereafter this Commission might lay down general principles of assessing an economic price of rice.

The Commission discussed this subject thoroughly, but felt the matter would be expedited if countries exchanged views and information directly. FAO should give assistance to countries whenever they are ready to launch such investigations.

CHAPTER IV

NUTRITIONAL ASPECTS OF RICE

INSTEAD of having a subcommittee on nutrition as was the case in the first session of the Commission in Bangkok, Thailand, 1949, the nutritional aspects of rice were taken up by the FAO Nutrition Committee for South and East Asia, which met in Rangoon from January 30 to February 4, 1950, just previous to the meeting of the Commission. The Committee's report was later presented to the Commission and the Commission received it with appreciation and adopted the following resolution: (See Appendix C for the report).

"The International Rice Commission

Having studied the report of the Second Meeting of the F.A.O. Nutrition Committee for South and East Asia;

Expresses its warm appreciation of the work of the Committee;

Notes with approval the recommendations dealing with the nutritional improvement of rice as consumed, including methods of milling, parboiling and enrichment, and with the value of an exhibit of rice processing methods (with special reference to their nutritional aspects) being held at a future meeting of the Commission;

Records its general approval of the report and urges Member governments to do all in their power to carry out its recommendation."

APPENDIX A

REPORT OF THE FIRST MEETING OF THE RICE BREEDERS WORKING PARTY

THE Rice Breeders Working Party was set up following the recommendation of the first meeting of the Commission and held its first meeting in Rangoon, Burma, on February 1–4, 1950. Dr. K. Ramiah, Director of the Central Rice Research Institute at Cuttack, Orissa, India, was elected Chairman, and Dr. L. E. Kirk, Chief of the Plant Industry Branch of the Agriculture Division of FAO, served as Technical Secretary. The following specialists participated in the meeting :–

U Ba Thein, Senior Economic Botanist, Department of Agriculture, Rangoon, Burma.

U San Pe, Assistant Economic Botanist, Mandalay, Burma.

Dr. M. F. Chandraratna, Botanist and Senior Agricultural Research Officer, Peradeniya, Ceylon.

Mr. Y. P. Coyaud, Chief Agricultural Engineer, Rice Office, Saigon, Indo–China.

Dr. J. G. J. Van der Meulen, Lecturer, Faculty of Agricultural Science, University of Indonesia, and Adviser to the Central Agricultural Research Station, Bogor, Indonesia.

Mr. Sukardi Tjitroprajitno, Member of Food Fund, Djakarta, Indonesia.

Dr. Phit Panyalakshana, Plant Breeder, Department of Agriculture, Bangkok, Thailand.

Mr. R. B. Jagoe, Senior Botanist, Department of Agriculture, Kuala Lumpur, Malaya.

Dr. Jenkin W. Jones, Principal Agronomist in Charge of Rice Investigations, United States Department of Agriculture, Washington, D.C., U.S.A.

Mr. Graham S. Quate, Agricultural Attache, U.S. Embassy, Bangkok.

Dr. T. Morinaga, Director, National Agricultural Experiment Station, Nishingahara, Kitaku, Tokyo (SCAP).

Dr. Hidetoshi Isobe, Director, Agricultural Improvement Bureau, Ministry of Agriculture and Forestry, Tokyo (SCAP)

This Committee dealt with various aspects of the improvement of rice through breeding and a summary of the general discussions is presented below:

General Discussion

The primary aim of improvement in rice by selection and breeding is increased yield. In Asia and the Far East, apart from the poor fertility conditions and inadequacy of irrigation or drainage under which rice is generally grown, low yields are almost invariably due to limitations of the varieties themselves. The relative importance of these adverse factors is different in the different countries and under different conditions in the same country. These limiting factors, as might be expected, were too numerous for attention by the Working Party but those of most importance were considered and are listed as follows:

1. Susceptibility to plant diseases.
2. Susceptibility to attack by insects.
3. Late maturity.
4. Lodging.
5. Shattering of the grain.
6. Lack of tolerance to saline soils.
7. Lack of tolerance to flooding and drought.
8. Narrow range of adaptation.

In addition to the above, the discussions emphasized the importance in any breeding program, of:—

9. Milling and cooking quality.
10. High nutritive values.

With regard to each of the above varietal characters, certain significant facts emerged from the discussions of the Working Party. These may be briefly summarized as follows;—

1. The most important diseases affecting the rice crop are:—
   (a) Sesame (Brown) spot (Helminthosporium oryzae);
   (b) Blast (Piricularia oryzae);
   (c) Bacterial leaf blight (Bacterium oryzae);
   (d) Seedling blight (Fusarium Spp. and Sclerotium rolfsii).

The first three are important over wide areas. Piricularia is very prevalent in Japan where losses are estimated from 10 to 20 or more per cent in affected areas. Piricularia and Helminthosporium are the most important

diseases of rice in India, the latter causing losses up to 80 per cent in years when it occurs under localized epidemic conditions. India has obtained strains resistant to Piricularia by hybridization and the technique of such breeding has been perfected. India is actively working also on the problem of Helminthosporium in rice, and has developed methods of testing for resistance to both these diseases. The prevalence of Piricularia in Japan is thought to be related to the relatively high rates of fertility with nitrogenous material and the relatively low temperatures, which suggest that this disease may become more serious in other countries as the use of fertilizers increases. Conversely, it is very probable that the non-use of nitrogenous fertilizers may be largely responsible for the fact that Piricularia, and perhaps some other diseases, are not regarded as important yield-limiting factors in Burma, Thailand, Ceylon and Indonesia.

2. The insects of greatest importance which attack rice are :—

(a) the stem borer (Schoenobius incertellus)
(Scirpophaga innotata)
(Chilo oryzae)
(Chilo simplex)
(b) rice bug (Leptocorisa acuta);
(c) army worm (Cirphis unipuncta);
(d) rice hispa (Hispa armigera);
(e) gall fly (Pachydiplosis oryzae);
(f) swarming caterpillar (Spodoptera mouritia).

The stem borers cause enormous losses in rice, especially in South China where the infestation is very severe in most years. There is some indication that resistant stocks have been found but the effort to find material for breeding purposes should be undertaken on a scale much more comprehensive than has yet been done. Virtually nothing has been done commensurate with the problem to investigate the entomological or breeding aspects of insect control in rice varieties. There are possibilities of developing methods of biological control.

3. Early maturity in rice varieties is important for several reasons. In many cases earlier maturing varieties would make it possible to grow two crops per season instead of one. Early varieties require less water. They tend also to be shorter strawed and produce less vegetative growth making them better adapted to mechanized farming. There is no evidence to suggest a genetic correlation between late maturity and high yield. On the contrary, some of the earlier maturing varieties are among the heavier yielders. This has been amply demonstrated in Japan. This is not to deprecate the value of later maturing varieties where the latter are more useful and better adapted.

Dr. K. Ramiah of India, Chairman of the Rice Breeder's Working Party addresses the group

4. Resistance to lodging. Lodging in rice varieties is frequently encountered in every country, and this problem is aggravated by the use of fertilizers. Shorter and stronger strawed varieties are urgently needed and can be obtained by breeding. Such varieties are essential also where rice growing is mechanized.

5. Resistance to shattering. Varities which shatter readily are much too common. Since non-shattering varieties can be secured by breeding without much difficulty, special attention should be given to this problem.

6. Tolerance to saline soils. There is evidence that this is a heritable character and can therefore be transmitted by breeding. The prevalence of saline soils in many of the rice growing countries suggests that breeding for tolerance to salinity should be regarded as a problem of considerable importance.

7. Tolerance to flooding and to drought. The statement in regard to tolerance of saline soils is equally applicable to varieties resistant to flooding and to drought.

8. Wider range of adaptation. Rice has usually been considered as having a rather narrow range of adaptation. While this may be true of indigenous strains and of most existing varieties, there are now notable examples of varieties with an exceptionally wide range of adaptation. The importance of this fact can scarcely be over-estimated. If the hundreds of varieties and strains which are now grown in a single country could be replaced with one-tenth the number, or perhaps fewer, it would then be much less difficult to initiate pure seed production and distribution policies. It would also enable the breeder to give much more attention to the further improvement of varieties grown on large areas.

9. Milling and cooking quality. This question is of first-rate importance in exporting countries. Wherever exports are involved, the breeder cannot afford to overlook market demand with respect to both quality and general acceptance of the product.

10. Nutritive value. Although suitable criteria for nutritive value in rice are not yet well developed, and correlations between nutritive value and morphological characters have yet to be demonstrated, the problem of breeding for high nutritive value along with desirable agronomic characters should receive continuous study in any breeding program.

The plant breeders of each country are interested in a wide range of rice improvement possibilities, but because their resources are limited each breeder naturally restricts his efforts to those problems that are currently deemed most

important. The main objectives at any one time, therefore, will vary from country to country, and this was found to be the situation with members of the Rice Breeders Working Party. Nevertheless, with respect to several of the yield–limiting factors listed above, there was general agreement as to the importance which they have for most of the countries in South and East Asia. There was general agreement also that much greater progress could be made toward the solution of some of the major plant breeding problems if the stations in each country were sufficiently staffed and equipped to enable them to participate in projects especially designed for a cooperative attack on certain of these major problems. One such project has been recommended by the Working Party.

Recommendations

As a result of the general discussion summarized above, the following recommendations were prepared and unanimously approved by the members of the Rice Breeders Working Party:–

1. That all countries participating in the rice improvement program should permit the seed of rice varieties and of breeding materials to be exchanged freely between plant breeders in the several countries and should facilitate such exchange of seed as much as possible.

2. That the plant breeders in each of the participating countries should continue to cooperate with FAO in a further development of the world Catalogue of Genetic Stocks for Rice.

3. That India, Indonesia and Japan be requested to designate one center in their respective countries for the maintenance of genetic stocks of rice as a service to plant breeders.

4. That each country which has not already done so should collect, as time and facilities permit, the seed of indigenous varieties of rice, including wild forms from different habitants, and grow them under observation in nurseries for 2 to 3 years as a means of securing valuable genetic characters for future use in breeding projects. Such material and races which show promise of exceptional value should be listed in the World Catalogue of Genetic Stocks and samples of seed supplied to those stations where collections of genetic stocks are being maintained.

5. That a comprehensive project of hybridization and selection with varieties of the Indica and Japonica groups of rice be undertaken jointly by the plant breeding stations of all participating countries as a promising means of securing varieties combining the most valuable qualities which are charac-

teristic of each group. This project involves extensive crossing of the two groups, the Indica and Japonica parents being chosen with reference to the special requirements of the participating countries. Because of lack of facilities at several stations, it would not be possible to initiate this project at the present time unless the hybridization work is largely undertaken at one station. This station would also grow the F1 hybrids and distribute the F2 seed to the other participating stations. Such a procedure has other advantages including considerable economy. The second generation seed (the basic material for selection) would not be available for at least two years so that participating stations would not be taxed unduly until they are better able to undertake the work of selection. The project does involve, however, considerable effort on the part of the station which undertakes to make the necessary crosses and for this reason additional personnel and facilities would have to be provided.

6. That FAO be requested by the Rice Commission to arrange for technical courses of several months duration to provide advanced training for technical workers in rice breeding, preferably in cooperation with a member government, and that scholarships or fellowships if possible be granted when necessary to enable qualified students and technical workers to take these courses. That FAO should award grants of travelling fellowships where found necessary to deserving young men engaged in rice research to visit centers of work in countries of the same region where similar work is in progress.

7. That the activities of plant breeding stations which are urgently in need of technical assistance and laboratory equipment from outside sources, be strengthened by making available to them for limited periods the services of highly qualified plant breeders or investigators in cognate sciences, and that Governments be urged to supply such stations with much needed equipment. Certain types of equipment are essential in the conduct of plant breeding investigations, but the equipment required is not elaborate and is relatively less expensive compared with what is required in physical and chemical laboratories.

The Working Party desires to state with special emphasis that little or no progress in plant breeding can be expected unless the staff members engaged in this work are permitted to devote full time to plant breeding investigations. Multiple duties of the technical personnel responsible for plant breeding are regarded by the Working Party as one of the main reasons for lack of progress in several of the stations in participating countries.

8. That the Working Party be continued as an active organization for rice breeding in member countries, and that its efforts be made as effective as possible by :—

(a) including in the membership one or more specialists in cognate sciences;

(b) provision for frequent meetings (at least once a year) to provide opportunities for consideration of the results of current investigations, the exchange of information, and the planning of new work.

Experience indicates that frequent opportunities for collaboration are not only desirable but essential for the conduct and effective prosecution of scientific investigations;

(c) inviting a limited number of specialists to address the Plant Breeders Working Party at its regular meetings, as a means of bringing to the group the most up-to-date information on breeding techniques and other pertinent topics;

(d) providing opportunities whenever possible for junior men who are actively engaged in rice breeding to attend meetings of the Working Party.

9. That FAO be requested:—

(a) to continue the World Catalogue of Genetic Stocks of Rice;

(b) to make available to plant breeders, as far as possible, all literature on rice improvement and related subjects;

(c) to make available the full-time services of an experienced plant breeder to assist and coordinate the comprehensive rice improvement program outlined above.

The Committee recommended that the next meeting of the Rice Breeders Working Party be held early in 1951, the exact time and place to be determined by the Director-General of FAO.

Promoting The Use of Improved Seed

The terms of reference of the Rice Breeders Working Party included the consideration of seed multiplication and distribution. A special session of the Working Party was held to discuss this problem following the conclusion of its deliberations on other rice breeding problems. This discussion and the recommendations which arose out of it are summarized below:—

General Discussion

The purpose of a crop improvement program by selection and breeding is a development of better adapted and higher yielding varieties, but unless

the seeds of improved varieties are extensively used in farm practice the work involved in selection and breeding is wasted effort. It is obviously of greatest importance that valuable results in crop improvement shall not be lost because of failure to capitalize on what has been achieved by research in plant breeding. While the plan adopted by different countries will vary necessarily in details, the experience of these countries which have developed succesful schemes indicates that certain features are essential to any workable plan. The most successful seed production and distribution policies have included the following provisions :—

1. That reserve stocks of foundation seed of improved varieties be maintained at stations where facilities for scientific supervision exist.

2. That provision be made by the governments, or through Seed Associations, for the multiplication of the improved seed in adequate quantities to satisfy the demand. The seed should be grown on Government seed farms or by reputable and experienced growers.

3. That provision be made for field crop inspection and inspection of the harvested seed in the sack, to ensure a satisfactory degree of purity and quality.

4. That regulations be established for certification of the seed with respect to varietal purity, quality for seed purposes, germination and freedom from recognizable diseases, in order to ensure reliability of the product. It is desirable that certified seed be sealed in the sack.

5. If the seed is produced by private growers, that provision be made by the Government or Seed Association to finance the purchase of such seed at a premium over the price of commercial seed, and also to provide storage for the seed until it is required by the farmer.

6. That special measures be taken to induce farmers to use improved seed by :—

(a) extensive comparative tests of varieties throughout the country to demonstrate the value of good seed of improved varieties, and

(b) making it possible for farmers to secure a supply of improved seed with a minimum of inconvenience and expense.

Recommendations

1. That member governments, either directly or through government sponsored or approved Seed Associations, initiate, promote, and support an improved seed production and distribution plan to ensure :—

(a) an adequate supply of pure seed of the best existing varieties, and

(b) adopt effective means of inducing farmers to use improved seed in substantial quantities.

2. That consideration be given by member governments in the development of seed production and distribution plans and policies, to the applicability and adoption of those features outlined above which have been so successfully applied in several countries.

3. That members of the Working Party be requested to supply FAO with an outline of such systems of seed multiplication and distribution currently in use in their respective countries and that FAO supply mimeographed copies of these statements to all members of the Working Party.

APPENDIX B

COMMENTS ON PLANNING OF THE FUTURE WORK OF THE INTERNATIONAL RICE COMMISSION

by

Ralph W. Phillips, Deputy Director, Agriculture Division, F.A.O.

THE Executive Secretary of the International Rice Commission has presented to you a review of the Commission's activities since its first meeting in Bangkok nearly one year ago. You have seen from that report that progress has been made on certain fronts, while in other fields discussed at the first meeting, relatively little advancement has been made.

The Commission, having reached its first birthday (if we measure anniversaries in terms of annual meetings rather than 12-month intervals), and having taken stock of its accomplishments during the year, will be making plans for work in 1950 and beyond. It is important, therefore, that during the current meeting serious consideration be given to the methods by which the Commission can achieve its objectives. Since the Commission is an arm of FAO, it is quite natural that the methods used in accomplishing the Commission's objectives will be similar, if not identical, to those used by FAO itself.

The methods by which an international organization accomplishes its objectives are necessarily somewhat different from those used by national governments and institutions. They include:

1. The assembling of information that can be used by policy-making and technical leaders in the member countries of the organization. Publications on "Efficient Use of Fertilizers" and the "Yearbooks of Food and Agricultural Statistics," are examples.
2. Convening of international meetings at which problems of common interest to two or more countries can be discussed. Obviously, meetings are not ends in themselves and are justified only if they

mark the beginnings of, or mile posts in the carrying out of, projects of importance in or to the participating countries.

3. Providing technical advice to individual countries on problems, where such outside advice is required, either by sending a mission or an individual worker. The Mission to Siam, work currently being done in Afghanistan and Iran by staff veterinarians to help bring rinderpest outbreaks under control, and work being done in various countries to help them improve agricultural statistics, are examples.
4. Organization of cooperative projects in which two or more countries pool their resources to study a common problem in which technical training is provided for the benefit of two or more countries in a specific field of agriculture. Examples of such cooperative undertakings will be cited later in this discussion.
5. Compiling fundamental information on sources of material such as is being done in the issuing of World Catalogue of Genetic Stocks of Rice, as a guide for countries wishing to acquire that material, and fundamental information on other subjects such as that contained in the nutritional survey of "Rice and Rice Diets."

It is highly important, in discussing possible activities, that each such activity be examined carefully to determine if it can be appropriately undertaken by an international agency, and, if so, whether or not it is an activity upon which the organization concerned is in position to take effective action. Our interest is in effective action on a relatively few projects rather than diffuse and ineffective action on many projects.

It should be recognized that all activities carried out by FAO or by the Commission are for the benefit of the member countries and if these activities do not help in some material way to further work in the member countries, they are not effective. One of the most productive types of activity which can be undertaken by International bodies such as FAO and the International Rice Commission is to provide the machinery through which countries can deal with common problems. A few examples of this type of activity outside the Commission may be helpful in indicating similar undertakings that might be included in the Commission's program.

One such undertaking is now well under way in Latin America. It actually had its beginnings at an International Meeting on Infestation of Stored Products, held in London in the summer of 1947. The primary purposes of that initial meeting were to analyze the extent to which losses in stored grain occur as a result of infestation and to discuss the various techniques for controlling such infestation.

It was evident that large losses were occurring in Latin America, particularly in the tropical and sub-tropical regions, hence this was a logical area in which to undertake follow-up work subsequent to the London meeting. Therefore, a regional technical meeting was held in Colombia early in 1949 to discuss the problems peculiar to this region. This has been followed by the establishment of a demonstration project in Costa Rica. The Costa Rican government had already made considerable progress in the improvement of grain storage facilities and agreed to undertake further improvement with the help of an FAO Adviser, who was placed in the country for one year. This type of rather long-term advisory assistance is justified, under our very limited budget, on the basis that the project was designed to help all the countries in the region. The adviser will complete his year of work in June of this year and, before that year is ended, a technical meeting will be held in Costa Rica to which all countries in Latin America will be invited to send entomologists and engineers concerned with grain storage problems, to study the improvements made and to determine how they can be applied in their own countries.

Another example of such cooperative action may be found in the improvement of agricultural extension services in Europe. Recognizing a common interest in most European countries in the development of better techniques for bringing information to farmers, FAO convened a meeting in the Hague during the summer of 1949. All European countries were invited to send delegates who were prepared not only to describe the existing practices of agricultural extension in their countries, but also to discuss ways in which techniques used successfully in other countries might be applied under their conditions. A great deal of interest in the improvement of extension services grew out of this meeting and a program is now under way in the sixteen European countries receiving aid under ECA to determine how best to strengthen agricultural extension services in those countries. I should explain that this problem is currently limited to the countries receiving ECA aid, and which for this purpose are banded together in an organization known as OEEC (Organization for Economic Cooperation in Europe), because there was a tangible source of financial support for the operation. The method of procedure has been the formation of a Working Party consisting of an FAO Adviser, a member of the OEEC staff, three extension specialists provided by ECA, and one extension worker provided by each of the sixteen OEEC countries. These workers met in Paris in January for preliminary discussions and to plan their operations. They are now divided into three working parties and are making visits to the respective countries to study extension problems at first hand and to suggest ways in which those services can be improved. They will again meet in Paris to draft their report and recommendations.

A third example of a program in which FAO has provided the stage on which the operation could develop, is the hybrid maize program in Europe. One of the plant breeding stations in Northern Italy had received through UNRRA some hybrid maize seed for experimental planting. Advantage was taken by FAO of this activity to hold a meeting at that station in Bergamo, Italy, in the summer of 1947. All European countries interested in maize production were invited to send plant breeders to this meeting, where the techniques of breeding inbred lines, and producing hybrids, were discussed in detail with the aid of a highly qualified expert supplied by FAO. This group not only studied the technical aspects of the problem but planned a testing program to determine which of the existing hybrids available from the United States and Canada could be used to the best advantage in different parts of Europe. Such a procedure was obviously necessary if advantage was to be taken of hybrid maize in field production at an early date, since several years would obviously be required to dovelop inbred lines from maize varieties already being produced in Europe. FAO assisted further in this program by securing experimental seed and making it available directly to the participating experiment stations. This was done during the winter of 1947-48, and a second meeting was held in January of 1949 to examine the results of the 1948 testing program and plan further tests to be carried out in 1949. Again, FAO secured the necessary seed for use in this experimental testing program and the results of the 1949 tests were considered at a third meeting, held in Rome during the past week. Thus, there has been initiated at relatively little cost to FAO, and to governments, a program which will yield very substantial results in terms of increased maize production in many European countries. I emphasize the low cost, since obviously with FAO's small budget, we must plan activities which yield large returns in agricultural improvement for each dollar spent by the Organization and countries have an equal interest in getting substantial returns for funds expended on agricultural improvement.

During the past week the Rice Breeders' Working Party met here in Rangoon to discuss ways of speeding up the improvement of rice through breeding. The report of the Working Party will be before you for consideration. You will find in it the basis for the development of a substantial program of cooperative effort similar to, but actually larger in scope than, the European hybrid maize program to which I referred. It is this kind of activity which, if actively sponsored by the Commission and by its member countries, can bring real returns to these countries through improvement in rice production.

This is an example of the kind of activity which might be developed as a project under the proposed Expanded Technical Assistance Program, commonly referred to as Point Four. Many projects developed under that program will no doubt be primarily for the benefit of individual countries, but some projects, such as this, might well be organized on an inter-country or regional basis. Obviously, projects in other fields, for example, improving the level of nutrition, increasing the adequacy of national statistics, and increasing the amount of fertilizers available to farmers, might be equally adapted to development as inter-country or regional undertakings.

Again, I should like to emphasize that it is only by the development of programs such as this that either FAO, or the Rice Commission, can justify their continuing existence for service in the field of agricultural production. It is the sincere hope of FAO that in the course of this meeting you will not only discuss the report of the Rice Breeders' Working Party carefully and take action leading to its implementation on the parts of governments, but that you will also consider carefully other kinds of technical activities which can be dealt with in a similar manner. The production and efficient use of fertilizers is a field which might be explored in essentially the same way. There are others. But I should like to leave you with the thought that FAO is not interested in developing what might be termed a "bits and pieces operation" but is anxious to help in the initiation of projects which, like the rice breeding program, can be helpful to countries on a continuing basis, There is no end point in agricultural improvement. We are anxious to help countries in any way that is feasible to devise programs aimed at immediate and continuing improvement. Obviously, FAO cannot bring about this improvement. Only the countries with their teams of technical workers, cooperating with farmers, can bring about increases in production, and in the efficiency of production. But FAO can provide the stage for discussions, it can assemble information and provide certain technical assistance and it can help in the development of cooperative projects for the benefit of its member countries. You have already heard from the Director General's message that the Organization stands ready to do everything that is feasible to implement programs or projects which you, in this second meeting of the International Rice Commission, agree give promise of being effective in improving rice production.

APPENDIX C

REPORT OF THE NUTRITION COMMITTEE FOR SOUTH AND EAST ASIA

Second Meeting[1]

THE IMPROVEMENT OF RICE AS CONSUMED

A Nutritional Standard for Rice

The FAO Nutrition Committee for South and East Asia recommended, at its Baguio Meeting in February 1948, that a thiamine content of 1.5 micrograms per gram should be regarded as a minimum standard for milled rice. The present Committee sees no reason to amend this definition. It takes note of the statement of the International Rice Commission (March, 1949) that "there is need to arrive at an international definition of properly milled rice from the point of view of nutrition by determining the optimum degree of removal of certain parts of the grain," and its recommendation "that further studies on the distribution of the nutrients in the various structures of the grain should be encouraged." Interesting research on the distribution of nutrients in the rice grain has recently been carried out and it is important that such research should be continued.

Thiamine content and degree of milling do not necessarily run exactly parallel. Again, there are differences in the distribution of thiamine and that of other nutrients in the various parts of the rice grain. The Committee is nevertheless of the opinion that at present thiamine content is a more satisfactory index of degree of milling and nutritive value than any method of determining the degree of removal of anatomical parts.

The Estimation of Thiamine

The Committee takes note of research to develop a simple and convenient method for routine thiamine estimation in rice milled to different degrees. Various calorimetric methods have been investigated and found to be insuffi-

1 The full text of the Report of the Second Meeting of the Nutrition Committee for South and East Asia is a long one. The portion of the report with which the International Rice Commission is particularly concerned is reproduced here.

ciently sensitive. At the moment therefore there is no alternative to relatively complicated methods such as the thiochrome test and micro-biological tests, for which extensive equipment is required and which can in general be carried out only in well-equipped nutrition research laboratories. The Committee recommends that the Food and Agriculture Organization should continue to encourage work on this problem, both in Asia and in Western countries. It appreciates the assistance provided by the Williams-Waterman Fund which has enabled methods of thiamine estimation to be investigated on behalf of FAO in the Agricultural and Mechanical College of Texas, U.S.A.

Milling

The Committee, at its Baguio Meeting, referred to "the possibility of milling rice in such a way that the portions of the grain richest in vitamins are retained in the milled product while at the same time the latter is acceptable to the consumer in respect of appearance and flavor." Up to the present no definite progress in this direction can be reported.

Undermilled rice continues to be used in a number of countries, and over large areas the hand-pounding of rice is still practised. The Committee in general supports the use of undermilled or "high extraction" rice from the nutritional standpoint, though it is fully aware of the poor keeping qualities of undermilled rice. In most countries in the region undermilled rice tends to deteriorate before it reaches the consumer, because the "turnover" is not sufficiently rapid and storage conditions are unsatisfactory. If good storage conditions are available and the time of storage is limited to a few weeks, undermilled rice can reach the retail market without undue deterioration.

There is evidence that husked rice, i.e., rice from which only the husk has been removed, is less digestible than rice which has been subjected to milling whether of high or low degree. For this reason, the Committee does not advocate the distribution of rice in the husked form.

Parboiled Rice

The Committee reaffirms the views of the Baguio Meeting on the desirability of increasing the consumption of parboiled rice in the region. It recognizes, however, the difficulty of making parboiled rice acceptable to populations used to "raw" rice. An important reason for its unpopularity is that it is often prepared commercially in an unsatisfactory manner, which results in a product of unattractive appearance and taste. Improvement in the condition of the final product can be achieved by more careful processing methods, e.g., by the use of clean water for steeping, by standardizing the periods of steeping,

steaming and drying, by drying at a uniform temperature, etc. The Committee learned with interest of a project to survey different methods of producing parboiled rice in mills and in households in India, and also of the construction of a modern parboiling plant in Viet Nam. The survey in India should indicate which of these methods gives the most satisfactory results and make it possible to recommend a standardized technique for improving the quality of the finished product.

Rice Enrichment

The Committee, at Baguio, expressed the view that rice enrichment is of value as an immediate measure for attacking deficiency diseases and recommended that "the results of any field experiments with enriched rice should be carefully recorded for the benefit of rice-eating countries and made generally available by FAO." The present Committee learned of trials of enriched rice in the Bataan Province in the Philippines and in Singapore. In the former area enriched rice has been supplied to some 63,000 people in seven municipalities, and in Singapore to about 15,000 people, including laborers, children and the inmates of institutions. These trials have shown, in the first place, that enriched rice is acceptable to rice-eating populations.

In Malaya, riboflavin as well as thiamine and niacin were added to the premix. In a report presented to the Committee this point was commented on as follows:

"Owing to the presence of riboflavin the grains of premix are bright yellow in colour. The evidence for riboflavin deficiency in Malaya is so great that it was decided to risk any disadvantage due to color. Those who purchase the premix will of course use it and in institutions the premix is added to the rice before cooking. Certain complaints reached us that in some institutions the inmates were picking out the premix, which was still faintly yellow after cooking, from the cooked mass of rice. Experiments were performed to find out if there would be any serious loss of vitamin if the yellow grains were removed after cooking. Two batches of enriched rice were cooked and from one batch as many yellow grains as possible were removed. Analysis showed that in spite of the yellow color still remaining in the premix grains, most of the vitamins had been dispersed amongst the mass of rice, and there was only a negligible loss through picking out the cooked premix. In actual fact, however, it has been found that in Malayan populations there is now no tendency to do this."

A substantial reduction in mortality from beri-beri is reported in Bataan resulting from the use of enriched rice. It is planned to extend enrichment to

other areas in the Philippines and by the end of 1951 some two million people in that country, or approximately 14.0 percent of the total rice-eating population, will be receiving enriched rice.

The Committee recognized the importance of a method of preventing beri-beri, and improving the nutrition of rice eaters in other respects, which can be put into operation immediately. It therefore recommends that the results of the experiment in Bataan should be surveyed by an international team of experts which would report on enrichment in all its aspects, including its administrative and economic aspects. It is suggested that arrangements for this survey should be made by FAO and the World Health Organization, in collaboration with the Government of the Republic of the Philippines. If the conclusion that rice enrichment can promptly reduce the incidence of beri-beri is fully confirmed, and the wider application of rice enrichment is found to be feasible from economic and administrative standpoints, its introduction into other parts of the region can, in the Committee's opinion, be recommended to governments. Enrichment is likely to prove particularly useful in areas in which beri-beri is an important public health problem. The Committee reaffirms the view of the Committee, at Baguio, that enrichment should be regarded as an expedient which does not remove the need for the general improvement of rice diets in other ways.

The Committee, at its Baguio Meeting, was of the opinion that "enrichment with iron .....cannot be regarded as an important necessity, there being little convincing evidence that average rice diets are deficient in iron." The present Committee considers that this statement may need qualification in view of recent observations indicating low haemoglobin levels in rice-eating groups.

Washing and Cooking

It is recognized that considerable loss of nutrients occurs during the washing and cooking of rice. The Committee learned with interest of recent work in Malaya, the results of which are summarized below:

Rice in Malaya is usually cooked by one of two methods, viz. (a) the washed rice is placed in a small quantity of cold water and boiled until all the water has been absorbed, or (b) the washed rice is added to a large volume of boiling water and cooked until ready, the surplus cooking water being drained off and discarded. It has generally been considered that, owing to the discarding of the excess water, method (b) is inferior to method (a). It has been shown, however, that with highly milled (raw) rice nearly all the loss of nutrients occurs during the process of washing and that practically no loss occurs in

the discarded cooking water. These results are in conformity with those of earlier experiments in other countries in the region. When a highly milled rice (thiamine content 1.0 microgram/gram) was cooked by the above methods, it was found that in both cases the cooked products had practically the same thiamine content: 64 percent of the thiamine was lost in the washing processes and only 6 percent lost in the discarded cooking water. It would appear that in method (b), in which the washed rice is added to the boiling water, rapid gelatinization of the outer layer of the grain prevents further nutrient loss. When an undermilled rice (thiamine content 2.1 microgram/gram) was cooked, however, losses of 33 percent of thiamine in the wash water, and 23 percent in the discarded cooking water, were observed. It would appear that only in the case of undermilled rice is the method of cooking, as employed in Malaya, of importance and that educational programs should be directed to reducing the losses in the process of washing.

Experiments on the effects of washing and cooking on enriched rice showed that such rice after being washed and cooked by methods (a) and (b) retained 5.3 and 3.5 microgram/gram respectively. The enriched rice thus retained thiamine in satisfactory amounts after washing.

The Committee recommends, however, that further experiments should be carried out concerning the effect on enriched rice of washing by methods used by different communities in Asia.

The Committee realizes the difficulties of influencing household methods of preparing rice for consumption, and the need for washing out the dirt and other impurities present in rice. It emphasizes the need to protect the consumer against himself by supplying him with a rice relatively free from impurities and hence requiring less rigorous washing.

Exhibition to Demonstrate Rice Processing Methods

The International Rice Commission is organizing an exhibition of rice-milling machinery in connection with its meeting in Rangoon in February 1950. This exhibition is mainly concerned with rice-milling machinery from the commercial standpoint. The Committee recommends that, at some appropriate future date, an exhibition of rice processing methods, with special reference to the nutritional aspects of these methods, should be arranged. This exhibition would be concerned with rice-milling machinery designed to conserve nutrients in the rice grain, with parboiling and "conversion," with the technique of rice enrichment, with demonstrations of the effect of washing and cooking on the nutritive value of rice, and with any other rice processing procedures of nutritional significance. The main purpose of the

exhibition would be educational, and the exhibition, when once set up, could travel from country to country in the region. The Committee suggests that it should be arranged at the time and place of its next meeting. The co-operation of nutrition workers in different countries in the region, as well as of commercial organizations, will be needed in order to prepare and collect a suitable series of exhibits.

Variation in the Nutritive Value of Rice as Grown

The Committee, at Baguio, referred to the influence of variety, climate, soil, conditions and methods of cultivation on the nutritive value of the rice grain, and commented that "it would obviously be advantageous if rice superior to the average in its content of one or more important nutrients could be produced through the study of these factors." While some work on problems in this field is proceeding in certain countries in the region, no results which appear to be of immediate practical importance have as yet been reported. A point of interest brought before the Committee was the relation between the thickness of the aleurone layer and the content of the grain in protein and other nutrients. There is evidence that coarse varieties of rice, in which the aleurone layer is thicker than average, are richer in protein than ordinary rice.

The Committee considers that research on "variation in the nutritive value of rice as grown" should be pursued and may in the long run give useful results. It is, however, in agreement with the conclusion of the Baguio Meeting that "any improvement in the nutrient content of rice which might be achieved along these lines is far outweighed in importance by the effect of processes to which the rice is subjected after it has been harvested."

APPENDIX D

RICE CONVERSION RATES IN SPECIFIED COUNTRIES

(Expressed in terms of weight as % to paddy)

Burma	67.9	
China	70	
India	72	hand pounded
	68	machine milled
Indo-China	64	
Indonesia	78	stalk paddy to paddy
	68	paddy to milled rice
	53	stalk paddy to milled rice
Japan	80.4	paddy to husked rice
	91.7	husked rice to milled rice
	73.7	paddy to milled rice
	75.6	paddy to undermilled rice
Malaya	63.0	paddy to milled rice
Thailand	See attached table	

THAILAND

MILLING OUTTURN PER ONE METRIC TON OF PADDY[1]

	5% Grade[2]		10% Grade[2]		15% Grade[2]		20% Grade[2]	
	Kilograms	Percent	Kilograms	Percent	Kilograms	Percent	Kilograms	Percent
Whole grain Rice	450	45.0%	420	42.0%	390	39.0%	390	39.0%
Broken Rice A1	138	13.8%	150	15.0%	162	16.2%	153	15.3%
,, ,, C1	48	4.8%	63	6.3%	81	8.1%	87	8.7%
,, ,, C3	15	1.5%	18	1.8%	18	1.8%	21	2.1%
		65.1%		65 1%		65.1%		65.1%

1. *Actual average outturn of mills in Bangkok in 1947*
2. *Grading Standards based on percentage of brokens*

APPENDIX E

AGENDA OF THE SECOND SESSION OF THE INTERNATIONAL RICE COMMISSION

1. Establishment of an Agenda Committee.

2. Designation of Committee on:

   A. Rice Production, Storage and Processing.

   B. Rice Statistics, Terminology and Internal Distribution.

3. Progress reports to the Commission.

   A. Report by the Executive Secretary of IRC.

   B. Report by the Rice Breeders' Working Party.

   C. Report by the Nutrition Committee for South and East Asia.

4. Consideration of the Commission's program of activities for 1950-51 and relevant budgetary proposals.

5. Reports which the Commission intends to submit to the Council, in accordance with the requirements of Article IV (j) of the Constitution.

6. Election of Chairman and two Vice-chairmen according to Article III (3) of the Constitution and Rules VIII and X of the Rules of Procedure of the Commission.

7. Consideration of the site and date for the third session of the Commission.

8. Other business.

APPENDIX F

ROSTER OF DELEGATIONS, OBSERVERS AND OFFICERS SECOND SESSION, INTERNATIONAL RICE COMMISSION

MEMBER NATIONS

BURMA

Leader: U Khin, Senior Deputy Director of Agriculture, Department of Agriculture, Rangoon.

Alternate: U Ba Thein, Senior Economic Botanist, Department of Agriculture, Rangoon.

Associates: U Nyo, Assistant Director, Land Records, Rangoon.

U Tha Myat, Deputy Director, Department of Agriculture, Southern Circle, Rangoon.

U Myat Tun, Chief Liaison Officer, State Agricultural Marketing Board, Rangoon.

U Kyin Sein, Deputy Chief Executive Officer, State Agricultural Marketing Board, Rangoon.

U Tin, Economic Botanist, Department of Agriculture, Mandalay.

Prof. Hla Ohn, Dean of Agriculture, University of Rangoon.

Dr. L. N. Seth, Lecturer in Agricultural Botany, University of Rangoon.

U San Pe, Assistant Economic Botanist, Department of Agriculture, Mandalay.

Secretary: Sao Hseng Ong, Agricultural Officer, Shan State Government, Rangoon.

CEYLON

Leader: Dr. M. F. Chandraratna, Botanist and Senior Agriculture Research Officer, Peradeniya.

EGYPT

Leader: Mohamed Gadel Hak Ibrahim, Head of Rice Investigation, Plant Breeding Section, Giza-Orman.

FRENCH UNION

Leader: B. J. Fontan, Head of Indo–China Economics Dept., Ministry of Overseas Territories, Paris.

Alternate: R. Du Pasquier, Inspector General of Agriculture, Office of the High Commissioner of France, Saigon.

Dr. Hidetoshi Isobe, Director, Agricultural Improvement Bureau, Ministry of Agriculture & Forestry, Tokyo.

J. H. Boulware, Head of Production Branch, Agriculture Division, Natural Resources Section, G.H.Q. SCAP.

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

Representatives: Dr. H.C. Yin, UNESCO Office, University Building, New Delhi, India.

W. J. Ellis, UNESCO Office, United Nations Building, Manila.

OFFICERS OF THE SECOND SESSION

Chairman: H. S. H. Prince Sithiporn Kridakara, Thailand.

Vice Chairman: U Khin, Burma.

Secretary-General: Mr. C. W. Chang, FAO.

Executive Secretary: Mr. W. H. Cummings, FAO.

Technical Secretaries:
Dr. Ralph W. Phillips, FAO.
Dr. L. E. Kirk, FAO.
Dr. D. H. Bau, FAO.
Dr. C. P. G. J. Smit, FAO.

Conference & Documents Officer:
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Assistant Conference Officer:
Sao Hseng Ong, Burma.

Assistant Documents Officers:
U Bo, Burma.
U Kaung Zan, Burma.
U Tin Maung Aye, Burma.

Committee A (Rice Production, Storage and Processing)

Chairman: U Khin, Burma.

Secretaries: Dr. Ralph W. Phillips, FAO
Dr. L. E. Kirk, FAO.

Committee B (Rice Statistics, Terminology and Internal Distribution)

Chairman: Phra Nararaj Chamnong, Thailand.

Secretaries: Dr. D. H. Bau, FAO.
Dr. C.P.G.J. Smith, FAO.

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