OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

D03508

United Nations Industrial Development Organization

ID

Distr.
LIMITED

ID/WG.89/24
19 November 1971

ORIGINAL: ENGLISH

Joint UNIDO, FAO, ECAFE Interregional Seminar on the Industrial Processing of Rice, organized in co-operation with the Government of India

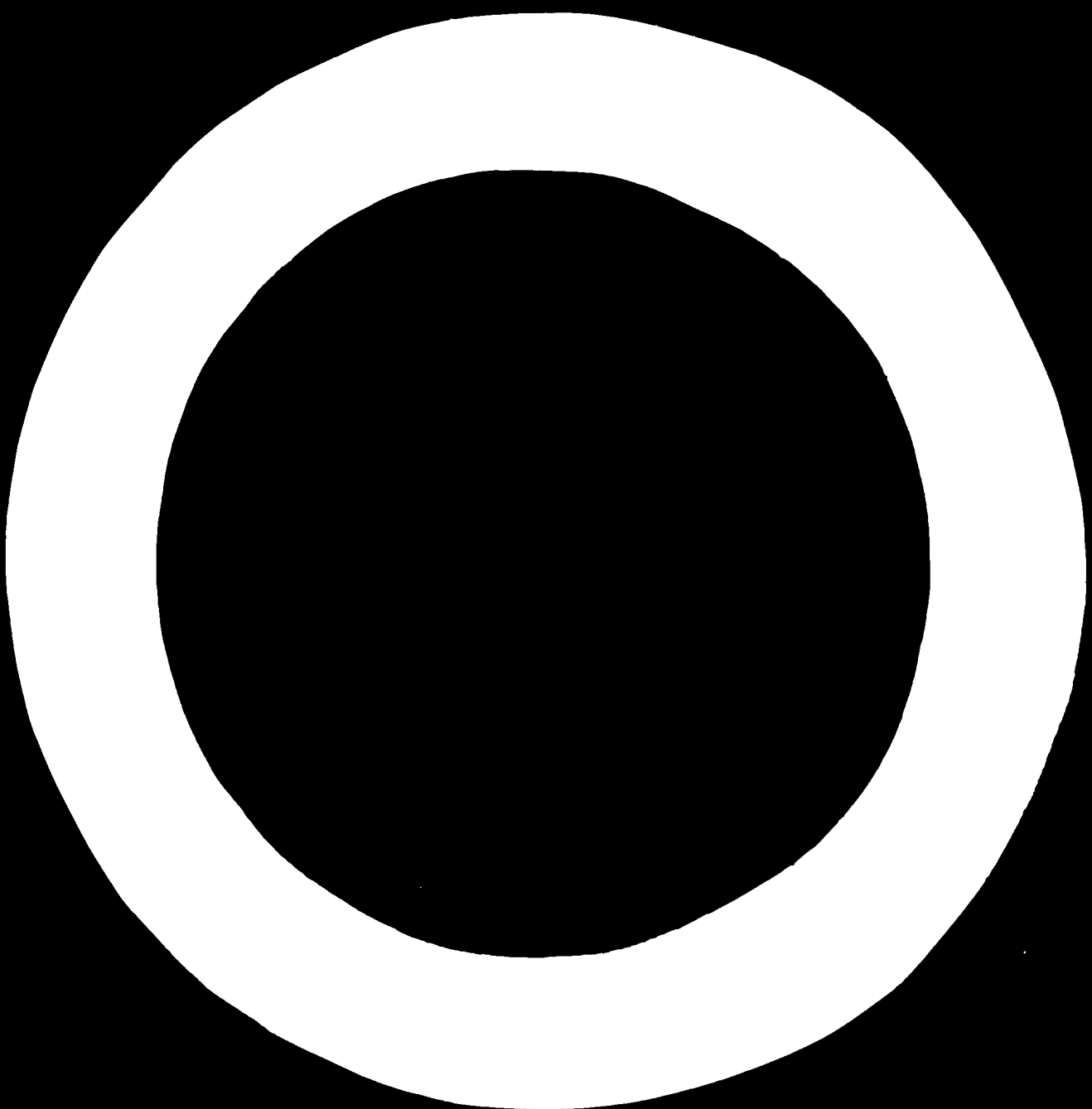
Madras, India, 11 - 16 October 1971

REPORT

ON THE INTERREGIONAL SEMINAR ON THE INDUSTRIAL PROCESSING OF RICE[1]

[1] The views expressed in this Report represent the views of the various Working Groups and individual participants; they do not necessarily reflect the views of the Secretariats of UNIDO, FAO and ECAFE. This Report has been reproduced without formal editing.

id.71-8780



C O N T E N T S

ANNEXES

FOREWORD

1. From 11 - 16 October 1971 an Interregional Seminar was held in Madras, India on "The Industrial Processing of Rice". This Seminar was organised jointly by UNIDO, FAO and ECAFE in co-operation with the Government of India, and was attended by 200 Participants, Consultants and Observers from twenty-five different countries. The Participants attended the Seminar in their personal capacities, and not as official representatives of their respective organisations. The views expressed in this report represent the views of the various Working Groups and individual Participants; they do not necessarily reflect the views of UNIDO, FAO and ECAFE.

2. Twenty-eight papers were presented on subjects covering the whole range of processes involved from harvest to the consumer, including the utilization of milling by-products.

3. The inaugural function took place in the Vivekananda Hall of the College of Engineering, Guindy at 10.00 hours on Monday 11 October. The welcoming address was given by Mr. K.P. Mathrani, Secretary to the Government of India, Department of Food and Chairman, Food and Nutrituion Board. Dr. M. Karunanidhi, Chief Minister of Tamil Nadu, gave the inaugural address, which was followed by the presidential address given by Mr. K.K. Shah, Governor of Tamil Nadu. Mr. Mihajlo Mautner (UNIDO), Director of Seminar, Messrs. H. von Hülst (FAO), V.M. Subramanian (ECAFE) and Dr. P.K. Kymal (Government of India), Co-Directors also addressed the meeting. A vote of thanks was proposed by Mr. G.C.N. Chahal, Joint Secretary to the Government of India, Department of Food.

4. Then followed the election of the Officers of the Seminar and the six Working Group leaders, and the agenda was formally adopted. The Seminar proper took place in the Indian Institute of Technology, Guindy.

5. In the afternoon of 11 October, Mr. P.U. Shanmugham, the Minister of Food, Tamil Nadu, formally opened a rice processing exhibition organized by the Department of Food and the Nutrition Board of the Government of India. The exhibition had a number of stands representing manufacturers of equipment, research and business organizations actively engaged in rice processing.

6. The Participants and Observers visited a modern integrated rice processing complex at Thiruvarur on 14 October.

7. Groups of related papers were presented to the Seminar and discussed after the respective group presentations. Discussion following the presentation of the papers was restricted to general subjects, leaving the detailed discussion to be dealt with by six Working Groups. The Working Groups were requested to summarize the current situation in their field, the problems involved and their recommended solutions. The material in this report is based on the papers presented, and on the findings of the Working Groups.

INTRODUCTION

8. The importance of the industrial processing of rice does not seem to have received due attention in most of the developing countries. The green revolution has brought into sharp focus the serious deficiencies in the methods currently practised from post harvesting of paddy to marketing of rice. Despite increased production, the loss of export earnings from rice for a fourth consecutive year, and the existence of a widespread concern over the problem of malnutrition, it would seem that an industrial revolution in rice processing is urgent if the increased agricultural production is to be meaningful in the developing countries.

9. One of the objectives of the Seminar was to provide technical and economic criteria for potential investors with a view to stimulating investment in modern rice processing units which are found to be viable. The developing countries should profit from the experience of advanced countries where even though rice production and processing is a minor economic activity, modern integrated industrial processing complexes have been successfully operated to maximum economic advantage. Benefit could also be derived from the experience of those developing countries in which modernization of rice processing has already met with success.

10. Speaking of the potential as a whole, the annual world production of paddy is 300 million tons valued at 15,000 million U.S. dollars, which would correspond to a yield of 3 million tons of rice bran oil of a value of 750 million U.S. dollars, and 12 million tons of defatted bran with 15 - 20 per cent protein valued at 360 million U.S. dollars. These figures once again stress the fact that the development of modern agriculture and the accelerated industrialization of processing methods are complementary and mutually supporting activities.

11. It is hoped that the Governments concerned will realize that a thorough reorganization of the industry aimed at improving its efficiency will not only help to solve pressing economic, political and social problems, but will also act as a profit incentive for large-scale investment in modernization programmes. It is equally important to national economies to develop new and diversified export products so that these countries will be less dependent on the export of rice which is subject to wide fluctuations in world markets.

12. The Governments of the developing countries may draw one more lesson from the technological advances already achieved in related fields, such as the processing of wheat and maize. It would seem essential that a co-ordinated approach should be made to solving such problems as the effective organization of working time by the grower; the intensification of rice cultivation; the acceptance of new rice varieties by the grower, processor and consumer; and the modernization of rice processing to ensure higher output. In fact, it is an integrated process that cannot be solved in parts. The recent advances in agricultural technology have raised rice to the status of an industrial crop, which means that the industrialization of rice cultivation, harvesting, processing and marketing can begin. The time has come when rice agro-industrialization has to be aggressively pursued as has been done in wheat, maize and a number of other industrial crops. The development of integrated agro-industrial complexes which involve the introduction of modern agricultural technology along with modern industrial processing technology and marketing is bound to bring new prosperity to the rice producing countries.

13. In retrospect, the Seminar has indeed stimulated great interest in the agro-industrialization of rice, and apart from the exchange of technical and economic information and data, it has laid broad guidelines for its future

development in the developing countries. The action-oriented programme which has been proposed in the recommendations will, if implemented, advance the cause of modernizing the rice processing industry and enhance the economies of the developing countries concerned.

14. The need for research, development and training at national, regional and international levels in order to constantly upgrade and place the rice processing industry on a sound techno-economic foundation was recognized by the Seminar. Efforts in this direction should be continued and strengthened.

CHAPTER I

MODERNIZATION OF THE RICE PROCESSING INDUSTRY

(covering parboiling, drying and milling)

15. The technical, economic, and food output advantages of modern industrial-scale rice processing techniques are substantial in comparison with traditional methods. The modern methods are typically based around equipment employing paddy cleaners, rubber roll or underrun sheller huskers, improved paddy separators, various types of polishers, rice grading equipment, mechanical paddy dryers, and (where used) hot-soaking parboiling equipment. The traditional methods are typically based around use of iron hullers and sun drying.

16. The yield and quality of rice produced by modern mills is superior to that of traditional huller mills and the by-products of modern mills can be put to much more economic use. The modern approaches can now be encouraged by governments, international organizations, and private investors for adoption in most of the major rice-producing areas of developing countries today. The state of technological development available today in the fields of parboiling, drying and milling is sufficiently advanced and tested that, once design is adapted to local conditions, equipment is available offering marked advantages of efficiency improvement more than commensurate with the higher cost of this equipment. The economic advantages of modern rice processing techniques are greatest when adopted on an industrial scale, when separated by-products are put to optimum economic use, and where local government policies permit premium prices for superior quality grades of rice. Modern rice processing industries require very careful planning to ensure proper location, capacity, technology, and profitable operation. Management requirements are complex and must not be overlooked for successful operation. Given the factors described above, modern rice processing industries can yield a return on investment at least comparable to that of most other industries in the majority of the rice-producing developing countries of the world today. And aside from the economic potential of these more efficient industries, the additional food output which these types of industries can make available can go a long way towards helping solve the major problem of long-term food supply to an expanding population predominantly dependent on rice.

RECOMMENDATIONS

The Seminar adopted the recommendations as embodied in the paragraphs below:

Need for Continuing Pre-Investment Planning Studies

I. No single "package" solution will fit all countries and local conditions. The local economic, political and social environment and the local traditions in the paddy-rice economy vary widely and can influence many aspects of the type, location, size, etc. of modern rice processing industries which should be established. Government policies can either encourage or discourage investment in this field. Local consumer tastes need to be taken into account along with marketing patterns and paddy supply logistics.

II. There is an urgent need for making pre-investment appraisals of these local environmental conditions affecting the ways and means of accelerating the adoption of modern rice processing techniques in each developing country. Governments of developing countries should be encouraged to make such studies to define the parameters for establishment of such industrial-scale mills in their locales or to request assistance in making such studies from an appropriate international organization. These surveys should be made by qualified consultants and should include an appraisal of all local factors influencing the establishment and operation of modern rice processing industries.

III. The survey reports should recommend the type, capacity, location, and number of units which will be appropriate for the local conditions and should propose the methods for attracting the necessary investor interest, capital, technical and management know-how, etc. in order to accomplish the objectives as rapidly and efficiently as possible. Necessary changes in local government paddy-rice policies in order to provide a climate for more rapid encouragement of these industries should also be recommended.

Need for Study of the Economics of Modern Rice Processing Industries

IV. Little information is available in the literature today concerning the economics of modern rice processing industries suitable for establishment in developing countries. Interested investors should be able to obtain general guidelines of the approximate investment cost and operating economics of modern rice processing industries of different technologies, sizes and capacities, types of operation, etc. Planning checklists and feasibility study pro formas should be made available to all interested governments, co-operative groups, and private investors. The minimum economic size of various types of units should be determined and published, as should be the break-even point and variable returns possible from alternate types of installations and methods of operation.

V. It would be desirable for an appropriate international organization to sponsor a major research study of the economics of this industry leading to publication of a practical guide to assist organizations and individuals in all developing countries who are trying to plan new industries in this field. The study should include the preparation of generalized model feasibility reports for various types of units which, when adapted to localized cost factors, can help to serve as a guide for the preparation of detailed actual project feasibility reports.

VI. International organizations should also be requested to make funds available to provide governments and investing organizations with technical and economic consultants to assist with carrying out the detailed pre-investment planning and feasibility analysis necessary for the establishment of the first new modern rice processing industries in each developing country locale.

Financing New Modern Rice Processing Industries

VII. Finance will loom large as a deterrent problem in considering a spread in the establishment of new modern rice processing industries. The major regional and international development banks should be encouraged to play a leading role in encouraging investment in this industry by making foreign credits easily available for the purpose. Local governments and banks should be encouraged to establish liberal provisions for helping to finance the working capital requirements of the units established. The countries of the primary machine manufacturers should be encouraged to offer long-term supplier's credits to developing countries for the purpose of encouraging establishment of modern rice processing industries.

Training Programme

VIII. The viability of a modern industrial-scale rice processing industry depends to a large extent on the availability of trained engineers and technicians to plan and operate these complex units and of skilled managers to handle difficult problems of paddy procurement programmes, inventory control, plant operation, rice marketing, etc.

IX. The existing country training institutions with training programmes for this industry should be encouraged to accept trainees from other developing countries to share their knowledge and help fill the gap in training facilities. Existing modern rice mill management should be encouraged to accept apprentices for training for other new mills. Many developing countries may find it worthwhile to establish their own specialized training programmes covering the technical and management aspects of this industry.

X. In support of country training programmes, appropriate international organizations should sponsor the preparation of suitable training materials for this industry including technical training manuals, course syllabi, technical drawings, photographs and visual aids, etc.

XI. International organizations should also consider providing management consultants experienced in this industry to assist managements of operating modern rice processing industries which are encountering difficulties.

XII. Many existing modern rice mills in developing countries are not being operated to their optimum efficiency today. Much better machinery operational manuals are required than those available from most machinery manufacturers today. Manufacturers should also provide improved after-sales service and training facilities to their customers to ensure proper use of their equipment. Preventive maintenance programmes should be encouraged in all operating units. As an example of the type of content appropriate for improved operating manuals, a list of suggestions is attached for improving rubber roll utilization rates.

Demonstration Plant Projects

XIII. While the technology for modern rice processing industries is largely known and tested today, it is still being constantly improved and does require local testing and adaptation to local conditions. Local paddy varieties, climate conditions, market preferences, construction materials, etc. vary widely. Accordingly, where a government or other local authority feels the need to establish a demonstration plant project as the first of its kind in a particular locale, appropriate international organizations should provide assistance including planning and feasibility studies, consulting services for design and implementation, training of operators and managers, and, where possible, financial assistance toward the capital investment necessary for such projects.

XIV. Demonstration projects should generally be of a minimum commercial capacity and should have multi-purposes of demonstration to interested local parties, testing and evaluation on local paddy varieties, developmental adaptation of equipment for local conditions and materials, and training.

Small Rural Rice Mills

XV. The small rural mill equipped with a steel huller has played an important role in the mechanization of rice processing in most developing countries to date. To remote rural locations where land holdings are small, where the number of varieties is large, where paddy transportation logistics are not well developed or unusually costly, and where there are not means for transporting bran rapidly to centrally located oil extraction industries, the steel huller will continue to serve its purpose in performing milling for local rural consumption for some time into the future. However, the number of huller units already existing in most developing countries should be sufficient so that governments should no longer need to encourage or promote further extension of small industries based on this technology either for dehusking paddy or polishing rice.

XVI. Machinery manufacturers should be encouraged to carry out more applied development and testing work to perfect and bring down the cost of new, more efficient small self-contained rice mills of approximately $\frac{1}{2}$ ton capacity but not at the expense of excluding a paddy separator which is the kingpin of a modern mill. Where found to offer a suitable alternative for replacement of hullers in small-volume rural mills, such units should be promoted with government backing and financial assistance to the millers.

Local Manufacture of Equipment

XVII. Many items of equipment required for modern rice processing industries can generally be fabricated locally in developing countries at a lower cost than importing foreign-make equipment. Examples are silos, dryers, mechanical handling equipment, etc. where considerable savings in foreign exchange are possible. Appropriate international organizations should encourage the establishment of local equipment-manufacturing industries in each country to provide for the needs of new modern rice processing industries being established. Assistance could include the supply of technical drawings and specifications and consultant aid. Once a number of modern mills are established in a country, it is important to have an industry supplying replacement rubber rolls. The technology for this process should be made readily available to all interested concerns.

The Technology for Modern Rice Processing

XVIII. The possibility of aflatoxin development in parboiled paddy is recognized and studies are recommended to determine the extent and causes of mycotoxins and aflatoxins. If aflatoxin levels in parboiled paddy are determined to be critical, studies should be made to determine methods to prevent their development.

XIX. The "under-run disc sheller" type of husker generally gives a marked increase in rice output over conventional hullers in almost all milling conditions. Rubber-roll shellers generally yield a marked increase in milling output over under-run disc shellers when milling raw rice. The rubber-roll shellers generally offer economic advantages over under-run shellers where replacement rollers are readily available at reasonable cost. The correct use of rubber-roll shellers includes ensuring that:

(a) rollers are installed properly, and are parallel and flush on ends;

(b) they are statically balanced and cylindrically true;

(c) they should be reversed after 24 hours of operation to equalize wear and maintain differential;

(d) rollers that have started to wear unevenly should be removed and turned on a lathe to correct the uneven surface;

(e) rollers should never be operated unloaded in the closed position;

(f) air cooling of rollers and exhausting the air chamber will prolong roller life;

(g) paddy fed to rubber rollers must be clean;

(h) attention should be given to bearings and the swing-out arm of rollers to prevent vibrations between units, which may lead to destruction of the machine.

Government Policies to Encourage Development of Modern Rice Processing Industries

XX. Because of the advantages to be gained in higher total food output, reduction of food grain imports and improved efficiency of this major processing industry, governments in all rice producing countries are encouraged to adopt policies which will encourage and promote investment in modern rice processing industries. Where possible, incentives should be given, such as long-term loans on easy terms, tax or customs duty holidays, guaranteed markets, etc. Rice grading standards should be adopted which permit payment of premium prices for higher quality grades of rice. Wherever possible, free private trade rice marketing and rice exporting should be permitted.

Training and consulting services should be provided. Foreign joint-venture investments in this industry should be encouraged. Adequate loan funds to finance the large paddy inventory stocks required for this industry should be assured. Local industrial development organizations should build expertise in this field and should help to promote investor interest in this type of industry.

International Standards for Equipment Performance Rating Specifications

XXI. There are not at present any uniform rating specifications or terminology used from manufacturer to manufacturer to compare the machinery being offered for use in modern rice processing industries. Most other industries had adopted such standards. Very often, the purchaser of processing equipment experiences difficulty in making an objective comparison of the performance or specifications of units supplied by different manufacturers. It is therefore recommended that an appropriate international organization should take the lead by:

(a) Deciding on standardized terminology to describe all machines and performance and rating factors;

(b) Determining standardized performance testing procedures for rice processing machinery in relation to prevalent paddy grading standards;

(c) Determining a code of uniform minimum specification factors and safety requirements;

(d) Determining standardized equipment capacity ratings for easy matching of components and for evaluation of a machine's throughput performance.

XXII. Manufacturers should be encouraged to adopt standards set by an international organization and to prepare their advertising material and quotations on this basis. Manufacturers should also be encouraged to help users of their equipment by providing comprehensive fault-finding charts and servicing procedure manuals for ready reference. An appropriate international body should be created to implement these recommendations.

Improving Paddy Processing Characteristics

XXIII. Agricultural research and extension workers at all levels should concern themselves to a greater degree with the overall processing characteristics of rice varieties. In developing new varieties, breeders should co-ordinate closely with processing specialists to ensure highest economic recovery characteristics of the new varieties. Agronomists should develop cultural practices which will result in production of the maximum quantity of paddy capable of quality processing. Simple and practical recommendations relative to the best time of harvest for quality processing should be developed and published for farmer use. Agricultural extension agents working with rice at all levels should be trained in the fundamentals of rice processing and should work deliberately to encourage the use of improved processing technology.

Co-ordination of Research, Development, and Training Programmes and Dissemination of Available Information

XXIV. The appropriate United Nations agency should co-ordinate research, development and training programmes relating to the modernization of rice processing techniques, and also the utilization of by-products, rice bran and husk. Wasteful duplication of effort can be prevented by ensuring the collection of information on past and current work and the effective dissemination of such information to those engaged

in research, development and training programmes. It is further recommended that the appropriate United Nations agency compile a list of material, references, and international organizations, institutions, and individuals engaged in this field with a view to collecting and disseminating information on their activities.

Paddy Supply and Processor-Producer Relationships

XXV. Difficulties of paddy supply availability and transportation logistics will often present critical limitations on the size and location of modern rice processing industries in developing countries. In planning for any such new industry, both the quantity and quality of paddy required must be assured and a workable collection and transportation system devised before establishing the mill. This must be done in close co-ordination with farming groups both in order to assure the supply of paddy necessary to operate the mill and to ensure a fair market price to the farmer.

Labour in Rice Processing Industries

XXVI. While recognizing that modern rice processing industries substitute mechanized processes for many tasks presently performed by labour in most traditional mills in return for marked efficiency improvements, planners governments, and investors should be encouraged to retain the maximum level of local employment possible in areas facing unemployment problems wherever the economic advantages of mechanical versus labour handling are found to be nearly equal.

Need for Continuing International Technical Meetings Workshops and Seminars

XXVII. The present Seminar on the Industrial Processing of Rice has played an extrmely valuable function and has demonstrated both the importance of the subject and the breadth and

complexity of its scope. It is felt that there is a definite continuing need for further meetings and seminars of this type on an international level to keep interest focused on the development of this industry, to share information in this fast-changing field and to provide an opportunity for experts in the field to communicate with their counterparts in other countries. In addition to future general international seminars, it is recommended that smaller specialized meetings should be held of engineers, technologists, agronomists, scientists and economists working in the field of rice processing to make detailed considerations of various problem areas in depth.

CHAPTER II

PADDY PROCUREMENT, TESTING, GRADING, TRANSPORTATION AND STORAGE

17. The discussion was directed towards the reduction of losses in the above activities, the maintenance of highest quality paddy and paddy products, the establishment of better standards and quality of products, and maximum economies in the paddy-rice industry.

Sowing

18. At present the varietal selection of paddy seed is not generally done, consequently periods of harvesting vary and high field losses occur.

Harvesting

19. Harvesting as currently practised by the small farmers is governed by socio-economic factors, rather than by sound agricultural considerations, they harvest at lower moisture content to facilitate hand threshing which invariable results in shedding, shattering and lodging losses.

Transportation

20. Bags of paddy are carried by people on their heads, by animal packs, carts, barges, etc., all of which cause high spillage and deterioration losses owing to ingress of moisture, insects and other infestation. In areas of intensive cultivation paddy is transported in gunny bags by motorized vehicles.

Storage

21. The paddy is usually stored in warehouses in gunny bags; however the use of silos for bulk storage is increasing. Extensive handling of the bags from godowns into silo receiving pits incurs high spillage losses as well as considerable handling and maintenance costs. There are also substantial losses due to rodents, birds, micr-organisms and insects. Despite the great number of well-designed warehouses, many are unsuitable for the proper application of insecticides and fumigants.

Grading

22. The grading and selection of paddy to suit mill requirements is not generally practised, and paddy supplied by the various agencies which collect from small farmers is of varying quality. This adversely affects the output and quality of rice from the mills. The proper grading and selection of paddy according to established standards would result in economies.

Storage of Milled Rice

23. Milled rice is stored in bags for long periods, often in poorly designed warehouses to the severe detriment of the quality of the grain. Under usual conditions, rice will not keep satisfactorily for periods of more than 2½ months; brown rice stores well as long as the bran and aleurone are intact. Highly polished rice also has very good storage qualities. The greatest difficulty is in the storing of semi-polished rice where the bran and aleurone are broken. In most developing countries, semi-polished rice is produced because of its higher nutritive value.

Packing

24. Most rice is packed in 95 to 100 kg. gunny bags which are large and very awkward to handle. Consequently, hooks are freely used, tearing the gunny bags which causes considerable spillage. Furthermore, these bags are bulky and difficult to stack.

General

25. The paddy-rice industry includes the following processing stages: sowing, harvesting, transportation, scalping, drying, storing, rice milling, bran utilization, oil extraction, animal feed manufacture, and the marketing of rice and by-products. Every step in this process contributes to the total economy of the system and it would be unwise to evaluate any single aspect in isolation.

26. Research and development work on infestation control, storage and handling has helped to reduce and control the losses, but there is a need to strengthen and continue this work.

RECOMMENDATIONS

The Seminar adopted the following recommendations:

I. That the first stage in the paddy-rice economy commence with the varietal selection of paddy and that sowing be limited to graded seeds which have been tested under the appropriate field conditions. The grain could then be harvested at the right time and at the optimum moisture content to minimize shedding, shattering and lodging losses. Furthermore, milling efficiency would increase with a regular supply of uniformly sized paddy.

II. That harvesting be done at the otpimum moisture content, which would be facilitated by proper seed selection, enabling the farmer to calculate harvesting dates. Assistance in threshing could be provided by the procurement and other agencies. At present, paddy is dried in the open on made-up floors near the fields, and it is frequently sun-dried on roads in uncontrolled conditions. This contributes to sun-checking and other losses such as bird-picking, and crushing by vehicle wheels, and contamination. It would be preferable for procurement agencies to purchase the high-moisture paddy and transport it rapidly to rural scalping, drying and interim storage facilities.

III. That bulk handling be used for the collection of harvested paddy as it is economical and minimizes handling losses. Well-designed, completely closed carriers lend themselves to insecticidal sprays and fumigation, and consequently infiltration can be prevented at this stage in addition to affording all-weather protection to the grain during transport. The rural drying and collection centres mentioned above should be located within 18 hours transportation distance (depending on the type of transport used) to prevent local heating and germination of the paddy. As the type of paddy and its condition are known at the time of receipt at the collection centre, the technical staff at these centres would be able to scalp (rough clean) and dry the paddy to an optimum moisture content prior to bulk interim storage at the centre. The size of such storage facilities would naturally depend on their location and the transportation systems available.

IV. That bulk storage of paddy be adopted and that the following alternative systems be considered:

(a) Low-cost conversion and reinforcement of conventional godowns, where doors and other openings are sealable, with the installation of mechanical handling equipment;

(b) Where new facilities are being planned, it would be desirable to construct modern bulk storage units such as silos or godowns with mechanical handling equipment, aeration and floor fumigation systems. These facilities should also be provided with scalping, drying and tempering systems. Parallel inputs of paddy could be received by these storage facilites, one from the rural collection centres in the form of scalped and dried paddy, and the other from the fields close to it in the form of high moisture paddy. These storage facilities should be designed as part of a rice milling complex comprising parboiling, rice milling, bran oil extraction and other by-product utilization plants or they could be located separately to supply groups of rice mills or plants processing the by-products. The paddy utilized by these complexes would, of course, be handled in bulk within the complex and in bulk carriers for delivery to mills outside the complexes.

V. That the collection and drying centres have an inspection department to determine the quality of paddy received; and incentives should be given to individual farming groups to supply harvested and dried paddy to the standards required. Valuable data are available on standardization and grading of paddy, and it is suggested that the developing countries establish standards relevant to their countries and also for export (in consultation with other countries) as soon as possible.

VI. That maximum storage periods and stack heights for milled rice be determined according to local conditions. Freshly milled rice should be allowed to cool in the gunny bags before being stored. Fumigation of the rice should be carried out strictly, and it would be desirable to have the gunny bags impregnated with insecticide. The delicate grain structure of rice prohibits bulk storage owing to the mechanical pressures and stresses involved and the vulnerability of rice to infestation.

VII. That the weight of the rice per bag be reduced to between 50 and 75 kg., depending on local needs so that removal by hand is less burdensome and the use of hooks can be eliminated. It is further recommended that the bags be tie-reinforced between walls (as in mattresses), to prevent full bags bulging and under-filled bags collapsing. Such bags would be stronger and would present a large, though lighter, surface suitable for stacking. For the consumer, smaller and more elegant packing could be provided in the form of PVC bags where the quality and type of the grain would be visible. Jute and hessian bags of the best quality should be used for the storage of milled rice.

CHAPTER III

RICE BRAN AND RICE BRAN OIL

27. Rice bran is a by-product of the rice milling industry and consists of the germ and the outermost layers of the endosperm of the dehulled rice grain. It contains about 15 to 20 per cent of an edible oil which, as experience in many countries has shown, can be extracted and refined using modern processes and equipment to give a high quality poly-unsaturated oil with composition, properties and uses comparable with corn or cottonseed oil. Moreover, the defatted bran is considered superior to raw rice bran as an animal feedstuff by virtue of its increased stability, and protein content, and as a fertilizer, being higher in nitrogen and phosphorous.

28. Data on rice bran oil production illustrate that only a small proportion of the potential source of edible oil is currently realized and extraction industries only exist to any significant extent in Burma, India, Japan and Thailand, although rice milling industries exist in very many countries. Exploitation of this potential could provide a valuable addition to the edible oil supplies in regions of the world which suffer a shortage of this commodity as well as reducing the need for soft oil imports in areas where foreign exchange is in short supply.

29. Increasing the edible oil supply by exploiting the large quantities of rice bran available has the advantage that cultivation of the rice plant is familiar and well-established in many parts of the world. Increasing the edible oil supply by introducing new crops such as soya, groundnut, or sun flower requires considerable initial agricultural development and investment as well as education of the farmer in the tending of a new crop unfamiliar to him. With rice, only in post-harvest matters are new methods and techniques required. On the other hand, for technical reasons outlined below, rice bran oil production is beset with technological difficulties and its efficient exploitation may require large scale restructuring of the entire rice milling industry with the attendant social implications. However, if re-organization of the rice milling industry into larger units is undertaken in view of its obvious advantages, the benefits should be maximized by including oil extraction in the overall plan.

30. The major impediment to the development of a rice bran oil industry in many countries has been the invariably high free fatty acid content of the crude extracted oil making economic refining for edible use almost impossible. The free fatty acid content arises because the bran contains an extremely active enzyme-lipase which hydrolyses the triglycerides of the oil and releases free fatty acids.

31. Thus, if no method of stabilization (destroying the activity of the lipase) is used, rice bran, particularly in countries where temperatures and humidities are high, rapidly becomes very high in free fatty acid content and unsuitable for edible oil production. Thus, in many countries where small scale rice mills, inaccessible to modern transport systems, are the rule, procurement of low free fatty acid bran becomes the major impediment to the industry. Ideally, oil extraction mills should be sited close to large mills in order that transport difficulties can be eliminated and immediate post-milling extraction of bran can be carried out. These small rice mills also tend to be inefficient producing a bran containing large amounts of impurities such as husk, broken grains, etc. which will lower the oil and the protein content.

32. Several methods of stabilizing bran have been studied, the most successful being some form of heat treatment which inactivates the lipase and peroxidase and also destroys micro-organisms, permitting a longer storage and transport for extraction of oil. None, however, appears to be in commercial use currently. The new XM process (extractive milling) recently developed in the U.S.A. eliminates the need for storage of an oil-containing bran by milling in the presence of hexane solvent and shows promise in the production of a low free fatty acid oil suitable for refining to edible grade. One X-M plant of a capacity of 90,000 ton/year of paddy is reported to be in continuous production in U.S.A.

33. Parboiling of rice prior to milling also appears to be of advantage from the point of view of oil extraction as it is well known that the bran is stabilized to some degree and has a comparatively higher oil content.

34. Some difficulties might be experienced by rice bran oil producers in the marketability of their products. Traditional use of other oils and fats such as coconut oil or animal fats have in some countries led to a reluctance of consumers to utilize a new product such as rice bran oil. Similarly, livestock feeders in some countries have had doubts on the nutritional value of defatted rice bran and have preferred to continue using raw rice bran.

35. With modern technology, there appear to be no insurmountable difficulties in refining rice bran oil for edible use. The processes of degumming, dewaxing, neutralization, bleaching, winterization, deodorization and hydrogenation can be carried out by conventional methods. Uses of rice bran oil are much the same as those of cottonseed, corn, or a wide variety of other soft oils currently engaged in world trade. Its particular areas of utilization in the edible field would be as a salad oil, cooking oil, manufacture of shortening and as the liquid portion of margarine blend. Its low linolenic acid content and high tocopherol content impart an oxidative stability and minimize the formation of rancidity and off-flavours which can limit the use of other soft oils in a fat product. The high linolenic acid content is thought to be responsible for the blood-cholesterol-lowering effect and this fact might enable the oil to take advantage of the current world-wide swing towards cooking oils and softer margarines.

36. In the industrial field, soap from rice bran oil is soft and readily soluble and although unsuitable for the familiar hard bar of soap unless hydrogenated or blended with tallow or a lauric oil. However, it can find a use in liquid or soft soaps served from dispensers or in shampoos for hair, cars, and the washing of delicate surfaces which require lower temperatures.

37. Oryzanol can be isolated from the oil, and in Japan medicinal properties are claimed for this material.

38. Rice bran wax which could be a by-product in refining crude rice bran oil, though of commercial interest, has not yet been produced on an industrial scale.

39. The medium and high iodine value fatty acids, produced by splitting and distillation of mixed rice bran oil fatty acids, could be used in the protective coating field as components of alkyds or epoxy resins and for the plasticizers, incorporated into polymer resin formulations. Further research is required in this area.

40. Protein concentrates can be prepared from defatted rice bran, but commercial exploitation of this process has so far been minimal.

41. There exists a wide gap between the potential and actual production of rice bran oil in the rice producing regions and the causes of this have been identified as one or more of the following:

(a) Difficulties in bran procurement due to seasonal rice milling, scattered nature of small scale mills and transport difficulties;

(b) Poor quality bran with high FFA oil and husk and broken rice;

(c) Lack of technical advice and expertise;

(d) Defatted bran, not accepted by local livestock feeder as a substitute for raw rice bran;

(e) Traditional use of other oils and fats, e.g. coconut oil or animal fats, has adversely affected consumers' acceptance of unfamiliar oil.

RECOMMENDATIONS:

The Seminar adopted the following recommendations:

I. That each country should try to identify the major causes of the current inefficiency in the use of rice bran as an oil source, and seek to eliminate them by modernization or re-organization of the rice milling industry. It is stressed that modern milling techniques are essential pre-requisites to the establishment of rice bran oil industries, and that some form of stabilization is essential if bran cannot be extracted within a few hours;

II. That rice bran oil refineries should be encouraged to use modern technology;

III. That training programmes on extraction and refining techniques for rice bran oil should be introduced in each country;

IV. That international standards on permissible solvents in processing rice bran oil and also standards governing crude and refined rice bran oil, defatted bran and other by-products should be drafted by an appropriate international organization;

V. That an international technical committee on the extraction and refining of rice bran oil and its by-products be set up to advise developing countries seeking to start or to improve their rice bran oil industries;

VI. That under long-term research projects further research on an inter-regional basis should be undertaken in the following areas:

(a) Stabilization of bran;

(b) Refining and utilization of rice bran wax;

(c) Blood cholesterol lowering action of rice bran oil and pharmaceutical action of oryzanol;

(d) Uses of rice bran oil fatty acids as potentially valuable by-products;

(e) Preparation of protein isolate from defatted bran;

(f) Comparative studies on defatted bran and raw rice bran as an animal feedstuff;

(g) An economic and technical evaluation of the [redacted] process as to the suitability of its adoption in developing tropical countries;

(h) Initiating research on plant genetics for increasing oil content of bran.

CHAPTER IV

RICE AS AN INDUSTRIAL RAW MATERIAL FOR THE MANUFACTURE OF PROCESSED AND READY-TO-EAT RICE PRODUCTS

42. The major form in which rice is consumed throughout the world is as a cooked whole kernel. Besides this main form of use, several produots prooessed from rice have been developed in various countries to provide ready-to-eat products which are tasty and versatile in use and have a long shelf life, e.g. rice flakes, popped or puffed rioe, instant or quick cooking rice, canned rioe, deep fried crispies, fermented products, rice crackers and wafers, etc. Such oonvenient products are appreoiated and enjoyed by most rice consumers.

43. These produots are manufactured by empirical methods which are not publicized. Soientifio information relating to their manufacture is very scanty. The information which is available is covered by patents, consequently the various prooesses are not freely available to all potential users. The art-technology relating to their manufacture needs to be oonverted to a soient-technology so that such products of uniform quality oan be produced universally.

RECOMMENDATIONS

The Seminar adopted the following reoommendations:

I. That the setting up of a study group on this subjeot by an appropriate international organization be urgently oonsidered, its terms of reference being to review and report on the present state of knowledge in the area of processed and ready-to-eat rioe produots, and to provide information particularly on:

(a) Basic principle of prooesses;

(b) Optimum prooessing techniques and equipment;

(o) Problems needing solution;

(d) Nutritive value and keeping quality of prooessed rioe products;

(e) Economic aspects;

(f) Marketing aspects;

II. That inter-regional co-operation be encouraged and an international committee set up to co-ordinate research programmes.

III. That educational and training institutions be strongly urged to include in their curriculu on Rice Technology a section dealing with "Processed and ready-to-eat rice products".

CHAPTER V

PADDY HUSK UTILIZATION

44. A review of the possible rice husk utilization schemes results in the conclusion that there is no single practicable solution to the husk disposal problem which can be applied on a world-wide scale. The beneficial use of husks must be derived strictly upon the basis of local opportunity, which is governed by the economic as well as social considerations of the particular area. Therefore, where husk disposal has become either a real or potential problem, the responsible individuals must fully utilize existing technical and commercial data as the basis for experimentally evolving a satisfactory disposal technique. Any technique so developed can be considered satisfactory only when the husk product evolved is marketable in a manner assuring remuneration to the producer so that the net return results in a decreased husk disposal cost. To accomplish this, adequate budgets must be provided to finance the research as well as the highly essential comprehensive market surveys.

45. If rice millers are classified as small, intermediate, and large, it generally appears that the problem of rice husk disposal is of the same magnitude as the mill size. Thus, the small miller really does not have a current problem in husk disposal. Similarly, there is practically no potential for him as regards the industrial scale utilization of husk. In the case of the intermediate size milling operation, strong doubt exists that an economically viable solution, from an industrial scale perspective, can be found for the surplus husk. Therefore, the intermediate size miller must become ingenious, concentrating upon all of the possible local beneficial uses of the rice husk that reduce his disposal costs in any way. Improved crop yields as well as ecological and urbanization pressures affect the large milling operation because the bulk of the existing classical rice husk disposal practices followed by the large mills are woefully inadequate. Consequently, it devolves upon the large miller to seek improved rice husk utilisation schemes. The large millers should, in self-interest, encourage research and development by actively participating in the financial support of such husk utilization efforts.

46. It is apparent that both fundamental and applied research on rice husk utilization is essential to overcome the mounting world-wide problem of rice husk disposal. To be fully effective and avoid wasteful redundancy, such research must be accelerated and co-ordinated under the aegis of an objective, independent international body, such as the United Nations.

RECOMMENDATIONS

The Seminar adopted the following recommendations:

I. that rice mills owners and their representative organizations make every effort to familiarize themselves with, and fully utilize, the existing technical and commercial literature now available on rice husk utilization;

II. that each government undertake independent fact-finding surveys to accurately ascertain the scope of the rice husk disposal problem in its country. Based upon these findings, governments should provide active support to the rice miller in developing beneficial rice husk utilization projects. Such assistance should take the form of extension services, the sponsorship of research, and appropriate legislation where needed;

III. that each country appoint a rice husk utilization co-ordinator who will be responsible for co-ordinating internal utilization efforts and maintaining liaison with his counterprarts in other countries and the United Nations;

IV. that a permanent international group be established under the sponsorship of the United Nations to co-ordinate world-wide rice husk utilization research and development. This agency would serve as a liaison link with the individual country rice husk utilization co-ordinator. It would also be responsible for implementing pilot stage study programmes derived from basic research efforts. Where such programmes

demonstrate a successful potential, implementation of their industrial exploitation will become the responsibility of those international organisations currently engaged in these endeavours;

V. that the United Nations establish an International Documentation Centre as a repository and retrieval library for world-wide literature of interest to member nations, and that this Centre have a section devoted to literature on rice husk utilization, where all pertinent technical and commercial data should be available upon request.

VI. that Rice Processing Research Institutes carry out studies for the beneficial use of rice husks, especially in context with local opportunity and requirements. All of these efforts should be closely co-ordinated with the above recommended international co-ordinating agency to assure full effectiveness and the availability of data resources. Some of the potentially productive rice husk utilization areas requiring further investigation are:

(a) animal feeding
(b) incorporation into the soil
(c) pressing aids
(d) fuel source (with silica as an end product)
(e) production of furfural
(f) building materials
(g) low temperature carbonization (destructive distillation)

VII. that in the area of research continued effort be expended in connexion with the development of an appropriate process and utilisation of low temperature carbonisation (destructive distillation), the resulting by-products (i.e. tar, light oil, methanol and carbon) being useful materials for industry.

CHAPTER VI

MARKETING OF RICE AND RICE PRODUCTS

47. The points that merit consideration in the marketing of rice and rice products are as follows:

(a) The introduction of high yielding varieties which have enabled many of the former deficit countries to become self-sufficient and even to become exporters;

(b) Changing patterns in ownership and management of land, with collective farming in some countries and an increasing number of small holdings in others;

(c) Poor response to family planning and increasing population pressure on land in many of the rice-growing countries;

(d) Increasing role of governments and co-operatives as large procurers and distributors, with rationing and price controls depending on the needs of the countries;

(e) Greater realization of the strength and frequency of monsoons and the need to build up buffer stocks in many countries; and

(f) Advances in the curing and particularly parboiling of rice, introduction of modern milling and better utilization of by-products. Furthermore, there is increasing production of wet-season paddy in some areas with attendant problems in preservation and marketing. There is also growing agrarian unrest with demands for higher wages and prices for agricultural produce.

48. The world market is concerned with polished raw rice, whereas domestic markets are concerned with under-polished raw or parboiled rice. There is considerable variation in world market prices for rice depending on variety and quality, while domestic prices generally move within a narrow range except for special qualities of rice. Irrespective of political ideologies,

government policies aim at maximising production with incentives to the producers. Among them, special mention should be made of the procedure followed in some countries, with payment of an advance to the producer and a bonus for prompt delivery. The system of large-scale storage and periodic release to millers, and control over retail prices, should also be considered. Some countries provide assistance for the purchase of fertilizers, and services in the form of tractor ploughing and plant protection. Several countries supply certified seed paddy. Rural indebtedness, due to high rates of interest and distress-selling to meet cash needs, continues to be a serious impediment to increased production in many countries.

49. Quality standards for both paddy and rice are assuming greater importance in many countries where there are penalties for higher moisture and foreign matter in paddy; and in the case of rice, higher moisture content, higher percentage of brokens, discoloured and under-polished grain and foreign matter. Such standards are of special significance in relation to paddy and rice produced during the wet season. In many countries, there are no schemes to pay a premium or provide other incentives for qualities which are superior to the prescribed standard. This situation requires prompt attention in order to stimulate interest in producing superior qualities of rice for both national and international markets. While parboiled rice does not have a world market, there is scope to apply the same incentives to improve the milling quality and to get better returns from soft varieties.

50. While there is strict government control over imports as well as general control over internal procurement and prices in most countries, the actual extent of such control in relation to private marketing varies with the needs of the countries and the importance of the crop to the national economy. Many countries are maintaining large buffer stocks which can be moved, at short notice, to deficit areas. Lately there has not been much interest in establishing international buffer stocks; thus, most countries will have to solve their own problems and, where necessary, by bilateral agreements.

51. An examination of the marketing situation, and more particularly the recent shift from a seller's to a buyer's market, further emphasises the importance of developing agro-industrial combines which integrate agricultural production, industrial processing and marketing, with all the attendant advantages to the economies of the developing countries.

RECOMMENDATIONS

The Seminar adopted the following recommendations:

I. That governments consider setting up a high-level Paddy-Rice Board to deal with all matters relating to the production, processing and marketing of paddy, rice and rice products;

II. That since price policies help to avoid distortions in crop production patterns and to prevent rises in consumer prices, governments develop such price mechanisms to encourage the producer to increase productivity and the processor to modernize facilities, while taking adequate precautions to proteot consumer interests. Premia for superior quality rice should also be provided. The effective implementation of price policies depends on the marketing arrangements which should be so organized as to give the maximum economic benefit to the producer and processor without increasing the cost to consumer;

III. That in oontrolled markets governments should set paddy and rice prices at such a level to cover the cost of modernizing prooessing facilities and ensure an adequate return on investments made by farmers and processors. Governments should also provide the necessary finance on easy terms and grant tax exemptions at least for a limited period;

IV. That in order to improve the marketing infra-structure, storage and transport facilities, short-term and long-term finances and marketing research be developed and strengthened wherever necessary, and with the assistance of international financing agencies.

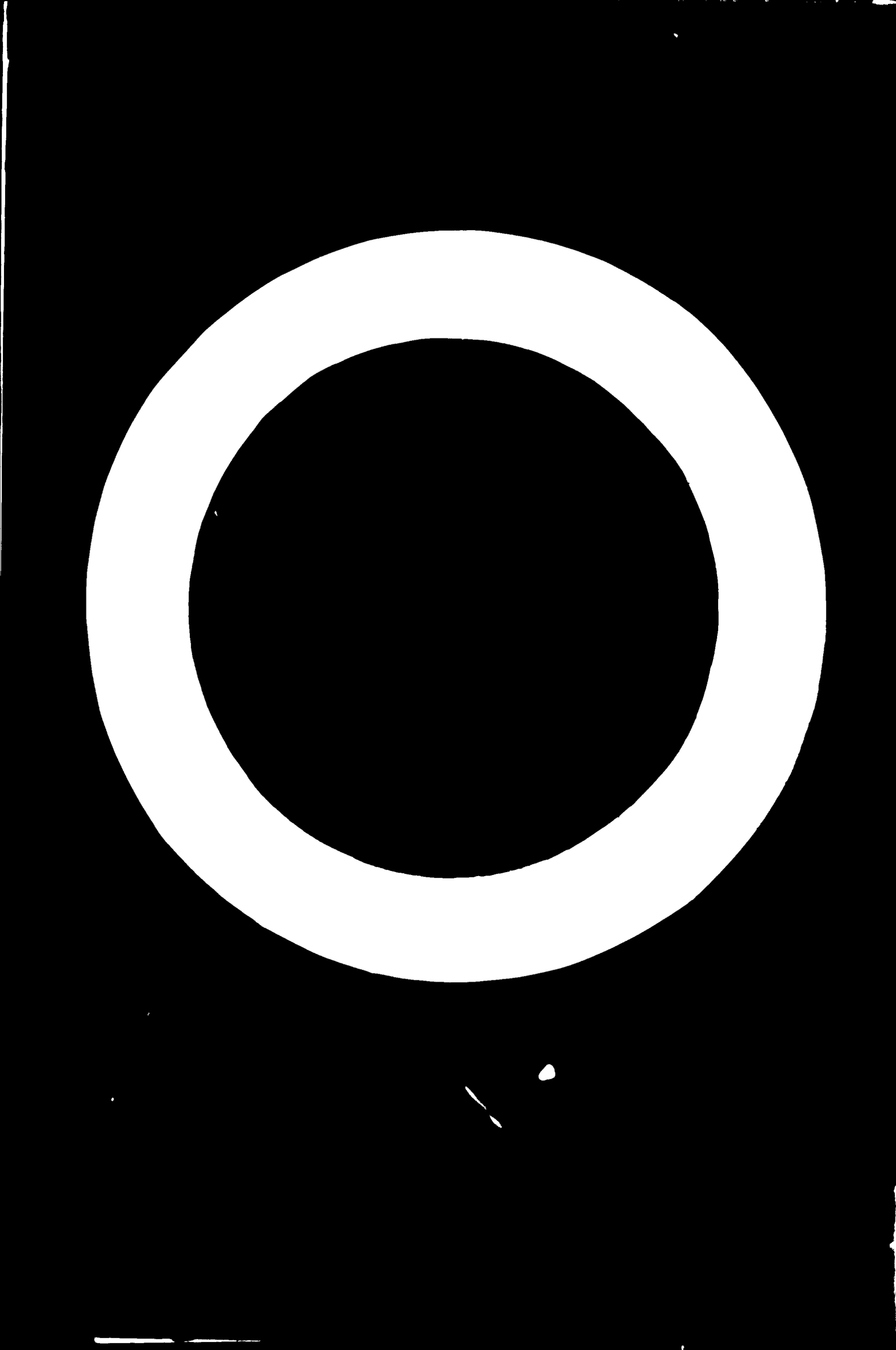
V. That the marketing techniques and price mechanisms adopted be designed to encourage the processing in modern rice mills of a substantial portion of the farmer-retained paddy, which amounts to about 50 to 70 per cent of the total production;

VI. That suitable measures be taken by the appropriate United Nations agency for the dissemination of information relating to technological developments concerning rice production, processing and marketing to the developing countries;

VII. That marketing research be undertaken at national and international levels to promote modern packaging, developing of new ready-to-eat rice products and to improve marketing channels for rice and by-products;

VIII. That, wherever necessary, governments build up buffer stocks in periods of surplus production to meet future shortages and to stabilize prices.

IX. That a price support mechanism be established to provide a minimum floor price and guarantee of purchase to safeguard the interests of paddy farmers.



ANNEX 1

AGENDA

Monday, 11 October

Vivekananda Hall of the College of Engineering

Morning

8.30 to 9.30 - Registration of Participants

Item 1: 10.00 - Welcome address by Shri K.P. Mathrani, Secretary to the Government of India, Department of Food and Chairman, Food and Nutrition Board.

- Inaugural address by Dr. M. Karunanidhi, Chief Minister of Tamil Nadu.
- Presidential address by Shri K.K. Shah, Governor of Tamil Nadu.
- Address by Director of Seminar, Mr. Mihajlo Mautner, Chief of the Light Industries Section, Industrial Technology Division, UNIDO, on behalf of the Executive Director of the United Nations Industrial Development Organization, Dr. Ibrahim Helmi Abdel-Rahman.
- Address by Co-Director of Seminar, Mr. H. von Hülst, Chief of the Agricultural Engineering Service, Agricultural Services Division, FAO, on behalf of the Director-General of the Food and Agriculture Organization of the United Nations, Mr. A.H. Boerma.
- Address by Co-Director of Seminar, Mr. V.M. Subramanian, Chief of the Metals and Engineering Section, Division of Industry and Natural Resources, ECAFE, on behalf of the Executive Secretary of the United Nations Economic Commission for Asia and the Far East, U Nyun.
- Address by Co-Director of the Seminar, Dr. P.K. Kymal, Executive Director, Ministry of Agriculture, Department of Food, on behalf of the Government of India.
- Vote of Thanks by Shri G.C.N. Chahal, Joint Secretary to the Government of India, Department of Food.

Tea Interval

Item 2: 12.00 - Convening of general meeting by the Director of Seminar for the election of Chairman, Vice Chairman, Rapporteur, Assistant Rapporteurs, six Working Group Leaders, and Adoption of Agenda.

12.30 to 14.00 - Lunch Interval

Indian Institute of Technology

Afternoon

Item 3: 14.00 - Introductory Statement by Mr. Mautner, UNIDO, relating to the Industrialization of Rice Processing.

Item 4: 14.30 - AGS:MISC/71/64: "A Review of FAO Activities connected with Rice"
by Mr. H. von Hulst, FAO.

Item 5: 15.00 - AGS:MISC/71/67: "A Review of the activities of the International Rice Commission and a Summary of the Report of the Sixth Session of the Working Party of the International Rice Commission on the Agricultural Engineering Aspects of Rice Production, Storage and Processing, Teheran, Iran 5-9 December 1970"
by Mr. Thet Zin, FAO.

Item 6: 15.30 - ID/WG.89/2: "The Importance of the Rice Processing Industry as an Agro-Allied Industry in the Developing Countries"
by Mr. D.W. Garvie

Discussion

16.30 - Opening of Exhibition on Rice Processing by Thiru P.U. Shanmugham, Minister for Food and Revenue, Government of Tamil Nadu.

Tuesday, 12 October

Morning

Item 7: 9.00 - ID/WG.89/18: "Marketing Aspects of Rice in Developing Countries"
by Mr. V.S.T. Mudaliar

Discussion

Item 8: 9.30 - ID/WG.89/13: "Review of Rice Processing Techniques"
by Mr. J.W. Wimberly

Item 9: 10.00 - ID/WG.89/4: "Transportation and Storage of Paddy and Rice"
by Mr. D.J.K. Cornelius

Item 10: 10.30 - AGS:MISC/71/65: "Handling, Drying, Storage, Testing and Processing of Rice"
by Mr. A.C. Huysmans, FAO.

Item 11: 11.00 - "Recent Advances in Pre-processing Handling and Threshing of Rice"
by Dr. N.G. Bhole

Item 12: 11.30 - "Recent Studies on the Structural and Economic Aspects of Grain Storage"
Presented by Mr. M. Kuppuswamy

Discussion

Item 13: 12.00 - ID/WG.89/7: "The Status of the Rice-Bran Oil Industry in the ECAFE Region"
by Mr. H.G.R. Reddy, UNIDO

12.30 to 14.00 - Lunch Interval

Afternoon

Item 14: 14.00 - ID/WG.89/6: "Rice-Bran Oil Technology"
by Mr. Myint Pe

Item 15: 14.30 - ID/WG.89/8: "Rice-Bran Oil and Wax"
by Dr. R.V. Harris"

Item 16: 15.00 - ID/WG.89/5: "Technical Advances in Rice-Bran Oil Processing"
by Dr. Y. Takeshita

Discussion

Item 17: 15.30 - ID/WG.89/19: "Studies on the action of Cations on Paddy, with particular reference to the role of Sodium Ion and its application in the preservation, parboiling and drying of Paddy"
Presented by Mr. V. Subramanyan

Item 18: 16.00 - "Parboiling of Paddy"
Presented by Mr H.S.R. Desikachar

Item 19: 16.30 - "Processing of Rice: Studies on Steeping of Paddy and Drying of Steeped Paddy"
by Professor A.M. Bose

Discussion

Wednesday, 13 October

Morning

Item 20: 9.00 - ID/WG.89/17: "Investment and Management Considerations for the Modernization f Traditional Rice Mills and for the Establishment of Modern Integrated Rice Processing Systems"
by Mr. R. Young

Item 21: 10.00 - "Modernizati n of the Rice Milling Industry in India"
by Dr. P.K. Kymal

Item 22: 10.30 - "Modernization of the Rice Milling Industry"
Presented by Mr. V.S. Aggarwal

Item 23: 11.00 - "Training for the Rice Processing Industry"
by Professor A.C. Pandya

Discussion

Item 24: 11.30 - ID/WG.89/13: "Paddy Husk Utilisation"
by Mr. E.C. Beagle and Mr. C.A. Beagle

Item 25: 12.00 - ID/WG.89/14: "Paddy Husk Utilisation"
by Mr. A.E Chittenden

Item 25a: 12.15 - ID/WG.89/23: "Water Resistant Composite Board from Rice Husks"
by Dr. R.C. Basishth

Discussion

12.30 to 14.00 - Lunch Interval

Afternoon

Item 26: 14.00 - ID/WG.89/3: "X-M Process for Solvent Extractive Milling of Rice"
Presented by Dr. J.W. Hunnell

Discussion

Item 27: 15.00 - ID/WG.89/11: "Rice Starch and Rice Starch Derivatives" by Dr. S. Barber

Item 28: 15.30 - ID/WG.89/15: "Rice as an Industrial Raw Material for the Manufacture of Processed and Ready-to-eat Rice Products"
by Professor J. Sakurai

Discussion

Item 29: 16.30 - AGS:MISC/71/73: "Summary Report of Meeting of Experts on the Mechanization of Rice Production and Processing", Paramaribo, Surinam, 27 September - 2 October 1971
by Mr A.C. Huysmans, FAO.

Discussion

Thursday, 14 October

Item 30: - Field Trip lasting one full day, by a special chartered flight to visit a modern industrial rice processing complex at Tiruvarur, Tamil Nadu.

Friday, 15 October

NO PLENARY SESSION

Morning

Item 31: 9.00 - Meeting of the Working Groups specified below to propose recommendations for consideration by the Seminar.

Working Group I: Modernization of the rice milling industry.

Working Group II: Paddy Procurement, Testing, Grading Transportation and Storage.

Working Group III: Rice-Bran and Rice-Bran Oil.

Working Group IV: Rice as an Industrial Raw Material for the Manufacture of Processed and Ready-to-eat Rice Products.

Working Group V: Paddy Husk Utilization.

Working Group VI: Marketing of Rice and Rice Products.

12.30 to 14.00 - Lunch Interval

Afternoon

Item 32: 14.00 - Meeting of the Six Working Group Leaders, convened by the Rapporteur, to consolidate their proposed recommendations.

Saturday, 16 October

Morning

Item 33: 9.00 - Convening of General Meeting to finalize Conclusions and Recommendations resulting from the Seminar.

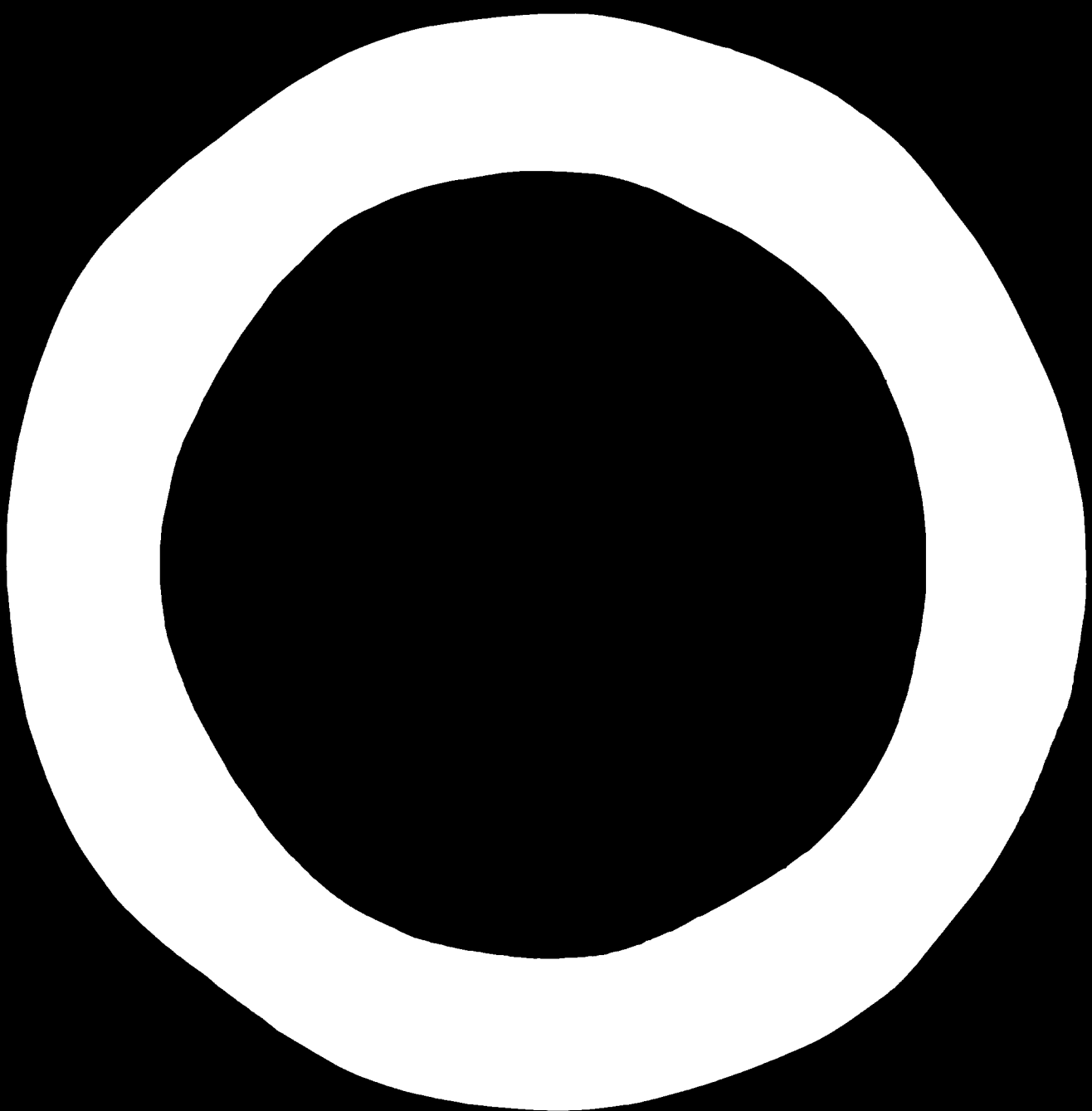
12.30 to 14.00 - Lunch Interval

Afternoon

Item 34: 14.00 - Adoption of Conclusions, Recommendations and Seminar Report.

Item 35: 15.00 - Valedictory Function and Addresses.

- Introductory remarks and summary of conclusions and recommendations by Dr. P.K. Kymal, Government of India.
- Address by Shri C. Subramaniam, Minister of Planning, Government of India.
- Concluding Address by Shri Fakhruddin Ali Ahmed, Minister of Agriculture, Government of India
- Farewell Address by Shri K.P. Mathrani, Food Secretary, Government of India.
- Address and Vote of Thanks by Mr. M. Mautner, Director of the Seminar UNIDO.



ANNEX 2

LIST OF PARTICIPANTS

PARTICIPANTS

NAME	FUNCTION	MAILING ADDRESS
ARAB REPUBLIC OF EGYPT		
Mr. Naim Thabit ATHANASSIUS	Chairman, Board of Management	West Alexandria Rice Mills C Alexandria
Mr. Mohamed Kamel EL WAKIL	Technical Manager	East Alexandria - Edko Rosetta Rice Mills Nozha-Alexandri
BRAZIL		
Mr. Ary HERZOG	Technical Adviser	c/o Instituto Rio Grandense do Arroz Av. Julio de Castilhos 58 Porto Alegre
Mr. Policarpo VITTI	Food Technologist	ITAL Caixa Postal 655 Campinas, S.P.
BURMA		
U Maung MAUNG	Mechanical Engineer	Trade Corporation No. 1 No. 70 Phayre Street Rangoon
CEYLON		
Mr. W.J. MENDIS	General Manager	Paddy Marketing Board 5 Elibank Road Colombo 5
Dr. C.L.V. JAYATILLEKE	Chief Rice Mills Engineer	Paddy Marketing Board 5 Elibank Road Colombo 5
ECUADOR		
Mr. Gustavo RIOFRIO	Manager, National Federation of Rice Cooperatives	FENACOOPARR 6to Piso, Centro Comercial Babahoyo
Mr. M.A. CORONEL	Industrial Promotion Engineer	Comisión de Valores- Corporación Fianciera Nacional Casilla 163 Quito
GUYANA		
Mr. K.H. AKEUNG	Technical Officer	Guyana Rice Marketing Board 1 and 2 Water Street Georgetown

NAME	FUNCTION	MAILING ADDRESS
INDIA		
Dr. P.K. KYMAL	Executive Director, Food and Nutrition Board	Khadya Vibhag Krishi Bhavan New Delhi
Dr. H.A.B. PARPIA	Director	Central Food Technological Research Institute Mysore - 2A
Dr. S.V. PINGALE	Manager (Quality Control)	Food Corporation of India Link House New Delhi - 1
Col. K.N. KOSHAL (Retd.)	Chief Executive	C.G. Dandekar Machine Works Limited Bhiwandi, Dist. Thana Maharashtra
Mr. K. VENTAKATARAMAN	Director	Ministry of Industrial Development New Delhi
INDONESIA		
Mr. Muslimin NASUTION	Mechanical Engineer	Badan Urusan Logistik Djl. Teuku Umar 12 Djakarta
Mr. Soerojo WIGNJODIPOERO	Mechanical Engineer	Djl. Bogowonto 28 Surabaja
KOREA		
Mr. Mai Kak CHUNG	Agricultural Specialist	351 Shindang-dong Sundong-ku Seoul
MADAGASCAR		
Mr. Richard RANDRIANAMOLY	Engineer Feasibility Studies	BDPI B.P. 8180 Tananarive Madagascar
MALAYSIA		
Mr. Othman Bin MAHMUD	Assistant Controller Trade Division	Ministry of Commerce and Industry Federal House Kuala Lumpur
Mr. Sim Hong GEH	Industrial Economist	c/o Federal Industrial Development Authority P.O. Box 618 Kuala Lumpur

NAME	FUNCTION	MAILING ADDRESS
MALAYSIA (contd.)		
Mr. Wan Mustafa bin Wan AHMAD	Scheme Manager	Ranchangan Pemasaran Padi and Beras P.O. Box 201, Tanjong Karang K. Selangor
Mr. Meow Toi LEONG	Industrial Promotion Officer	c/o Federal Industrial Development Authority P.O. Box 518 Kuala Lumpur
PHILIPPINES		
Dr. Dante B. de PADUA	Associate Professor	Dept. of Agricultural Engineering U.P. College of Agriculture College Laguna
Mr. Silvestre C. ANDALES	Assistant Professor	Dept. of Agricultural Engineering U.P. College of Agriculture College Laguna
SIERRA LEONE		
Mr. Thomas A. COLE	Operations Manager	Rice Corporation 20 Wilberforce Street Freetown
THAILAND		
Mr. Pisal KHONGSAMRAN	Engineer	Factory Control Division Ministry of Industry Rama VI Road Bangkok

CONSULTANTS

NAME	FUNCTION	MAILING ADDRESS
Mr. V.S. AGGARWAL	President	East India Rice Mills Association c/o Modern Machineries Corporation Ltd. 12-A Netaji Subhas Marg Calcutta-1 India
Mr. S. BARBER	Chief, Cereals Laboratory	Institude de Agroquimica y Tecnologia de Alimentos Jaime Roig, 11 Valencia-10 Spain
Mr. Eldon C. BEAGLE	Proprietor	The Beagle Organization 1201 So. River Road West Sacramento California 95691 USA
Professor N.G. BHOLE	Assistant Professor	Rice Processing Engineering Centre Indian Institute of Technology Kharagpur (W.B.) India
Professor A.N. BOSE	Professor and Head	Department of Food Technology and Biochemical Engineering Jadavpur University Calcutta-22 India
Mr. D.K. CORNELIUS	Partner and Consulting Engineer	Engineering Services Corporation 2 R.S.V. Naidu Street Kilpauk Madras-10 India
Mr. A.E. CRITTENDEN	Principal Scientific Officer	Industrial Technology Department Tropical Products Institute Culham, Abingdon Berkshire England
Dr. H.S.R. DESIKACHAR	Scientist	Central Food Technological Institute Mysore-2 India

NAME	FUNCTION	MAILING ADDRESS
Mr. D.W. GARVIE	Sole Partner and Chief Executive	R.G. Garvie and Sons 2 Canal Road Aberdeen AB9 2NG Scotland Great Britain
Dr. R.V. HARRIS	Senior Scientific Officer	Oils, Fats and Waxes Section Tropical Products Institute 56-62 Gray's Inn Road London W.C.1 England
Dr. J.W. HUMMELL	Director of Research	Riviana Foods Inc. P.O. Box 2636 Houston Texas 77001 USA
Mr. M. KUPPUSWAMY	Superintending Engineer (Rice Mills)	Department of Food Krishi Bhavan New Delhi-1 India
Dr. P.K. KYMAL	Executive Director	Ministry of Agriculture Department of Food Krishi Bhavan New Delhi-1 India
Mr. V.S. Tyagarajan MUDALIAR	Managing Director	17/1 Nungambakkam High Road Madras-34 S. India
Professor A.C. PANDYA	Professor and Head	Rice Processing Engineering Centre Indian Institute of Technology Kharagpur (W.B.) India
Mr Myint PE	Chemical Engineer	Trade Corporation No. 1 No. 70, Phayre Street Rangoon Burma
Professor J. SAKURAI	Director	Shin Shokuhin Gijutsu Shinko Kai Post No. 162, Room 1002 Ichigaya Heights 28 - 4 Honmuracho Shinjuku-ku Tokyo Japan

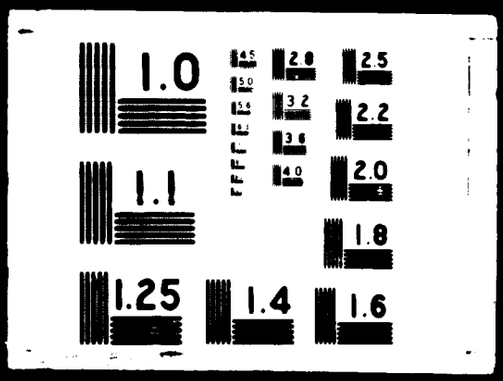
NAME	FUNCTION	MAILING ADDRESS
Dr. V. SUBRAMANYAN	Emeritus Scientist	Modern Rice Mill P.O. Vijayapuram (S. Rly) Tiruvarur India
Dr. Y. TAKESHITA	University Professor and Technical Adviser	Tokyo Oil and Fat Industry Co. Ltd. 4-7-10 Iidabashi Chiyoda-ku Tokyo Japan
Mr. R.C. VASISHTH	Research Director	Flecto Coatings Canada Ltd. 430 Vanguard Road Richmond, B.C. Canada
Mr. J.E. WIMBERLY	Rice Processing Adviser	c/o Ford Foundation P.O. Box 7282 Karachi Pakistan
Mr. R. YOUNG	Senior Industrial Economist	Industrial Economics Consultant 719 Florales Drive Palo Alto California 94306 USA

3. 12. 73

2 OF 3

DO

3508



OBSERVERS

NAME	FUNCTION	MAILING ADDRESS
Mr. Damra AMATYAKUL	Chief Engineer	Office of the Under Secretary of State Ministry of Industry Rama VI Road Bangkok Thailand
Mr. Jean Paul COUDOUR	Engineer	SATEC Maruthi-Nagar-Door 6/646 Anantapur Andhra Pradesh India
Mr. Manfred FISCHER	Company Representative (MIAG)	c/o Comen Inc. 708 Aurora Boulevard CPO Box 2894 Manila Philippines
Mr. William GOLDEN	Project Leader	Ceylon Ford Foundation Rice Project Central Agricultural Research Institute Gannoruwa, Peradeniya Ceylon
Mr. Yasuhiko JÓKÓ	Engineer	Nararhinodai 6-8 Funabashi Chiba-ken Japan
Mr. Yasumasa KOGA	Director	Satake Seisakusho Co. Kita 1-7-12, Kunitachi Tokyo Japan
Mr. Antero S. MANALO	Agricultural Engineer	M. Palis Street Los Baños Laguna The Philippines
Mr. Jean-Claude MICHE	Technologist	49 avenue de Condé 94- Saint-Maur France
Mr. Graham Neil STEVENS	Liaison Officer	Overseas Liaison Department National Institute of Agricultural Engineering Silsoe, Bedford Herts. England

NAME	FUNCTION	OBSERVERS
Mr. Yataro KATO	Factory Manager	Kanemi Sooko Co. Ltd. Ono-Machi 8710 Saneki-Gun Hiroshima-ken Japan
Mr. Yasuo WATANABE	Chief	Export Division Kyowa Agricultural Machinery Co. Ltd. Satokaido Nangoku-Shi Kochi-ken Japan
Mr. Norio TANAKA		Kyowa Agricultural Machinery Co Ltd. Satokaido Nangoku-Shi Kochi-ken Japan
Mr. H. HITOTSUMATSU	President	Tokyo Oil and Fats Industry Co. Ltd. 4-7-10 Iidabashi Chiyoda-ku Tokyo Japan
Mr. T. TAKAHASHI	Chief Engineer	Tsuno Food Industrial Co. Yasunaka-Cho 6-8-10 Yao-City Osaka Japan
Mr. T. KUSUDA	Director and Chief Engineer	Kato Oil Mill 252 Shimaya-Machi Konohana-ku Osaka Japan
Mr. D.J.L. ROGERS	Consultant	Ricegrowers Co-op Mills Ltd. 173 Palm Avenue Leaton, N.S.W. Australia
Dr. R E. PARKER	Project Specialist	The Ford Foundation Rice Process Engineering Centre I.I.T. Kharagpur West Bengal India
Mr. R.E. ARMATT	President	Flecto Coatings Ltd. 430 Vanguard Richmond B.C. Canada

NAME	FUNCTION	MAILING ADDRESS
Mr. A.A. JOHNSON	Administrator	The Ford Foundation 55 Lodi Estate New Delhi India
Mr. I.P. LEONOV	Chief of Department	The Ministry of State Purchases of the U.S.S.R. Moscow U.S.S.R.
Mr. V.K. MERZLOV	Chief of Research Group	Timirjazev Agricultural Academy Moscow U.S.S.R.
Mr. G.N. BOLLENBACK	Chief of Party	S.M. Cantor Associates/USAID/FAN c/o American Consulate Vasant Vinar New Delhi India
Shri A.M. ARUMUGASWAMY	Merchant	The Madurai Dist. Rice and Oil Mill Owners Association 63 Wobbs Church Street Ponnagalam, Madurai-10 India
Shri E. ABRAHAM	Chief Executive	Binny Limited P.B. No. 1111 Meenambakkam, Madras-61 India
Shri I. Sashimeran AIER	Secretary	Government Industries Department Kohima, Nagaland India
Shri P.C. BADER		East India Rice Mills Assn. 195 Mahatma Gandhi Road Caloutta India
Shri S.K. BIHARI		Gauri Shankar Rice Mills Barduan, West Bengal India
Shri S.N. BANERJI, DTA		Department of Food Krishi Bhavan New Delhi, India
Shri T.K. BANERJEE	Director	Food and Civil Supplies Govt. of Haryana Chandigarh India

NAME	FUNCTION	MAILING ADDRESS
Shri P.M. BELLIAPPA	Registrar	Cooperative Societies Govt. of Tamil Nadu Madras India
Shri V.V. BENADAKAR	Business Manager	Swastic Rubber Products Ltd. Swastic House Poona, Bombay-3 India
Shri R. BHASKAR	Technologist (Paddy Processing)	NCDC C-56,NDSE, Part II New Delhi-49 India
Shri P.G. BHANDARI	Manager (Product)	Desmet (India) Pty. Ltd. Shivnagar Estate Dr. Annebasant Road Bombay 19 India
Dr. K.R. BHATTACHARYA	Scientist	Central Food Technology Research Institute Mysore-2 India
Dr. B.K. BISWAS	Research Engineer (Processing)	Division of Agricultural Engineering IARI New Delhi, India
Shri N.R. CHARIU	Assistant Commercial Manager (Rice Mills)	Binny Limited P.B. No. 1111 Meenabakam, Madras-61, India
Shri S. CHENNAKESHAVAIAH		Ryots Agricultural Produce Marketing Society Mandya India
Shri P.K. DORAISWAMY	Additional Registrar	Cooperative Societies Hyderabad (A.P.) India
Shri B.V. DESHPANDE	Assistant Sales Manager	G.G. Dandekar Machine Works Ltd. Bhiwandi (Dist Thana) Maharashtra State India
Mr. Donnis A. FERNANDAS	Manager, Technical Sales 'A' Division	Hindustan Ferode Ltd. Plot No. 306, TPS III 15th Road, Bandra Bombay-50 AS India

NAME	FUNCTION	MAILING ADDRESS
Shri N.S. GANGADHARAN	Assistant Rice Mill Engineer	Department of Food Krishi Bhavan New Delhi India
Shri D.K. GANGAPADHYAY	Registrar	Cooperative Society Government of Assam Shillong, Assam India
Shri Kamla Pad. GARG	Provincial Marketing Officer	Food Department Lucknow (U.P.) India
Shri G.L. GOENKA	Director	Damodar Enterprises Ltd. 1A Vansittaro Row Calcutta-1 India
Shri N. GOPALAKRISHNAN	Joint Director	National Coop. Dev. Corporation C-56, NDSE, Park II New Delhi-49, India
Professor V.K. GUPTA		Indian Institute of Management Vastrapur Ahmedabad-15 India
Dr. S. GOVINDASWAMI	Rice Technologist	Central Rice Research Institute Cattack-6 Orissa India
Shri O.P. GOENKA	Production Manager	Foods, Fats and Fertilizers Ltd. P.B. No. 15 Tadepalligudem, A.P. India
Shri N. GOVINDARAJULU	Secretary	Thanjavur Dist. Rice Mill Owners Association P.7/54 A, Rajan Road Sivinivasapuram Thanjavur, Tamil Nadu India
Shri C.R. GUPTA	Development Officer	I.M. Directorate, Dte. General of Technical Development New Delhi India
Shri M.S. GURUSHANKARIAH	Project Officer	Agro Industries, Agricultural Finance Corporation Ltd. Dhanraj Mahal, 1st Floor Chattarapatti Shivaji Maharaj Marg, Bombay India

NAME	FUNCTION	MAILING ADDRESS
Shri B.N. HANUMANTHAIAH	Business Manager	The Ryots Agricultural Produce Marketing Society Ltd. Mandya, Mysore India
Shri C.S. HUBLI	Jt. Registrar	Cooperative Societies Mysore India
Shri L.C. JAIN	Director	Rice Mills and Processing Civil Lines Raipur, M.P. India
Shri R.S. KASHYAP	Mechanical Engineer	Raipur Coop Marketing Society Ltd. Ramsagar Para Raipur, M.P. India
Shri S.M. KUVALEKAR		Swastik Rubber Products Ltd. Swastik House Poona-3, Bombay India
Shri Sushil KUMAR		Modern Rice Mills and Kumar Cold Storage Dhampur (Dist. Bijnor), U.P. India
Shri P.K. KRISHNAMURTHY		Damodar Enterprises Ltd. 1A Vansittart Row Calcutta-1, India
Shri P.S. KOTHARI		Damodar Enterprises Ltd. 1A Vansittart Row Calcutta-1, India
Shri Haridas H. LILLA-MEY		New India Oil Mills 387/89 Narsi Natha St. Bombay-9 India
Shri F.G.T. MENEZES	Director (Vanaspati)	Directorate of Sugar and Vanaspati Krishi Bhavan New Delhi India
Shri N.D. MUKHERJEE	Engineer	Grain Storing and Processing Industries 29 Strand Road Calcutta-1 India

NAME	FUNCTION	MAILING ADDRESS
Shri S.K. MIRCHANDANI		US AID New Delhi India
Shri K.B. NAIK, M.L.A.	President	Baragarh Regional Cooperative Marketing Sooiety Ltd. At and P.O. Bargarh Dist. Sambalpur, Orissa India
Shri K. KRISHNAN NAMBIAR	Registrar	Cooperative Societies Trivandrum, Kerala India
Shri P.S. NADKARNI		Cooperation Dept. Govt. of Maharashtra Central Building Poona Bombay India
Shri S.J. PHADKE	Chief Engineer	M.P. Coop Marketing Federation Malik Market Hamida Road Bhopal, M.P. India
Shri K.R. RAJAGOPAL	Manager	The Madurai Dist. Rice and Oil Mill Owners Association North Chitrai St., Madurai-1 India
Dr. G.V.N. RAYUDU	Asst. Professor	Department of Mechanical Engineering of Technology Madras-36 India
Shri K. RAJAMANNAR	Partner	Engineering Services Corporatio No. 2, R.S.V. Naidu Street Kilpauk, Kadras-10 India
Shri J.RAMALINGAM	Chief Engineer	Tamil Nadu Cooperative Marketing Federation Ltd. 89 Poonamallee High Road Madras-10
Shri P. RAMDAS	Jt. Manager (Tech. and Quality Control)	Central Warehousing Corpn. C-90, NDSE, Part II New Delhi-49 India
Shri C. HANUMANTHA RAO	Zonal Manager	National Seeds Corporation Hyderabad, A.P. India

NAME	FUNCTION	MAILING ADDRESS
Shri V. RAMARATNAM	Project Engineer	Chemech Engineers Pvt. Ltd. 16/3 Sterling Road Nungampakkam, Madras-34 India
Shri K.Chandra Sekhara REDDY	Deputy Registrar/ Manager	Modern Rice Mill Tadepalligudem W. Godavari, A.P. India
Shri K.C. ROY	Project Engineer	West Bengal State Cooperative Marketing Federation Ltd. 6-Ganesh Chunder Avenue (6th Floor) Calcutta-13, India
Shri K. Abdulsalam ROWTHOR	Rice Mill Owner	Villupuram Thaj Rice Mill Madras Trunk Road, Villupuram India
Professor S. SAMPATH	Deputy Director	Indian Institute of Technology Madras India
Shri Prem Sukh SARADA	President	Bengal Rice Mills Association P-11, Mission Row Extension Caloutta India
Shri N. SRINIVASALU	Rice Specialist	Tamil Nadu Government Madras India
Shri M.R. SHARMA	Chief Marketing Officer	State Farms Corpn. of India West End Colony New Delhi-21 India
Shri Baldev SINGH	Director	National Small Industries Corporation Ltd. Near Okhla Industrial Estate New Delhi-20, India
Shri S.B. SIKKA		Sika and Sikka Engineers Private Ltd. D-Shiv Sagar Estate Dr. A. Besant Road Worli, Bombay-18 India
Shri S. SUBRAMANIAN	Industrial Finance Officer (Technical)	Industrial Development Bank of India "KURALAGAM" 3rd Floor Esplanade, Madras-1 India

NAME	FUNCTION	MAILING ADDRESS
Shri S.K. SUR	Joint Technical Adviser	Department of Food Calcutta India
Shri B.L.N. SWAMI	Secretary	Orissa Mill Owners' Assn. Post College Square Cuttack-3 India
Shri D.M. TARIANG	Ex. Engineer (Agriculture)	Government of Meghalaya Dte. of Agriculture Shillong (Assam) India
Shri K.G. TELANG	Director	Food and Civil Supplies Vallabha Bhavan New Secretariat Bhopal (M.P.) India
Shri P. THOTHADRI	Deputy Zonal Manager	Food Corporation of India 1/144 Mount Road Madras-6
Shri J.S. VARSHNEYA	Chief Officer	Rural Credit Section State Bank of India P.B. No. 12, Bombay-1 B.R. India
Shri V.K.M.P. VENKATACHALAM	President	Tanjore Mill Owners and Paddy and Rice Millers Association Thanjavur India
Shri C.S. VIRAKTAMATH	Scientist	Central Food Technology Research Institute Mysore-2 India
Shri T.S. FRANCIS	Director	Directorate of Millets Dev. Madras-34 India
Shri Lokmani LAL		Modern Rice Mill Allahabad India
Shri P.K. CHAKRAVARTI	Special Commissioner	Orissa Collectorate India
Shri J.K. MAHANTI	Secretary	Govt. of Orissa Bhubaneswar, India
Shri M.N. DORESWAMY	Internal Financial Adviser	Department of Food New Delhi India

NAME	FUNCTION	MAILING ADDRESS
Shri T.S. KRISHNAMURTHY	Engineer Cooperatives	Office of the Registrar of Cooperative Societies Chepauk, Madras-5 India
Dr. A. AUSTIN	Senior Cereal Physiologist	Indian Agricultural Research Institute New Delhi India
Shri Satish BAL	Lecturer	Rice Process Engineering Centre Indian Institute of Technology Kharagpur (W.B.) India
Shri P. Balaram NAIDU	Managing Partner	Vijay Engineering Corpn. 12 Old Post Office Road Coimbatore-18 India
Shri B.N. PRASAD		Shree Bishwanathjee Mills P.O. Dumar Distt. Sahabad, Bihar India
Shri S.B. SARAN	Registrar	Cooperative Societies Uttar Pradesh Lucknow (U.P.) India

UNIDO SECRETARIAT

Mr. M. MAUTNER
Director of the Seminar
Chief, Light Industries Section
Industrial Technology Division
UNIDO
P.O. Box 707
A-1011 Vienna
Austria

Mr. E.D. MANNING
Assistant to Director of Seminar
Industrial Development Officer
Light Industries Section
Industrial Technology Division
UNIDO
P.O. Box 707
A-1011 Vienna
Austria

Mr. H.G.R. REDDY
Technical Secretary of Seminar
UNIDO Regional Industrial Adviser
ECAFE
Sala Santitham
Bangkok
Thailand

FAO SECRETARIAT

Mr. H. von HÜLST
Co-Director of Seminar
Chief, Agricultural Engineering Service
Agricultural Services Division
FAO
Via delle Terme di Caracalla
Rome
Italy

Mr. A.C. HUYSMANS
Agricultural Engineer
Agricultural Services Division
FAO
Via delle Terme di Caracalla
Rome
Italy

Mr. Thet ZIN
Agricultural Services Officer
FAO Regional Office
Maliwan Mansion
Phra Atit Road
Bangkok 2
Thailand

AO SECRETARIAT (contd.)

r. G.H.W. HUTTON

FAO Country Representative
Senior Agricultural Adviser
1 Ring Road, Kilokri
New Delhi-14
India

r. K. HAYASHI

Executive Secretary
International Rice Commission
FAO Regional Office for Asia and the Far East
Phra Atit Road
Bangkok 2
Thailand

r. J. HALLAM

Project Manager
Grain Storage Project
1 Ring Road, Kilokri
New Delhi-14
India

CAFE SECRETARIAT

r. V.M. SUBRAMANIAN

Co-Director of Seminar
Chief, Metals and Engineering Section
Division of Industry and Natural Resources
ECAFE
Sala Santitham
Bangkok 2
Thailand

r. KOBAYASHI

Consultant
ECAFE
Sala Santitham
Bangkok 2
Thailand

OVERNMENT OF INDIA

r. P.K. KYMAL

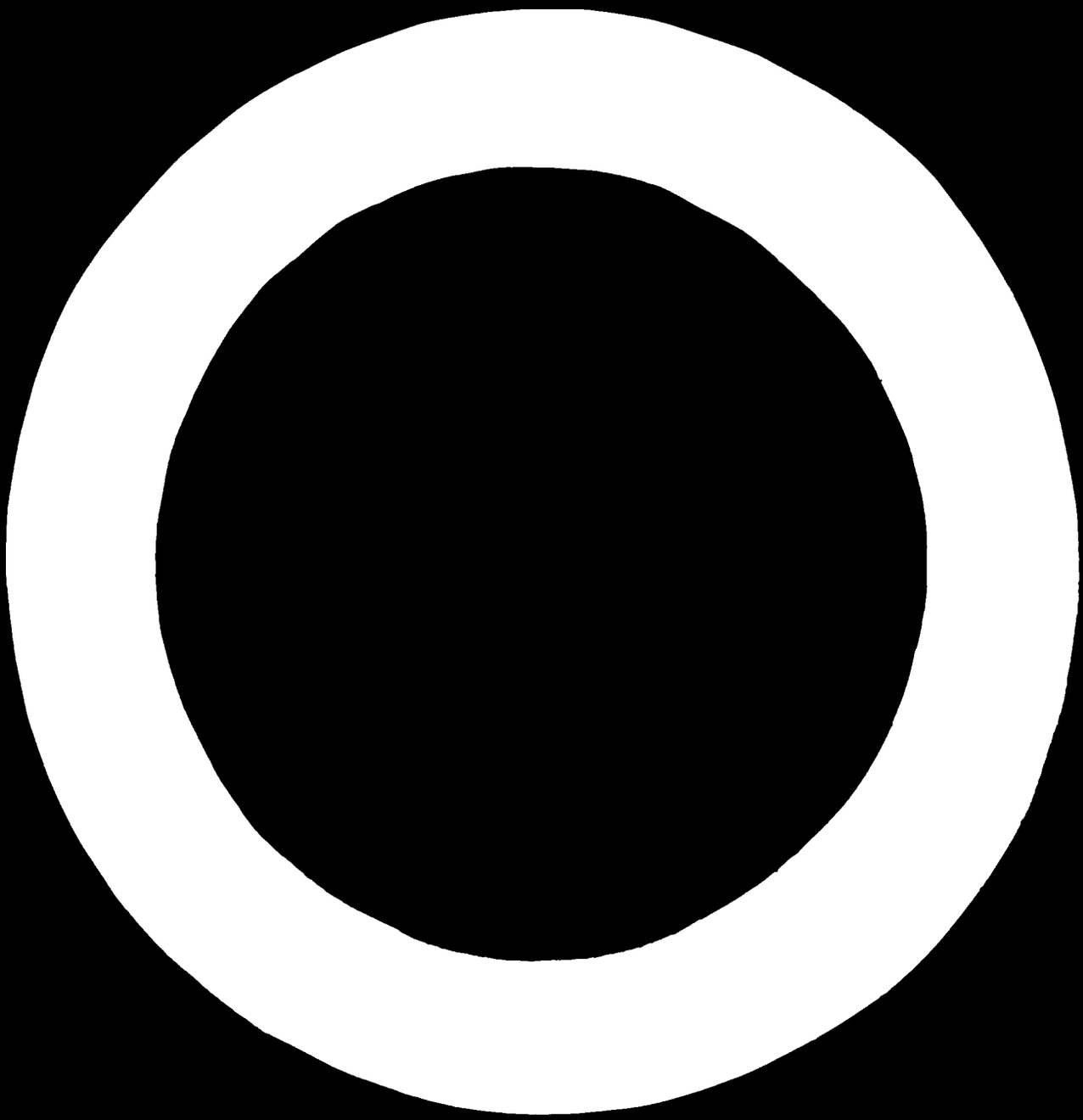
Co-Director of Seminar
Executive Director
Ministry of Agriculture
Department of Food, Krishi Bhavan
New Delhi-1
India

hri T.R. PARAMESWARAN

Liaison Officer for Seminar
Under Secretary
Ministry of Agriculture
Department of Food, Krishi Bhavan
New Delhi-1
India

hri J.C. SINGH

Protocol Officer for Seminar
Ministry of Agriculture
Department of Food, Krishi Bhavan
New Delhi-1
India



ANNEX 3

LIST OF DOCUMENTS

LIST OF DOCUMENTS

ID/WG.89/1 Rev. 1*	Agenda
ID/WG.89/2 ** and Summary**	"The Importance of the Rice Processing Industry as an Agro-Allied Industry in the Developing Countries" by Mr. D.W. Garvie
ID/WG.89/3 and Summary	"X-M Process for Solvent Extractive Milling of Rice" by Mr. J.F. Nowlin
ID/WG.89/4 and Corr. 1 and Summary	"Transportation and Storage of Paddy and Rice" by Mr. D.J.K. Cornelius
ID/WG.89/5 and Summary	"Technical Advances in Rice-Bran Oil Processing" by Dr. Y. Takeshita
ID/WG.89/6 and Summary	"Rice-Bran Oil Technology" by Mr. Myint Pe

* All papers are available in English only.

** Except in the cases of ID/WG.89/7 and ID/WG.89/19 summaries are available in English, French and Spanish.

*** Copies available from FAO only.

**** Copies available from the Government of India only.

ID/WG.89/7 and Summary	"The Status of Rice-Bran Oil Industry in the ECAFE Region" by Mr. H.G.R. Reddy
ID/WG.89/8 and Summary	"Rice Bran Oil and Wax" by Dr. R.V. Harris
ID/WG.89/9 and Summary	"Utilisation of Rice Bran" by Mr. D. Halliday
ID/WG.89/10 and Summary	"Rice-Bran Wax Recovery and Utilisation" by Dr. R. Lásztity
ID/WG.89/11 and Summary	"Rice Starch and Rice Starch Derivatives" by Dr. S. Barber
ID/WG.89/12 and Summary	"Rice as an Industrial Raw Material for the Manufacture of Processed and Ready-to-Eat Rice Products" by Mr. G.E. Doré
ID/WG.89/13 and Summary	"Review of Rice Processing Techniques" by Mr. J.E. Wimberly
ID/WG.89/14 and Summary	"Paddy Husk Utilisation" by Mr. A.E. Chittenden
ID/WG.89/15 and Summary	"Rice as an Industrial Raw Material for the Manufacture of Processed and Ready-to-eat Rice Products" by Professor J. Sakurai
ID/WG.89/16 and Summary	"Paddy Husk Utilisation" by Mr. E.C. Beagle and Mr. C.A. Beagle
ID/WG.89/17 and Summary	"Investment and Management Considerations for the Modernisation of Traditional Rice Mills and for the Establishment of Modern Integrated Rice Processing Systems" by Mr. R.B. Young

ID/WG.89/18 and Summary	"Marketing Aspects of Rice in Developing Countries" by Mr. V.S.T. Mudaliar
ID/WG.89/19 Summary	"Studies on the Action of Cations on Paddy, with Particular Reference to the Role of Sodium Ion and its Application in the Preservation, Parboiling and Drying of Paddy" by Mr. B.S. Vasan, Mr. N.G.C. Iengar, Mr. M. Nagasubramanian, Mr. R. Bhaskar, Mr. C.S. Shivanna, Mr. R. Mohanandoss and Mr. V. Subrahmanyan (Contributed by the Government of India)
ID/WG.89/20	"Use of Inert Media (Sand and Paddy Husk Powder) in Simultaneous Parboiling and Drying of Paddy" by Mr. N.G.C. Iengar, Mr. R. Bhaskar, Mr. R. Chandrasekaran, Mr. P. Dharmarajan (Contributed by the Government of India)
ID/WG.89/21 Rev.1	List of Partioipants
ID/WG.89/22 Rev.1	List of Documents
ID/WG.89/23	"Water Resistant Composite Board from Rice Husks" by Dr. R.C. Vasishth
AGS:MISC/71/64***	"A Review of FAO Activities connected with Rice" by Mr. H. von Hülst, FAO
AGS:MISC/71/65***	"Handling, Drying, Storage, Testing and Processing of Rice" by A.C. Huysmans, FAO
AGS:MISC/71/67***	"A Review of the Activities of the International Rice Commission and a Summary of the Report on the Sixth Session of the Working Party of the International Rice Commission on the Agricultural Engineering Aspects of Rice Production, Storage and Processing, Teheran, Iran, 5-9 December 1970" by Mr. Thet Zin, FAO

AGS:MIS/71/73 *** "Summary Report of Meeting of Experts on the Mechanization of Rice Production and Processing, Paramaribo, Surinam, 27 September - 2 October 1971" by Mr. A.C. Huysmans, FAO

**** "Recent Advances in Pre-Processing, Handling and Threshing of Rice" by Dr. N.G. Bhole (Contributed by the Government of India)

**** "Recent Studies on the Structural and Economic Aspects of Grain Storage" by Mr. M. Kuppuswamy and Mr. N.S. Gangadharan (Contributed by the Government of India)

**** Parboiling of Paddy" by Mr. H.S.R. Desikachar and Mr. K.R. Bhattacharya (Contributed by the Government of India)

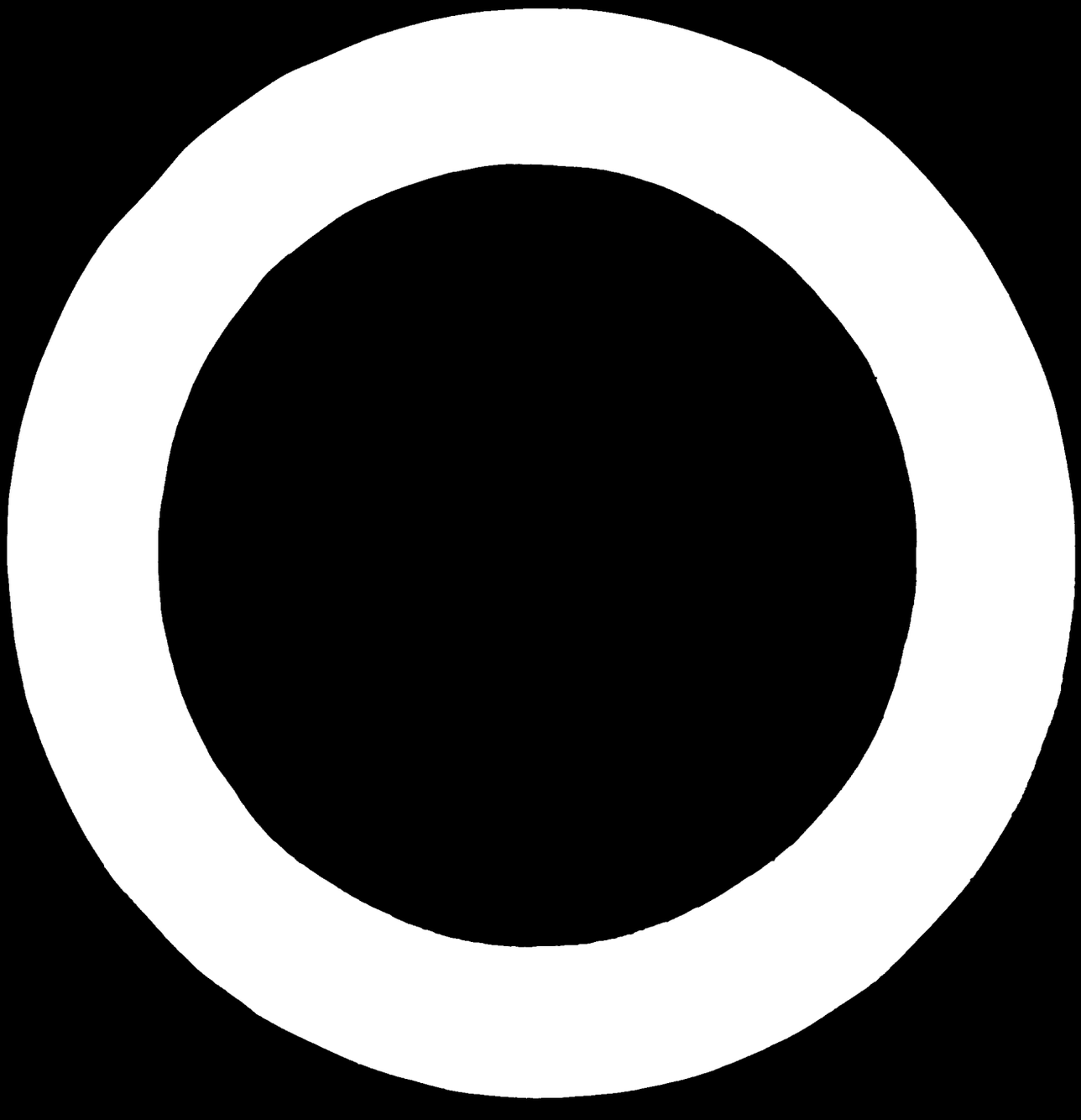
**** "Processing of Rice-Studies on Steeping of Paddy and Drying of Steeped Paddy" by Professor A.M. Bose (Contributed by the Government of India)

**** "Modernization of the Rice Milling Industry in India" by Dr. P.K. Kymal and Mr. S.N. Banerjee (Contributed by the Government of India)

**** "Modernization of the Rice Milling Industry" by Mr. V.S. Aggarwal and Mr. P.S. Sarda (Contributed by the Government of India)

**** "Training for Rice Processing Industry" by Professor A.C. Pandya (Contributed by the Government of India)

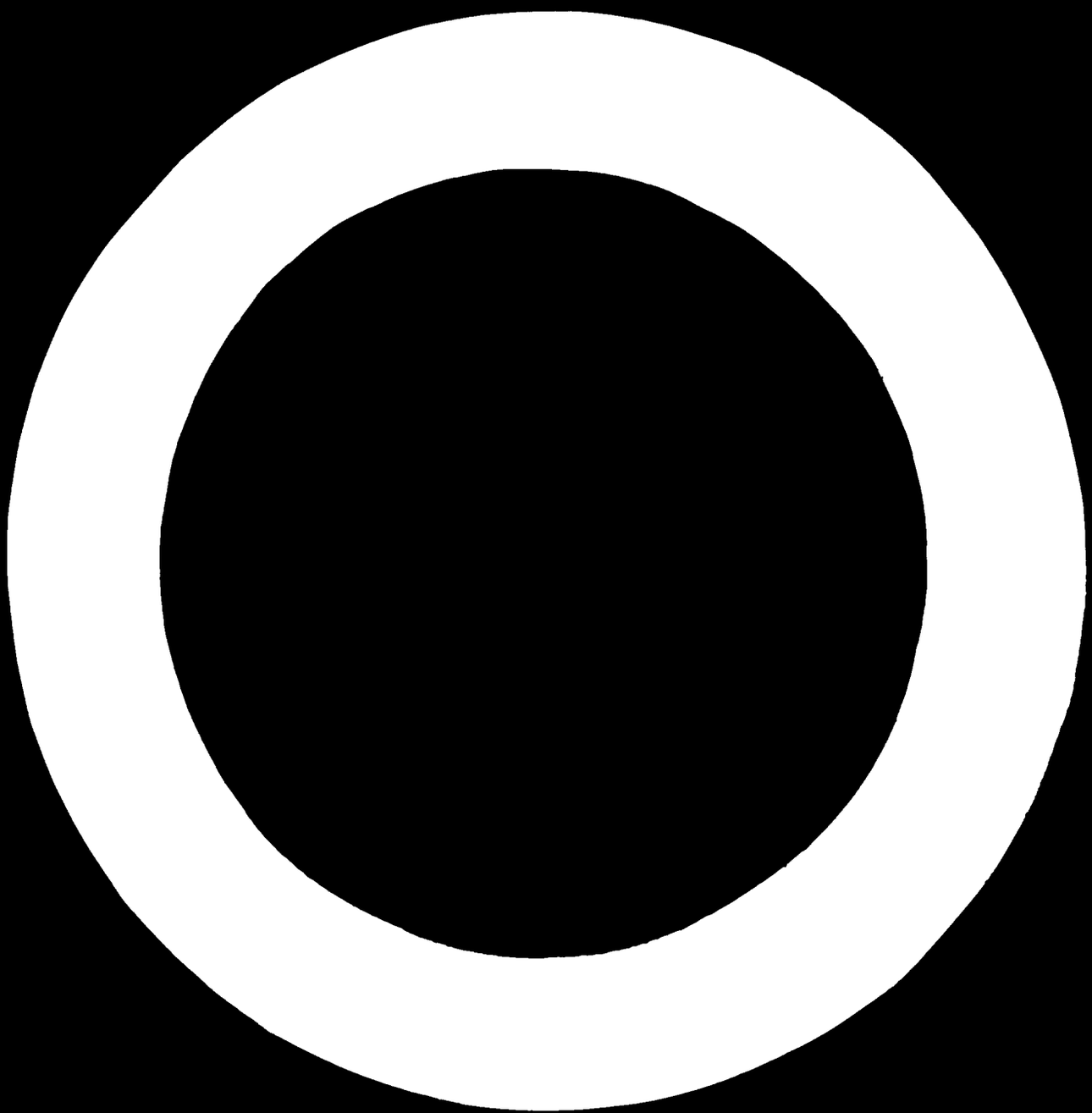
ID/WG.89/24 Report on the Interregional Seminar on the Industrial Processing of Rice



ANNEX 4

LIST OF SEMINAR OFFICERS

Chairman	:	Shri K.P. Mathrani, Secretary to the Government of India, Ministry of Agriculture, Department of Food
First Vice Chairman	:	Dr. J.W. Hunnell (U.S.A.)
Vice Chairmen	:	Shri G.C.N. Chahal (India)
		Mr. G. Riofrio (Ecuador)
		Mr. N.T. Athanassius (A.R.E.)
Rapporteur	:	Mr. G.N. Stevens (U.K.)
Co-Rapporteur	:	Shri V.S. Aggarwal (India)
Assistant Rapporteurs	:	Working Group Leaders
		Group I : Mr. R. Young (U.S.A.)
		Group II : Shri D.K. Cornelius (India)
		Group III : Dr. Y. Takeshita (Japan)
		Group IV : Dr. S. Barber (Spain)
		Group V : Mr. E.C. Beagle (U.S.A.)
		Group VI : Shri T. Mudaliar (India)
Technical Secretary	:	Mr. H.G.R. Reddy (UNIDO)



ANNEX 5

LIST OF WORKING GROUPS AND THEIR LEADERS

Working Group I: Modernization of the Rice Milling Industry

Group Leader - Mr. R. Young (U.S.A.)

Working Group II: Paddy Procurement, Testing, Grading, Transportation and Storage

Group Leader - Mr. D.K. Cornelius (India)

Working Group III: Rice-Bran and Rice-Bran Oil

Group Leader - Dr. Y. Takeshita (Japan)

Working Group IV: Rice as an Industrial Raw Material for the Manufacture of Processed and Ready-to-eat Rice Products.

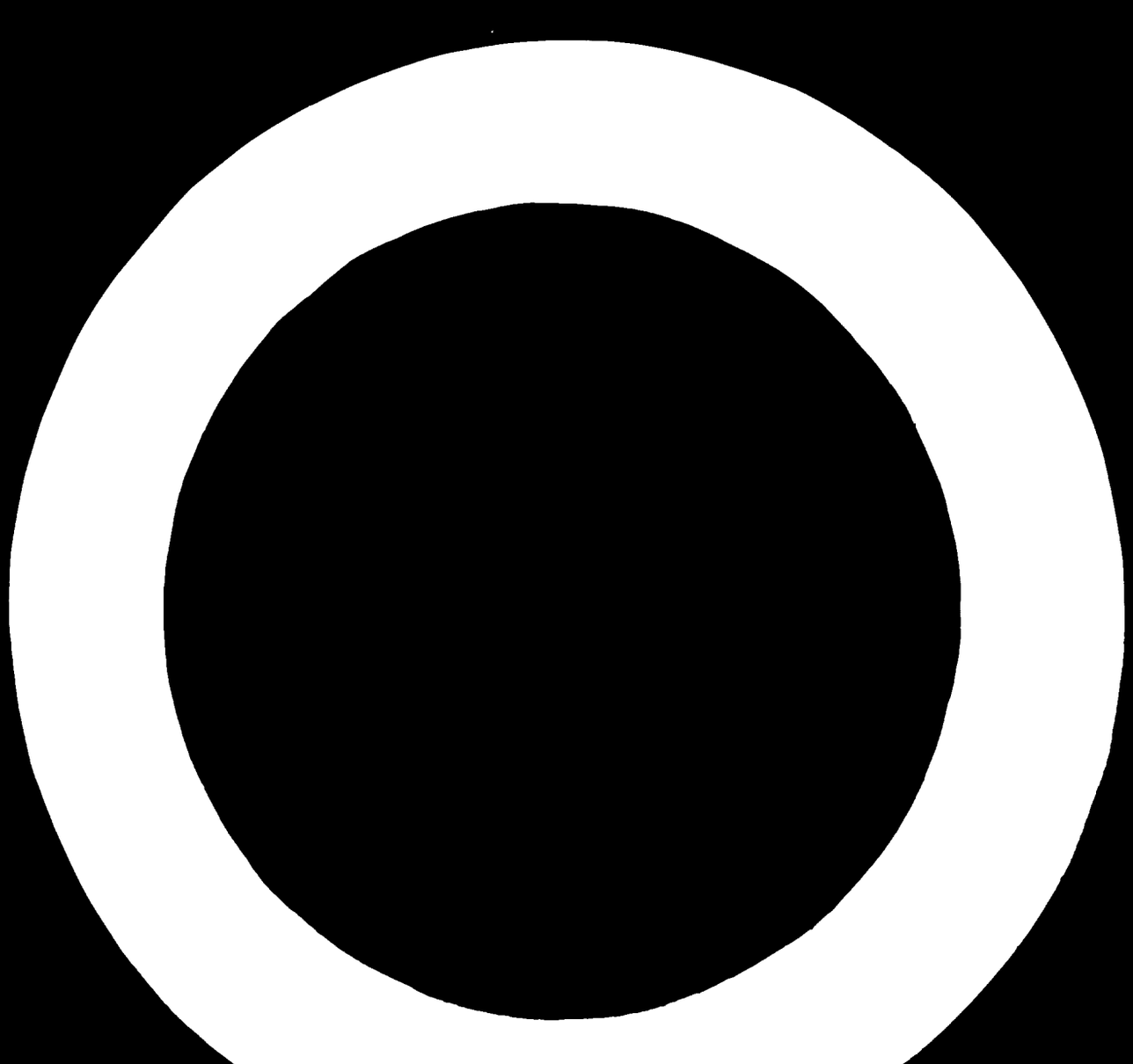
Group Leader - Dr. S. Barber (Spain)

Working Group V: Paddy Husk Utilisation

Group Leader - Mr. E.C. Beagle (U.S.A.)

Working Group VI: Marketing of Rice and Rice Products

Group Leader - Mr. T. Mudaliar (India)



ANNEX 6

Welcome Address by Mr. K.P. Mathrani, I.C.S. Secretary to the Government of India, Department of Food and Chairman, Food and Nutrition Board

Your Excellency, Honourable Chief Minister, Honourable Ministers, distinguished delegates and friends,

I have great pleasure in welcoming you on behalf of the Government of India to this Interregional Seminar on Industrial Processing of Rice. I am very happy that there are delegates not only from this region but from other regions as well. We are indeed pleased that our country has been chosen as the venue for holding this Seminar and are appreciative of the honour done to this country to hold this Seminar in India. We are thankful to UNIDO, FAO and the ECAFE for recognising the progress that has been made in this country in the field of rice processing and for accepting our invitation to hold the Conference here. I should like to express, on your behalf as well as my own, our gratitude to His Excellency the Governor of Tamil Nadu for graciously agreeing to preside over this inaugural function and to Honourable Chief Minister of Tamil Nadu for kindly accepting our request to inaugurate this function. We feel deeply honoured by their presence and their participation in the function. Interregional Seminars of this type are very highly beneficial since it enables scientists, technologists, administrators and others interested in the subject from different countries to meet together and to learn from each other's experience so that they are enabled to contribute to the economic progress of their countries.

The subject of this Seminar is a very important one, particularly for the countries in this region. Rice is the staple food of approximately half the population in this world. Over 1,500 million people in this region where 9/10ths of the world's rice is grown, derive their sustenance from this cereal. The number of people relying almost solely on rice as staple food may be over 250 million in India alone and probably no less than 450 million in the Republic of China. Outside the Asian region, rice is the predominant food in only a few countries but it is becoming increasingly popular in many parts of Africa and Latin America.

Thanks to what is commonly called the 'Green Revolution', which is a very significant phase of development particularly in the developing countries, there is ample promise that the production of rice in this region is likely to increase steeply in the years to come. It has been estimated by the F.A.O. in their study on agricultural commodity projections for 1970-1980 that the total world demand of rice at current prices would increase by about 30 per cent to 250 million tonnes in 1980. In the same study, it has been estimated that the world output of paddy would reach 387 million tonnes in 1980 from the present level of about 200 million tonnes. The bulk of this increase is expected to be in the developing countries, particularly the main producing countries of Asia and the Far East. This increase in production would be the result mainly of adoption by the developing countries of improved technological practices and of scientific methods of cultivation including the use of high yielding varieties of seed, increased use of fertilisers, pesticides, etc.

These figures would show the very important role played by rice not only as the basic food in the countries of this region, but also as a very important economic commodity for these countries. It is obvious that the amount of the crop that becomes available for consumption out of what is produced depends on the efficiency of the pre-processing, milling and storage operations. In this, modern technology and scientific methods play a vital role and unless such methods are adopted, the full benefit of the increased production may not become available to the producers and the consumers. It is therefore very fitting that UNIDO and ECAFE have decided to organize a seminar on such an important subject as processing of rice.

There is a common impression that processing of rice means only the milling of rice. This is strictly not correct. There are many aspects that have to be taken into consideration and where better technology has to be applied in order to obtain the full benefits of the increased production. These are:

(a) Harvesting in a shorter length of time and at the right stage of maturity;

(b) Handling significantly larger volumes of crops;

(c) Improvements in the methods of threshing, drying and transport of large quantities;

(d) Improvement of rice milling;

(e) Proper utilization of by-products of rice milling; and

(f) Development of improved storage facilities.

In dealing with rice processing, it is therefore necessary to consider all these factors because each one of them is sufficiently important in itself to deserve considerable research and study in order to ensure that wastage at each stage is reduced to the minimum.

Starting from the operations at the farm level, which involves four main steps, viz., harvesting, field-curing, threshing and drying, inefficient methods could and do lead to wastage of rice grains by physical loss and spoilage of the crop which in turn affects storage and milling. The choice of the optimum harvesting time is an important element. Early harvest leads to wastage because of the presence of chalky and immature grains, while the late harvest would result in a large quantity of sun-cracked grains leading to a higher percentage of brokens and wastage during milling. Research on optimum harvesting time has, I believe, been carried out in a number of countries under different climatic conditions, but it appears the results do not seem to have been standardized yet. It is necessary to bestow attention on this aspect as the success of the succeeding operations like milling, etc., would, to a very large extent, be dependent on the harvesting of the paddy at the optimum time.

After the paddy has been cut, the usual practice is to leave it bound in sheaths on the ground or stacked in a variety of ways to facilitate drying. The local weather conditions and with it the choice of techniques differ, but the inadequate milling yields that are often obtained clearly demonstrate that the methods that are being used in many countries are not suitable for ensuring the optimum quality of rice after milling. Not much work seems to have been done in this regard particularly to determine the best possible way of ensuring proper curing and drying without damage to the grains. It will have to be considered how far it is practicable to replace field drying by more efficient mechanical or chemical methods. This is particularly necessary in areas where due to climatic conditions paddy has to be harvested with a very high degree of moisture. Some work in this direction is being done in the rice milling complex at Thiruvarur which the delegates will be visiting on the 14th instant. Since, with the introduction of multiple cropping in many of the countries in this region

the possibility of large quantities of paddy being harvested during the rainy season is increasing, it is neoessary to make a systematic study of the development of simple inexpensive methods of drying paddy when harvested under very moist conditions.

Coming to milling proper, it is seen that there is scope for considerable improvement. In many of the countries in this region, the number of rice mills of diverse varieties is very large. There are, for example, no less than 48,000 large and small rice mills in India, over 40,000 in Japan and about 15,000 in Thailand. Most of the mills at present in use are old and their efficiency is low. Though India and some other countries in this region have taken steps to introduce modern rice milling methods, the progress in this direction has been rather slow. While large-scale mills are useful for that part of the crop which is sold from the farm to Governmental agencies or large traders, a substantial part of the crop that is used for consumption in the producing areas is handled by small hullers which thrive because of their proximity to the farm and because the rice that is milled for home consumption by producers is in small quantities and is milled at frequent intervals. The yield from such mills, however, is low and the percentage of brokens is rather high. In India, we have been conscious of this problem and have been trying to take some steps to replace the old and inefficient machinery with modern machinery. To serve as demonstration units, seven modern rice mills were set up in various States in the country and after running them for some time and assessing their advantages, the Food Corporation of India, which is the major purchasing, storing and handling agency on behalf of Government, is putting up 25 modern rice mills in different States. In addition to this, we are setting up a number of modern mills in the co-operative sector, as also improving and modernising a large number of the existing co-operative rice mills. This, however, is only touching the fringe of the problem. Modernisation has to be extended to the large number of small mills dotted throughout the country. In order to achieve this, the Government of India have passed legislation to provide for compulsory licensing of rice mills and enable the licensing authority to insist on modernization of the existing rice milling units within a period of three to five years. Along with this, Government are also taking steps to ensure that the requisite machinery and equipment for modernization is available in the country and also to see that adequate finance is forthcoming through the banking institutions for the private millers who wish to modernize their mills.

Though the advantages of modern rice mills are quite obvious, still considerable educational and publicity effort is necessary to convince the private rice millers of the advantages of modernization, particularly from economic angle. In this, I am sure seminars like the present one would help considerably; for the problems are not limited to this country but to all the rice growing areas in these regions.

Another point that I would like to refer to is that most of the modern rice mills that are in use in this country and possibly in the other countries of this region, have been developed in countries with different types of conditions such as Germany and Japan. These mills would have been designed to handle the types of paddy grown in or available to those countries. The paddy varieties grown in different countries differ considerably in their varietal aspects and mills designed for one variety of paddy may not be quite efficient in milling another variety. For example, it is seen that the Japanese mills which have been installed in this country are very efficient while milling short bold varieties of paddy, while they are not so efficient in milling long and slender varieties which are grown in this country. It is necessary to conduct research in this field and to evolve appropriate modification for different varieties of paddy in order to obtain the maximum efficiency for the different varieties of paddy. Similarly, research work is also called for in the field of par-boiling in order to reduce the cost, so that par-boiled rice, which is more nutritious than raw rice, could be produced without much additional expenditure.

Before concluding, I would only like to refer to the importance of the by-products produced during milling. The most important of the by-products is rice bran. Bran produced from parboiled rice particularly is rich in oil and it improves considerably the economics of the modern mill provided bran can be collected and edible oil extracted from it. The main problem in this is that the oil in the rice-bran quickly becomes rancid, so that unless the bran can be conveyed very quickly to the extraction unit, the resultant oil is not good enough for edible purposes. There is scope for research in stabilizing the oil in the rice bran. This will add considerably to the economy of the countries in this region which are generally short in edible oils. The defatted rice bran is a very good source of protein and could even be used in helping in the nutrition programmes that are being undertaken in different countries in these regions.

I do not think I need say much about the importance of storage. While action is being taken in most of the countries at the government level to improve storage facilities and to reduce loss in storage, the quality of storage, particularly at the farm level, leaves much to be desired. In India, we have taken up some schemes for improvement of storage at the farm level by designing and distributing bins which are suitable for the purpose. But a lot more work is to be done in this sphere - particularly in the field of extension with a view to popularizing cheap and effective types of storage among the farmers in order to reduce storage loss at the level of the producer.

I have only attempted to outline very briefly what I feel are the most important aspects of the field of rice processing. Many of these aspects will be dealt with during this Seminar and a number of papers dealing with this will be read and discussed. We, in India, are looking forward with a great deal of interest to the discussions in this Seminar and to the conclusions that will emerge, which I am sure would help us in no small measure in ensuring that maximum quantity of rice out of the paddy that is produced is made available to the consumers.

I thank all of you once again for responding to the invitation and for agreeing to participate in this Seminar. We, on our part, have tried to make suitable arrangements for your stay here and for your participation in the Seminar and I hope you will have a very pleasant and confortable stay here. In the end, I should like to thank again His Excellency the Governor of Tamil Nadu and the Honourable Chief Minister of Tamil Nadu and Honourable Ministers of Tamil Nadu for sparing a part of their valuable time for this important developmental activity.

ANNEX 7

Inaugural Address by Dr. M. Karunanidhi, Chief Minister of Tamil Nadu

Dear Governor, colleagues and friends,

On behalf of the State of Tamil Nadu, I extend a hearty welcome to the delegates and visitors who have come to attend this Seminar from various countries and from other States of India, and on behalf of the people of Tamil Nadu, I thank the UN Industrial Development Organization, ECAFE and FAO who have taken all the pains to conduct this Seminar.

It is most appropriate that this Seminar is held in Tamil Nadu, the State which has come out with flying colours in tiding over the crisis of acute food shortage and severe drought conditions and paved the way for the successful implementation of the "Green Revolution" in this part of our country. This was possible mainly due to the active co-operation extended by the people and by the officials to the Government in this direction.

The basic wants of any man, to whichever country he belongs, are food, clothing and a house to live in. Food is essential for man's living so also clothing to protect the modesty of man and he requires a house to live in. Man is worried about his food more, as without it, he cannot survive at all. Then only he can think about clothing and shelter. Rice occupies a more important place among other food grains. The rice available should be fit for eating and also nutritious and it should also be available at a reasonable rate. All Governments are concentrating on the processing and devising of various measures to achieve this end and also taking efforts to train the agriculturists in augmenting food production. Agriculture is the main occupation in Tamil Nadu and I hope that the deliberations and discussions at this Seminar will be most fruitful to our people.

The Food Corporation of India has installed many modern rice-mills in Tamil Nadu. In addition to that, we have also started many modern rice mills, under the co-operative sector. A rice-bran oil mill is being successfully run in Tamil Nadu. It has been decided to start more mills on similar lines. The age-long food

control has been lifted. Compulsory procurement has been dispensed with in this State. It gives me great pleasure that this Seminar is conducted at the most opportune moment, when people in Tamil Nadu are happy over these developments that have taken place in recent years.

When there was a serious shortage of rice and when the price of rice was soaring up beyond the reach of the poor and downtrodden people and they were struggling hard to make both ends meet, our late Chief Minister 'Anna' introduced the 'Rupee a Measure' Scheme at Madras and Coimbatore cities and their suburban areas. This had an immediate and remarkable effect. The rise in the prioe of rice and other food grains was controlled. Simultaneously concrete measures were taken to increa e food production. Thanks to the dynamic approach made to this problem, the State of Tamil Nadu has today passed from a stage of dependence to a situation of surplus.

At present, we are facing many new problems. When there was shortage, paddy was directly lifted to rice mills from the fields. But when rice is available in plenty, the question of storage of the stock arises. As such, we have to stock the paddy safely and care has to be taken to preserve them in good condition. We have to train the agriculturists on this aspect of storage also. How best we can do in this field has to be explained to the agriculturists and all help neoessary should be rendered to them.

There are many modern rice mills with drying facilities in Thanjavur District, which is the granary of Tamil Nadu. We can attribute two reasons for this. Paddy is being grown in more than 16 lakhs of acres in that district alone. Further, drying of paddy becomes essential since Kuruvai, i.e. the first crop is harvested during the rainy season between the months October and December. I understand that you are going to visit those modern rice mills at Thanjavur District. You are going to visit Thanjavur District at the beginning of the rainy season. So there is every possibility of yourself experiencing all the day-to-day problems and difficulties in harvesting, drying, milling, etc. prevalent in Thanjavur District. You can have a clear idea of the fertility of Thanjavur District, the district from where I hail. I feel elated in giving you a warm send off to Thanjavur District.

The capital investment towards the purchase of drying machinery is very high. But as they are useful only for two months in a year, naturally, the oost of operation increases. Paddy is to be brought from distant places to those mills, thus adding

to the cost. If wet paddy grains are stored in big storage tanks and air pumped into them, it may help in drying by evaporation of moisture, at lesser cost. We can adopt this as an interim measure. If only husk is used instead of oil, the cost of fuel will be reduced. The facilities for drying the entire harvested paddy will have to be on a very large scale which may not be economical; as such we have to devise alternate measures to reduce the cost.

I hope that your deliberations will help in achieving maximum benefits at the minimum cost bearing in mind the basic fact that the conditions are different from one country to another and from one place to another.

When we apply technology to field operations, local conditions should necessarily be taken into account. Where labour is cheap and machinery is costlier mechanized handling and highly automated machinery may make the operation costlier. That has been the experience with the modern rice mills. Apart from this, the cost of assembling paddy also adds substantially to the overall cost. The cost of parboiling contributes substantially to the variations from initial expectations and estimates based on which these mills were set up. Of course, parboiling provides a means of ensuring better utilization of the drying facility. But it will not be possible to set up mechanized drying capacity to handly any large part of the harvest over a large area during the rainy season. It is therefore necessary to evolve means of processing and handling which would fit in with local conditions and local costs and at the same time obtaining maximum efficiency. The work to be done will be threefold - the study of the technological feasibility of the process; development of suitable equipment and balancing of the costs and the benefits in terms of preservation; better out-turn or better quality. We cannot afford such high levels of wastage as at present in processing as well as storage and handling. But we have to bear in mind that cost will be a factor to be reckoned with since the facilities have to compete with the existing conventional processing and methods of handling.

You are gathered here to exchange the experience and knowledge gathered and the results of studies made under different conditions to meet different contingencies. I am sure that such exchange of information will enable our experts to evolve solutions for our own problems consistent with local conditions and needs.

I have narrated certain general problems which arise in Tamil Nadu only. I am fully aware that it is the responsibility of the Government to find out solutions to these problems. But Government can only refer them to the experts who are to find solutions. Government will provide all facilities to the experts; the underlying idea being the Green Revolution on the Agricultural front is followed by a similar revolution on the Processing front also.

I wish this Seminar all success and I am certain that your deliberations will be fruitful. I thank you for the patient hearing you have given me and I thank the organizers once again for having given me this opportunity.

ANNEX 8

Presidential Address by Shri K.K. Shah, Governor of Tamil Nadu

May I thank you for inviting me to this Joint UNIDO/FAO/ECAFE Interregional Seminar on the Industrial Processing of Rice? On behalf of the Government and people of Tamil Nadu, I have pleasure in welcoming the delegates from different countries who have come to attend this Seminar.

One of the important programmes initiated by the Government during the Third Plan and being continued in the Fourth Plan, is the modernisation of the rice processing industry. Modern rice mills give better performance both in quality as well as in quantity as compared to the traditional existing mills in the country. It is calculated that even on the conservative estimate of average additional return of only 2.5 per cent, the annual gain in terms of extra rice on the present level of production would be about 1.6 million tonnes of rice. That is why the United Nations have sponsored this Interregional Seminar where nearly 50 countries are represented. We are beholden that India has been chosen as the venue for this Seminar. We in Tamil Nadu are particularly happy that the Seminar is held in Tamil Nadu, under the dynamic leadership of our Chief Minister, in recognition of the significant contribution of Tamil Nadu to the Green Revolution in India.

The progress in agricultural production particularly in food grains, during the last few years, has been impressive. We often hear the term 'Green Revolution' to indicate this break-through on the agricultural front. Whereas we were greatly dependent on imports of foodgrains, we are now nearing a state of self-sufficiency and are in a position to contemplate stoppage of concessional imports of foodgrains. The improvement in the production and productivity has been very impressive in regard to wheat. The doubling of total production of wheat in India from a little over 12 million tonnes to over 23 million tonnes in four crop seasons is rightly held to have few parallels in recorded agricultural history. Appreciable results are also being achieved in the case of rice.

Introduction of hybrid seeds, improvement and expansion of irrigation, use of inorganic fertilizers, apart from maximising the use of organic wastes and intensive plant protection measures, have helped us considerably. A network of extension workers backed by an organization for provision of all the inputs has served as a base of this agricultural revolution. Without intensive utilisation of land by way of multiple cropping, we would not have succeeded.

Tamil Nadu has been an active participant in this agricultural revolution and has achieved substantial results in the matter of production of rice. While the exotic varieties such as I.R.8 have been made full use of, Tamil Nadu had, even earlier, evolved high yielding varieties such as A.D.T.27, Co.25 which are widely grown in the Thanjavur delta which is the rice bowl of this State. Latest in this series is Co.33, named as 'Karuna'. This has been evolved to meet the need for a short duration variety to be grown as the first crop in the Cauvery delta. The pressing need in the delta is to ensure harvest of the first crop sown in June-July before onset of the north-east monsoon. A.D.T.27 which had been introduced earlier had improved the yield substantially, but certain difficulties in handling were experienced due to the high moisture content and germination. The research effort was directed to reducing these disabilities and Co.33 is the result.

An intensive effort has been made to increase the crop area by extending the area under double-cropping. Special mention should be made of the programme for extending the area under what we call the 'navarai' crop which is harvested during the summer months. Tamil Nadu, I may say, is unique in one respect. There is harvest of paddy in different areas for almost nine months in the year because of tank irrigation and substantial use of ground water. The 'navarai' crop plays an important role in price stabilization because this extends the period of harvest and cuts down what otherwise would be the lean season by three or four months. Intensive efforts to increase the number of wells are under implementation. Irrigation co-operatives have been organized for sinking of tubewells. Such tube- and filter-points will help cultivation in Thanjavur delta to extend the double-cropping area and reduce dependence on regularity of rains.

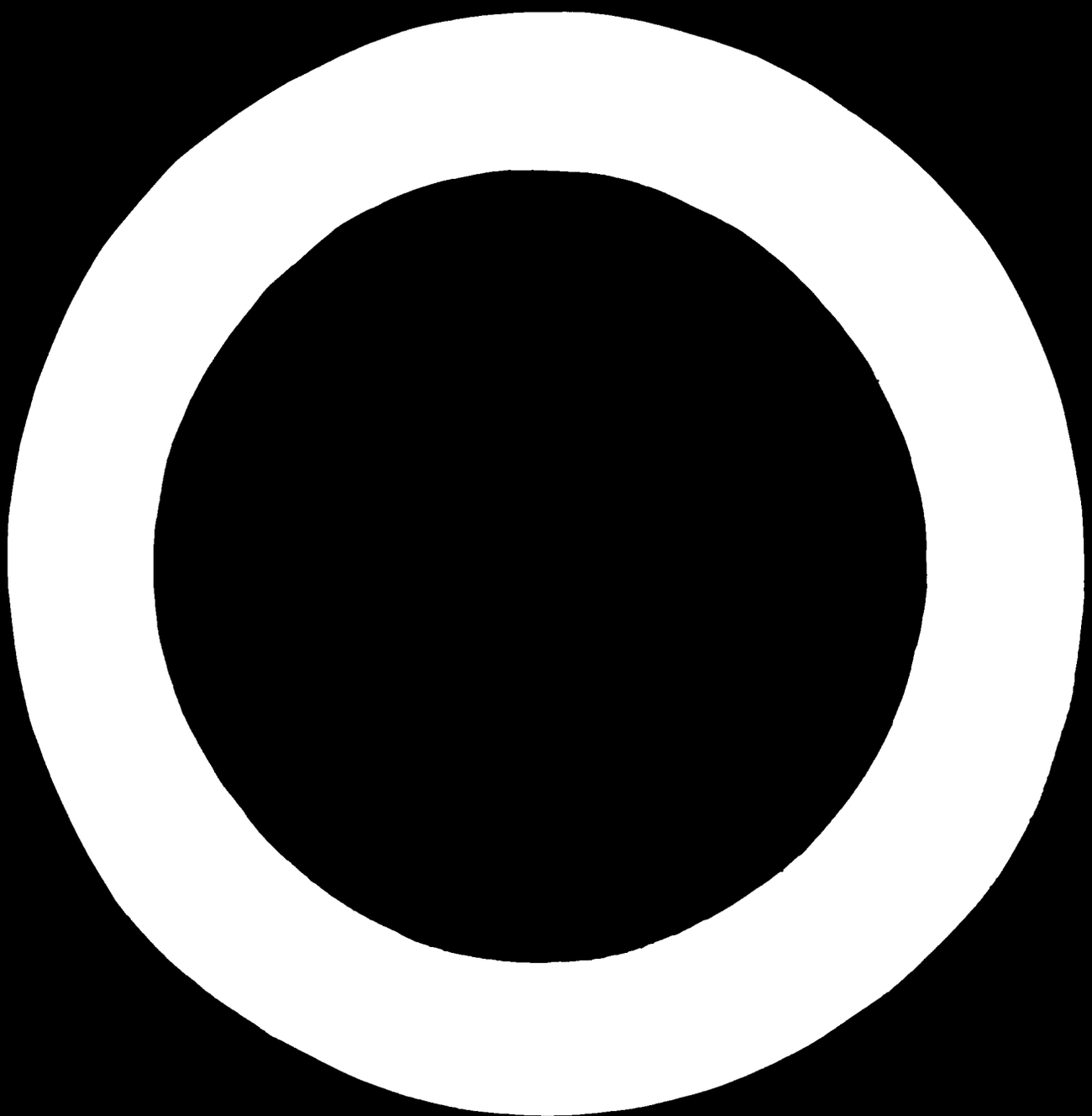
Farmers all over the country have taken enthusiastically to these programmes for improving productivity and thereby their own economic condition. Use of high-yielding varieties involves heavier investment on manures, fertilisers, plant protection measures and irrigation facilities. The farmer needs better

credit facilities for these costlier inputs and has to be assured of a ready market. Price support infuses confidence in the farmer and ensures price stabilization through a network of godowns of buffer stock organized by the government agencies.

A large co-operative network for marketing and distribution and supply has helped us considerably in Tamil Nadu. These co-operatives have set up a number of modern rice mills and have proviced storage facilities. It must be admitted that the modern mills set up are still in the experimental stage and I am sure that this Seminar will help them to devise ways and means to get over teething troubles and also gear up their organisation for procurement and marketing so as to enable them to utilise fully the capacities established.

Milling in this State is now primarily by 10,000 hullers. There are a few sheller units. The example of the co-operatives will be followed by the private trade when the advantages of the modern mills are demonstrated. The use of the modern technology and the introduction of latest developments would greatly facilitate full utilisation of the benefits of the agricultural revolution. This Seminar will, as stated earlier, help our people to know the latest developments and technology so that maximum efficiency at minimum cost can be achieved.

The Green Revolution cannot be complete without a Rice Revolution and self-sufficiency in millets and pulses. I hope this Seminar will pave the way for rice revolution and will be followed by similar seminars on millets and pulses. May I once again extend warm greetings and wish you success in your deliberations?



ANNEX 9

Opening Address on behalf of the Executive Director of the United Nations Industrial Development Organization 1/

Excellencies, Ladies and Gentlemen,

I wish to welcome you on behalf of the Executive Director of UNIDO, Mr. Ibrahim Helmi Abdel-Rahman, to this Interregional Seminar on the Industrial Processing of Rice which has been jointly organized by UNIDO, FAO and ECAFE in close co-operation with the Government of India. The Seminar will endeavour to provide potential investors with criteria relating to the technical and economic viability of modern rice-processing at a rather problematic period in the history of the rice industry which, it is seldom realized, is potentially the largest agro-allied industry in the world, processing some 300 million tons of raw material annually worth over 15 thousand million U.S. dollars to the farmers alone.

Despite the increase in the production of raw material following the Green Revolution, export earnings from rice have dropped for the fourth consecutive year and malnutrition is a more forbidding problem than ever. This clearly demonstrates the equally urgent need for a new industrial revolution to complement and take full advantage of this greatly increased produotion and the multiple potential benefits to be derived therefrom. Whereas a few years ago the industry was operating most successfully in a 'seller's market', it is now having to sell to a 'buyer's market' which demands high-quality products of a guaranteed standard. The inefficiency and wastefulness of traditional rice-processing techniques are well known and could be minimized by the establishment of a modern rice-processing industry which would ensure that the raw material is used to the fullest possible extent, thereby avoiding further deterioration in the economies of the major rice producing countries.

It is interesting to note that several non-traditional growers and exporters of rice in industrialized countries have established modern rice-processing industries which, despite high labour and transportation costs, produce rice and rice products at a relatively lower cost than in many of the traditional

1/ Read by Mr. Mihajlo Mautner, Chief of the Light Industries Section, Industrial Technology Division, UNIDO and Director of Seminar.

rice-growing countries, thereby proving that modern processing systems are economically viable. Thus, almost paradoxically, industrialized countries have become 'trendsetters' in an industry which is of minor economic significance to them. Furthermore, it seems likely that these very countries with their recently introduced anti-pollution legislation will be the first to find an economically viable solution to the rice husk utilization problem which the developing countries will also be confronted with in the near future. We are convinced that the investors' current disenchantment with the rice-processing industry is a temporary phase that can be surmounted by initiating a dynamic process of modernization. It has been calculated that a modernized rice processing industry, based on the current world production of paddy, could potentially produce, in addition to rice, 3 million tons of polyunsaturated rice-bran oil which at 250 U.S. dollars per metric ton represents a current market value of no less than 750 million dollars. A further potential source of income is 12 million tons of high quality defatted rice-bran containing 15 to 20 per cent protein which is eminently suitable for use as animal feed and at 30 dollars per ton represents a current market value of 360 million dollars.

Such impressive figures not only indicate the enormous additional revenue that would accrue from modernization of the industry, but they also show that improved processing methods would successfully combat the 'second generation' effects of the Green Revolution resulting from the prolific increases in yield. It must be recognized that the development of modern agriculture and accelerated industrialization of processing methods are two complementary and mutually supporting processes.

The improved efficiency of modern rice processing would result in increased total food grain and by-product availability which could decisively influence some of the most pressing economic, political and social issues confronting many developing countries. In fact, most national economies would benefit from even a modest increase in total mill output which would act as a profit incentive for large-scale investment in modernization programmes.

Among the other aspects of the process of industrialization emphasis must be laid on the export of processed products. By developing new and diversified export products, the export position of the developing countries would be considerably strengthened and their economies less vulnerable to fluctuations

in the demand for rice on which their exports largely depend. The development of export products, either on a regional or international scale, would lead to the establishment of new branches of industry providing the national economies of the developing countries with new dynamic growth.

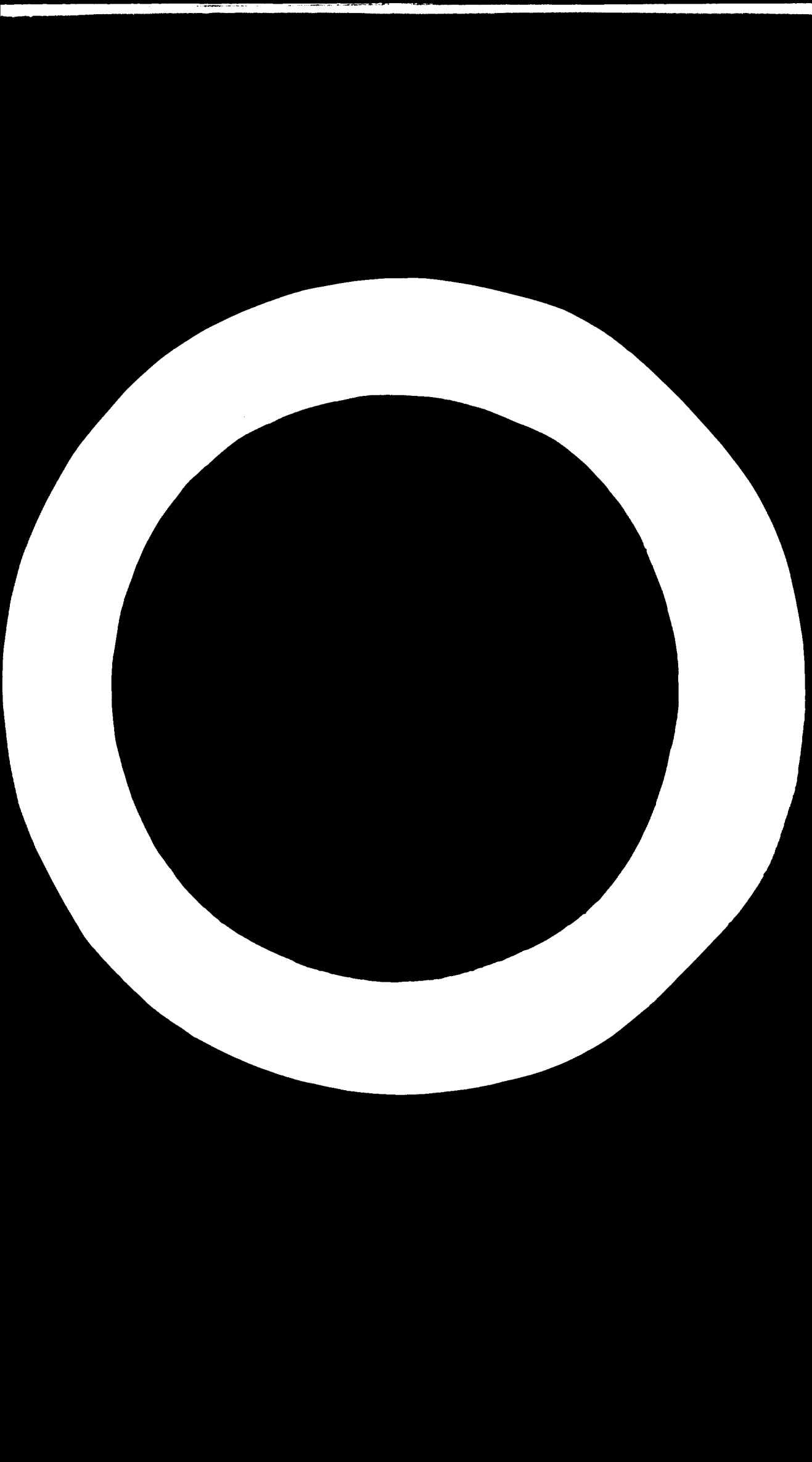
We believe that the international organisations involved in bringing about modernisation of the rice milling industry should aim at co-ordinated action. However, we realise that any action undertaken by international agencies would be on a much smaller scale than measures adopted by national governments whose attempts to modernise the rice-milling industry are often frustrated by socio-economic and political problems demanding determined action.

The agenda of this Seminar appears to be comprehensive, and yet it reflects only to a limited extent the vast issues facing the rice industry today. Nevertheless, we are confident that the dialogue initiated here will bring fruitful and constructive results, to the benefit of the developing countries.

We are grateful to the authors for having invested so much of their valuable time in the preparation of their papers, and our thanks are also due to the observers for attending this Seminar.

We are conscious of the fact that you have all left positions of responsibility to attend this Seminar which has an intentionally promotional character. We have thus invited experts from both the commercial and governmental sectors who are directly concerned with the industrial processing of rice in the hope that the recommendations made on the basis of their discussions will lead to an effective programme of investment and modernization to the benefit of the major rice-producing countries.

We are aware of the urgent need for practical solutions and we would ask you to devote yourselves wholeheartedly to this task in both your scheduled and informal discussions. We are also deeply conscious of the excellent work done by the Government of India for standing host to this Seminar and for the excellent facilities and support tendered. The success of this Seminar will be in no small measure due to the co-operation the Government has demonstrated throughout the preliminaries to this Seminar.



ANNEX 10

Introductory Statement of
Mr. H. von Hülst, Chief, Agricultural Engineering Service,
Food and Agriculture Organization of the
United Nations

Mr. Chairman,

Before joining FAO two years ago, I spent seven fruitful years in India. I am particularly pleased, therefore, that the venue of this meeting is in Madras. I always felt very much at home in India and am glad to have the opportunity to meet so many old friends again.

In the last two years FAO has started to work closely with UNIDO in various fields, including the mechanization of agriculture, the manufacture of farm implements and the processing of agricultural products. As Chief of the Agricultural Engineering Service I have been personally involved. I am pleased to have the honour to represent FAO and the Agricultural Services Division at this meeting and to be sitting at the same table as our friends from Vienna.

From Rome I bring to you the greetings and best wishes of Dr. Boerma, our Director-General, for the success of this most important meeting of experts.

Some seven or eight years ago, the world was faced with enormous problems in the production of food crops and a population explosion that looked as if it was going to outstrip all possibilities of increasing food production within the next few years. It was at that time that Dr. Sen, that renowned son of India and Director-General of FAO, set in motion the studies for the Indicative World Plan, to try and establish the steps that would have to be taken to feed the growing population of the world in the period 1965-1975 and on to 1985. Since then, however, the picture for the immediate future has changed radically, although the long term outlook still looks uncertain. The use of the new high-yielding varieties of hybrid maize, of wheat and of rice, has spread much faster than anyone ever anticipated. This was helped by a series of good monsoon rains in the Asian sub-continent and the increasing use of fertilizers. Incidentally, the FAO World Fertilizer Programme and the setting up of factories for the production of fertilizers in developing countries is a field in which FAO and UNIDO have been working very closely together.

The resulting spurt in food production has led to some entirely new problems - overproduction, the creation of large surplus stocks and a trmendous fall in world prices, particularly for rice. The worst sufferers, as so often happens, are the rice exporting countries of the developing world. While the USA and Japan have been reducing the area under rice, Japan still holds surplus stocks of over six million tons. The share of the developing countries in the total world exports fell to 45 per cent in 1970, compared with an average of 64 per cent during 1964-66, while the developed countries increased from 23 per cent to 42 per cent. The bulk of the rise in exports from the developed countries was contributed by the doubling of exports from Italy and Japan. Even more serious was the fall in world prices of rice. The FAO export price index (1957-59 = 100) fell from 129 in 1969 to 104 in December 1970 and 89 provisionally in April 1970. Furthermore, concessional exports rose to 25 per cent of world trade in 1970 from less than 10 per cent in the mid-1960's.

Those of us gathered here today, technical experts from various parts of the world, may not be able to do much to influence the political decisions that will have to be taken to rectify these imbalances. It is a problem that FAO is actively working on through the Committee on Commodity Problems which met in Rome last week, as are other UN agencies such as UNCTAD. But I hope that we, as technical experts, can come up with some technical recommendations this week that will be of benefit to the developing countries.

First of all, we must assist the countries to improve their milling and processing techniques. This is essential in order to improve the quality and value of rice for domestic consumption and for export, in order to be able to compete equitably with the high standards set by Italy, Japan and the USA.

Secondly, we should consider the possibilities of alternative uses for rice, for example, for starch making and for cattle feed. This latter would have the additional advantage of helping to alleviate the chronic shortage of proteins in the Third World.

The technical possibilities exist, but can it be done on an economically viable basis? I hope this is something that will be considered during the course of this week.

But now I want to come to another point. At the last FAO Conference two years ago in Rome, the point was made that the world's number one problem today is no longer food production but unemployment and under-employment. This was stressed even more strongly at the Second World Food Congress held in The Hague in June 1970. Here in India alone, an additional 10 million people are entering the labour market every year. What an enormous problem and challenge this poses to us. This is one of the main reasons for the creation of UNIDO, so that they may assist developing countries to set up industries to absorb the constantly growing labour force. We for our part in FAO likewise are giving this problem the most serious consideration, of how we can maintain or increase labour utilisation through bringing new land under cultivation, the creation of land clearance and development schemes, and through irrigation schemes.

To me as an agricultural engineer this is a very real problem. How far should we go in advocating mechanization? We know that selective mechanization through the intensification of agriculture can increase labour utilization, as it has done in Japan and Taiwan and elsewhere. We know that increased earnings, that mechanization makes possible, will create consumer demands which in turn stimulates the setting up of industries to produce consumer products. And we know that increased output of agricultural products should lead to increased labour requirements in the processing industries.

Two weeks ago, I attended a meeting in Surinam of a group of experts called together to consider the Mechanization of Rice production. We have brought along with us a draft of the recommendations of this meeting and details of these will be given to you later by my colleague, Mr. Huysmans. One of the recommendations advocated selective mechanization and stressed the importance of intermediate technology. Improved animal draught equipment, for instance, can help millions of small rice farmers. At the same time, it creates the possibility of setting up mainly small-scale and thus labour intensive manufacturing facilities for farm tools and implements. This is a field where FAO collaborates closely with UNIDO. FAO have the responsibility for carrying out surveys on the state of mechanisation of developing countries and coming up with recommendations on the types and quantities of equipment to meet local requirements, while UNIDO surveys the facilities available for manufacture and comes up with recommendations on what is required to expand existing facilities or set up new facilities for their manufacture. Such joint surveys have recently been carried out in Burundi and Ceylon and more are in the pipeline.

Bearing in mind the major problem of lack of employment opportunities, we must give serious consideration to the location and scale of industries involved with the milling and processing of rice. Should these be large capital intensive enterprises, concentrated in urban centres, with possible problems of logistics in moving the paddy to such terminals? Alternatively, should we rather be thinking of labour intensive small-scale industries located close to the point of production?

These are some of the problems I shall look forward to hearing discussed by the many technical experts here with us this week.

ANNEX 11

Statement on behalf of the Executive Secretary of the Economic Commission for Asia and the Far East[1/]

I bring to you greetings from U Nyun, Executive Secretary of the Economic Commission for Asia and the Far East (ECAFE). The organisation of this Inter-regional Seminar on Industrial Processing of Rice strikes me as a distinct landmark in our efforts to develop a vital industry; it will not only help in disseminating new knowledge and information on technological developments in so important a field as the processing of a basic food grain, but also provide guidelines for their future development in a large number of developing countries. We are happy to welcome the delegations and other participants from countries in Africa, Latin America, Asia, and Europe. We warmly acknowledge the generous hospitality of the Government of India, whose co-operation and generous host facilities have made it possible to hold a seminar of this magnitude.

The large number of technical documents commissioned for the session encompass the entire range of post-harvest rice processing techniques, and include fields such as new industrial technology, handling and processing, economic aspects and marketing. These documents will undoubtedly provide adequate background material for your deliberations.

It would perhaps be appropriate for me to review here the steps taken by the ECAFE secretariat to develop the rice processing industry and the utilisation of rice bran in the region. As far back as 1965, the first Asian Conference on Industrialisation (ACI-I) drew attention to the development of farm machinery intended to improve the processing of agricultural products. At that conference, attention was also drawn to the profitable utilisation of rice bran, a by-product of the rice milling industry.

1/ Read by Mr. V.M. Subramanian, Chief, Metals and Engineering Section, ECAFE and co-director of the Seminar.

With the advent of the green revolution, there was an added impetus for modernizing agricultural processing machinery. The Asian Industrial Development Council (AIDC) was created in 1966; with its headquarters in Bangkok, it deals exclusively with action-oriented projects. A number of projects in various disciplines have been successfully carried out since its inception, and many more are in the offing. Speaking exclusively of the projects which have a bearing on the industrial processing of rice, the third session of the AIDC held from 12 to 19 February 1968 at Bangkok recommended that the highest priority be accorded to the manufacture of machinery for agricultural production. With this main objective, the Council recommended the organization of a survey mission to visit the countries concerned in the region for consultations, gathering technical data, suggesting plant sizes, etc.

In accordance with the mandate of AIDC, a fact-finding team on industries manufacturing agricultural machinery, which functioned from 3 November 1968 to 18 January 1969, visited twelve developing countries in the region. The team, besides making other recommendations, placed considerable emphasis on the introduction of riding paddy tractors and improvement in design of power-operated paddy threshers. On rice processing machinery, the report of the team stated that the introduction of new high yielding varieties of rice pointed to the need for improved machinery and techniques for rice processing. It recommended that improved drying, hulling, milling, storage, and transport facilities be adopted to avoid the substantial losses resulting from the traditional harvesting methods. In order to examine the numerous problems of the industry, it recommended the organization of a technical survey team to investigate exhaustively the conditions of rice processing in the interested countries and also factors such as drying, storage, handling and transport.

The fourth session of AIDC, held in Bangkok from 12 to 18 February 1969, considered the report of the fact-finding team and noted that the mechanisation of agriculture was especially important in rice-growing countries where the introduction of improved high yielding rice varieties and the application of double cropping had resulted in a great increase in the demand for farm machinery, particularly machinery for land preparation, harvesting and processing of the output. The Council felt that development of industries for manufacturing rice-processing machinery deserved special attention and recommended that a survey team be organized on a regional basis.

An expert team on rice-processing machinery visited nine interested countries in the region between 6 November and 28 December 1969. Noting that rice processing is the most important agro-industry in the region from the point of economic growth as well as nutrition and monetary value, the team drew attention to a great deal of avoidable wastage and the imperative need to introduce modern technology. It referred to possibilities of improving the techniques of post-harvest handling and processing of rice, involving threshing, cleaning and drying, storing, processing, packing, and marketing so as to derive a higher milling recovery of rice, a superior quality of milled product, cleaner by-products, a lower cost per ton of processing, a reduction of wastage and storage losses and a better economic return to the producers and processors.

I am glad to say that the report of the AIDC expert team on rice processing machinery (document AIDC (6)/1 dated 9 March 1970) has been circulated as one of the documents for this Seminar. It contains a number of useful recommendations on re-organising this most important food industry in the region.

In the related field of the utilisation of the by-product, rice bran, extensive work has been done at the ECAFE secretariat, particularly on extraction of rice bran oil with a view to augmenting the vegetable oil resources. AIDC at its fourth session considered this subject and recommended the setting up of an expert study group on rice-bran oil industry. In accordance with this mandate, such a group was set up towards the latter part of 1969. Its report (document AIDC (5)/24 dated 16 January 1970) is also being circulated to the Seminar. This comprehensive report pinpoints the industry's main problem as basically that of obtaining sufficient quantities of the raw material, bran; to this end, it deals extensively with the shortcomings of the milling techniques currently practised and recommends measures for their improvement. The technical aspects of the stabilization of the bran to prevent lipolysis are also dealt with. The value of the defatted bran as a feedstuff is emphasised and the current shortcomings as to its quality are indicated. Modern technology involved in oil extraction and refining is discussed in detail. Investment and operation costs of a model rice bran oil plant and the economics of the production of refined edible oil as a function of the free fatty acid content of the crude oil are illustrated. The report gives valuable information on the industry as a whole, having in mind the special problems of countries in the region. The recommendations of the group provide positive guidelines for the development of this industry in future.

AIDC, at its fifth session held from 15 to 21 January 1970 in Bangkok, in considering both the reports on rice processing machinery and on rice bran oil industry, expressed the view that they provided a good example of the way in which AIDC projects can assist in a practical way the acceleration of economic development in the region. The Council recommended that the ECAFE secretariat, in collaboration with other interested international organizations, organize an international symposium in the vicinity of a pilot project such as Tanjavur in India. It is particularly gratifying to us that this recommendation has resulted in the organization of this Interregional Seminar.

It is my fervent hope that this Seminar will provide a unique opportunity for exchanging ideas of practical value. It is our expectation that it will lead to many decisons for the reorganization of this important industry in all the rice producing countries in the world. We in ECAFE wish to re-emphasize that we stand ready to extend such assistance as is possible within our means to help the developing countries in attaining this objective.

I wish you a most fruitful session.

ANNEX 12

Address by Co-Director of Seminar, Dr. P.K. Kymal Executive Director, Ministry of Agriculture, Department of Food, on behalf of the Government of India

This Seminar is concerned with the modernisation of rice processing industry so as to improve the entire post harvest handling, storage and processing of rice from pre-processing involving threshing, cleaning and drying to storing, processing, packing and marketing to derive a higher milling recovery of rice, a superior quality of milled products, cleaner by-products of greater value, a reduction of storage losses and a better economic return to the producers and processors. Modernisation involves change. In any movement for modernization of this kind, we find on one extreme the enthusiastic supporters and on the other, the die-hard conventionalists. The enthusiasts are impatient to put their ideas into practice and argue all in favour of the programme even if they do not have enough facts and figures to justify their concepts. People who resist change, on the other hand, are conservative, sceptic and challenge even the best available experience and scientific data. In between, we come across the people who are willing to be convinced and who are amenable to change, if the demand for change is supported by adequate facts and figures. People who are called upon to change have very often genuine doubts and hesitations. These doubts and hesitations are often mixed up with vested intsrests. They should be convinced of the need for change and the benefits that would follow from such a change. It is important that the change should be for the better. The enthusiasts and the conventionalists who are on the extreme, tend to be subjsotive in their evaluation and understanding of the problem. A more objective evaluation and fact-finding enquiries have to be undertaken by the experts in the field and a balanced presentation of the results should be made for the benefit of all concsrned avoiding subjective colouring as far as possible and exaggerated statement. This Seminar, I am sure, will interpret the existing knowledge in an objective manner. It is here that the Seminar can make a very valuable contribution.

I wish to refer in this connexion to an exhibition that has been organized in conjunction with this Seminar. This exhibition represents the experience of a large number of experts and people from the Industry and depicts the current state of development and the knowledge that is currently available. The these represents the evolution of processing of rice from the traditional to the most modern. Inter-related problems such as the raw material to be processed and other aspects have been brought in, to highlight the problems. The cultural heritage and inevitability of rice and rice-processing in India have been touched upon to illustrate how rice production, processing and utilization is inextricably bound up with the very life of the people. The problems involving change are illustrated and some of the techniques to be used for persuading and inspiring all concerned have been presented. Seeing is believing. Pilot study, demonstration projects and exhibition play a role in accelerating the process of modernisation.

Thank you all very much for your kind attention.

ANNEX 13

Vote of Thanks by Thiru G.C.N. Chahal Joint Secretary, Ministry of Agriculture, Department of Food, Government of India

Your Excellency, Honourable Chief Minister, Honourable Food Minister, Distinguished Delegates and Friends,

In the end it is my pleasant duty to thank His Excellency the Governor of Tamil Nadu for kindly agreeing to preside over this morning's function. Your Excellency's presence here has been a source of great encouragement to all participants. We are grateful for the remarks Your Excellency has made about the urgent problems faeing the Rice Processing Industry.

We are also deeply grateful to the Chief Minister of Tamil Nadu who has so kindly agreed to inaugurate the Seminar. You have, Sir, pointed out in your address the most burning problems which confront the rice processing industry. We can assure you, Sir, that these problems will receive the attention at the Seminar and will help guideing the deliberations in the Seminar. Tamil Nadu is already one of the foremost States in the country in successfully implementing the problems of modernisation of rice. It is in recognition of this leading role played by the Tamil Nadu Government that the venue of the Seminar has been fixed in Madras. Under your dynamic leadership, we can look forward to further acceleration of the pace of developmental programmes connected with processing of rice.

I also thank the Director-General of UNIDO, Director-General of FAO, Executive Secretary, ECAFE for sending their greetings and messages of good wishes on this occasion. It is on account of keen interest taken by them that this important Seminar has been organized. We also wish to convey our sincere thanks to the Director of Seminar, Mr. M. Mautner, who has taken upon himself the important task of conducting this Seminar. We also deeply appreciate the presence, here, of Mr. Subramanian of ECAFE, Mr. H. Von Hilst of FAO, Co-directors of the Seminar and for the kind remarks which they have made in their addresses.

Our sincerest thanks are also due to the Food Minister, Tamil Nadu for evincing keen interest in the Seminar and giving his guidance and help. We are also grateful to the Chief Secretary, Food Secretary and various other officers of the Tamil Nadu Government for rendering us all assistance in organizing this Seminar here in Madras.

We are indeed greatly honoured by the presence of a number of participants representing various countries of this region and other regions who have come to attend the Seminar. We are bound to benefit immensely from their rich experience and expertise on the subjects. I also thank most sincerely the participants from India who have come from various parts of the country. Their presence shows the deep interest they have in rice processing industry and adopting new techniques and practices for growth and prosperity of the industry. We hope that discussions in the Seminar and the occasion it provides for studying the experience in the application of the most sophisticated technology to the socio-economic conditions prevailing in the country will be of considerable interest to the participants specially to those who have come from abroad.

Last but not least, I have to thank Dr. Kymal, Co-Director and the staff of the Food Department who have made all the detailed arrangements for holding the Seminar. They have been immensely helped in their task by the willing co-operation and help given to them by the Director of Indian Institute of Technology, his colleagues and staff, by the officers and staff of Food Corporation of India, by the co-operative establishments, by the manufacturers of equipment and members of industry. I am also deeply indebted to the guests who have come to attend the function for sparing their valuable time and gracing the occasion with their presence.

ANNEX 14

Address by Thiru P.U. Shanmugham
Minister for Food and Revenue, Government of Tamil Nadu
on the occasion of the opening of the Exhibition

I am grateful to the organizers of this Interregional Seminar on Rice Processing, the United Nations Industrial Development Organisation, the Economic Commission for Asia and the Far East and the Food and Agriculture Organisation of the United Nations and the Government of India for having given me an opportunity to declare open this exhibition and to address you on this occasion. The farmers, in spite of several handicaps such as lack of assured irrigation, attacks by rodents and pests have produced more and more each year during the last four years. They deserve to be congratulated as also the officers who have worked hard. But whatever may be the result on the farm front to improve the production, the benefits of such increased productivity will be neutralised if there are losses at different stages from the threshing floor to the dining-table. The need for preservation of grains and to minimise the loss at all stages such as transportation, storage, processing and distribution have always been matters of importance. While it is generally agreed that processing in the conventional hullers is not the best method from the point of conservation, an effective alternative is not ready yet. The hullers have their advantages. They are cheap and small units which can be set up to meet the local needs. Generally only about one-third of the production is marketed through the trade channels. The rest is consumed by the producers or given as wages to the labour. The local practice is that such small quantities are parboiled at home and milled in the local mills on payment of a small charge. Modern milling machinery cannot meet this local need since their capacities are too large and correspondingly they are expensive. For meeting the local needs and particularly for hulling small quantities on payment of charges, they cannot replace the hullers. It is therefore necessary that small and cheap units which would ensure better standards of processing at low processing cost should be evolved to replace the hullers. Most of the people here consume parboiled rice. The cost of parboiling appears to have completely offset the economies of the use of modern machinery. Boiled rice produced by the conventional hullers is cheaper than raw rice because of the better outturn obtained, whereas with the modern mills it actually becomes costlier than raw rice. The possibilities of reducing both

capital cost and operational cost in the modern mills have to be examined. Such examination should include within its scope the possibilities of modifying the process and the equipment to reduce the cost and it should not be confined to merely improving the operational efficiency because that can only result in marginal economies, which cannot offset the present difference in cost. The private trader is able to produce rice of good quality by conventional methods, even though if required to supply to Government he supplies substandard grain and brings a bad name to the Minister holding the food portfolio! The benefits of modern machinery in the matter of conservation cannot be denied. The bran produced is more valuable since it is free from husk. Oil extraction from bran is a profitable subsidiary industry and the de-oiled bran is very useful as cattle feed. At the same time competitive economy would also be a very relevant and important factor if sophisticated machinery is to gain general acceptance and not be merely a State-sponsored experiment.

The conventional method of handling paddy and rice in gunnies is one of the major causes for the losses. At the farm level possibly there is no alternative because limited quantities have to be collected from numerous producers. Even at the distribution point also, the supply to the retailers has to be in such small packages and the flexible package has the advantage that the cost of return of the containers is substantially less. Use of any special type of containers necessarily involves a return empty trip, thus adding to the cost and offsetting the advantages in terms of curtailment of losses. Large milling units with modern machinery offer scope for bulk storage both of paddy before milling and of rice after, followed by bulk transportation up to the distribution points. Whatever may be the nature of the storage, unless the moisture, rodents and insects are kept out, the loss will be large. While transporting the grains from the storage to the retail point, we have to take them in small packages which are likely to give rise to spillage. So we should try to have suitable flexible containers which would minimise spillages. Maximum efficiency at all stages is necessary to ensure an attractive price to the producer, which would also be an incentive to produce more and at the same time permit supply to the consumer at reasonable prices. Also, if the quantity produced in the field can be converted with minimum loss in the processing, I think that not only this State but also the entire country should have surplus food grains.

In Tamil Nadu the Government handles a very small portion of produce in pursuance of the policy either for public distribution or for buffer stocks to check speculative trade. Use of the modern technology on such a small part of the production alone, may not achieve the desired results. While that may constitute a demonstration, unless the cost benefits are also demonstrated, commercial acceptance and thereby large-scale use cannot be ensured. In any case a major part of the produce which is not marketed but is consumed only in the local area by producers and their labour, can be covered only by equipment suitable for small-scale operations.

Therefore while technological improvements can be evolved and efficient methods established, all possible steps should be taken to ensure that the benefits intended can be obtained at reasonable costs, consistent with local conditions as would enable replacement of the conventional methods, which may be wasteful but cheaper.

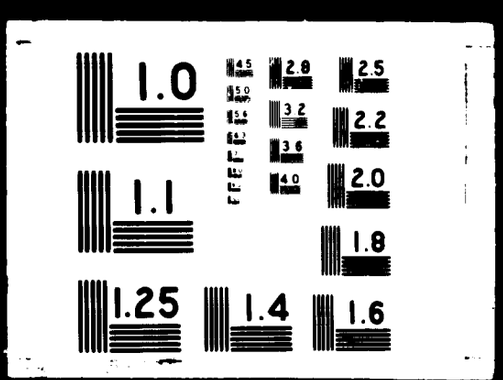
On behalf of the Government of Tamil Nadu and in my capacity as the Minister for Food I eagerly await the results of the deliberations and I look forward to solutions to our problems emerging from these discussions. I have great pleasure in declaring the exhibition open. This exhibition as well as your visit to Thanjavur will give you an idea of traditional methods as well as the modernization that has been done. During your visit to Thanjavur you may also consider visiting a conventional huller mill as also some purchase centres to get first-hand knowledge of the field conditions.

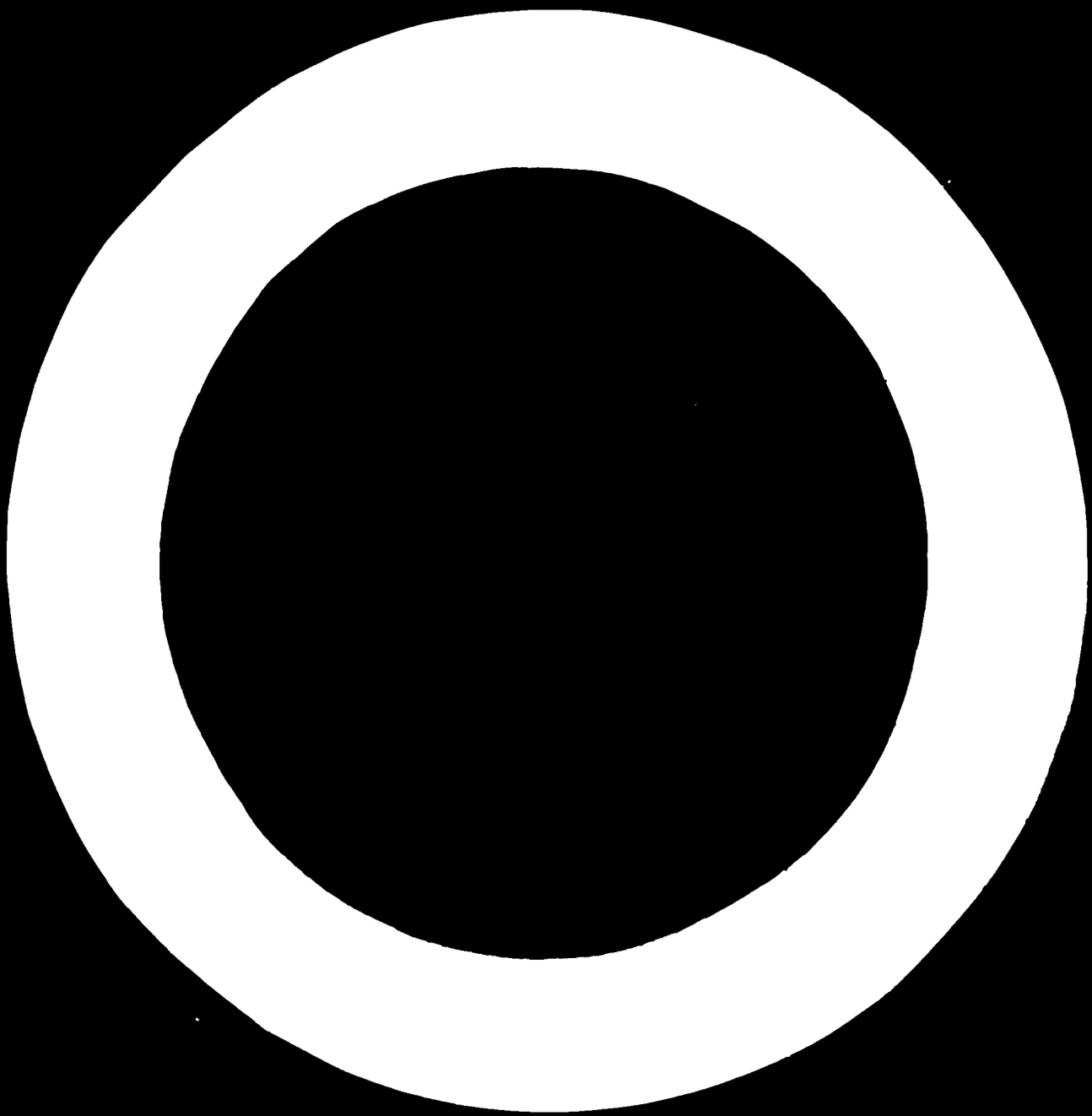
3. 12. 73

3 OF 3

DO

3508





ANNEX 15

Address by Shri C. Subramaniam
Minister of Planning, Government of India

Distinguished Guests and Friends:

It was very kind of my colleage in charge of Agriculture to have invited me to participate in today's deliberations of this important Seminar. In his letter extending the invitation to me, Shri Fakhruddin Ali Ahmed was kind enough to refer to the steps that were initiated for the modernization of the rice processing industry in the oountry, when I was Minister for Food and Agriculture. At that time, we were short of food grains and rice was a scarce commodity even internationally. The accent, therefore, was on increasing production in the farms. Nevertheless in those oritical days of hand-to-mouth existenoe, with many an anxious moment looking for arrival of ships at the ports and movement of trains to important oentres of distribution, we felt that along with steps for higher production, measures should also be initiated for better processing of the available paddy and thus making the best of what we had. For, if the techniques of oultivation among the farmers were largely traditional and baokward, the techniques of processing as practised by rice-millers were no better. We felt then that the existing regulations relating to this industry were substantially negative in character, and that efforts should be made for modernizing processing teohniques and equipment in a phased manner, invoking legal compulsion wherever necessary. As part of the proces thus initiated, this Seminar has been convened and I am glad to note that many distinguished workers in the field from various countries have been assembled for reviewing the existing position and for chartering the course of action in the coming years.

We, in India, have a very large number of rioe mills with varying capacities but with a majority of them being very small units. The total number, I am told, is a little over 67,000 of which nearly 59,000 are the traditional huller types, about 5,000 sheller-cum-huller types, and the balance complete shellers. The majority of rice mills were established in the 1930's or established subsequently but based on the design of 1930's. No wonder they have beoome obsolete and are inefficient and wasteful in their functioning.

The loss arising out of primitive techniques of processing has been estimated variously by different scientists and organizations. Some of the papers that have been prepared for this Seminar also make a reference to this aspect of the problem. The extent of the loss is considerable by any estimate. Even conservatively, the figure for this country should be in the region of 2 million tonnes of paddy valued at about Rs. 90/- to Rs. 100/- crores per year at current level of paddy production. The fourth Five Year Plan anticipates an increase from 54 million tonnes to 81 million tonnes of paddy during the Plan period. Without an improvement in the techniques of processing, the extent of loss will be correspondingly higher in the years to come. This I find is a problem common to many other countries in Asia and the Far East even if the degree of waste may vary from country to country.

It is in this context that I am concerned that the seven modern rice mills that were set up during the Third Plan period by import of equipment from Germany and Japan have not so far sparked off a general replacement trend among the rice mill owners in the country. I understand that the Rice Mill Industries Regulation Act 1958 was amended last year making it obligatory for the millers to effect replacements and improvements with a view to improving processing performances within a period of three years. Nevertheless, I have been informed that the three manufacturers of modern rice mills in the country have so far been able to sell only about 75 new mills and assist in the modernization of 38 old units in different parts of the country. While legislation should help to expedite matters and hasten the process of transformation, legislation by itself may not suffice. It is necessary to carefully identify the factors that have stood in the way of a faster replacement. The more important among these have been covered in your deliberations during the past five days. While I do not claim to have recently made any close study of this problem, it seems to me that three major aspects require attention. These are of a technical, financial and policy nature.

On the technical side, the average size of the units that have been fully tested and adapted in the field is too large for the existing owners of rice mills to undertake replacement with their own resources. There is also the added fear that adequate business may not be forthcoming to such new units in small villages. It seems to me that some intensive research and development efforts are now called for to evolve mini-rice mills, incorporating modern methods of conserving and processing the grain. A few small-sized units have no doubt been developed on a pilot basis but

these require to be tested out in different regions under different conditions and for different strains of paddy. I hope Governments at the States and at the Centre will give a fillip to such research work as a matter of high priority. I also hope that the producers of rice-milling machinery will collaborate effectively with Government in this endeavour.

The financial difficulty referred to is partly related to the technical one of the size of the plant. Unless the units are small-sized, the cost of replacement goes beyond the normal borrowing power of the rice mill owners. It would be useful, therefore, to have a definite plan of special assistance through banks and term-lending institutions should be drawn up for assisting the rice mill owners for carrying out their obligations under the amended Act.

The policy that I had in mind - and which I would like my colleague to look into - is the structure of prices and their relation to the quality of rice produced by the mills. I am not unaware of the practical difficulties in enforcing a highly differentiated price structure for rice, to cater to rice of different varieties produced by different types of mills. Nevertheless, some premium for rice that comes out of a system that ensures good quality by cleaning, efficient removal of foreign matter, good boiling, scientific and controlled removal of husk and bran will be fully justified. The cost of these operations, which have the effect of saving grain for the country, is quite considerable compared to the cost under primitive processing techniques. Ultimately, the consumers, when they are properly educated, will not mind paying a little extra for better processing and for better quality. Initially, however, for this movement to catch on, some incentives will have to be provided by the Government, coupled with a system of disincentives for outdated techniques.

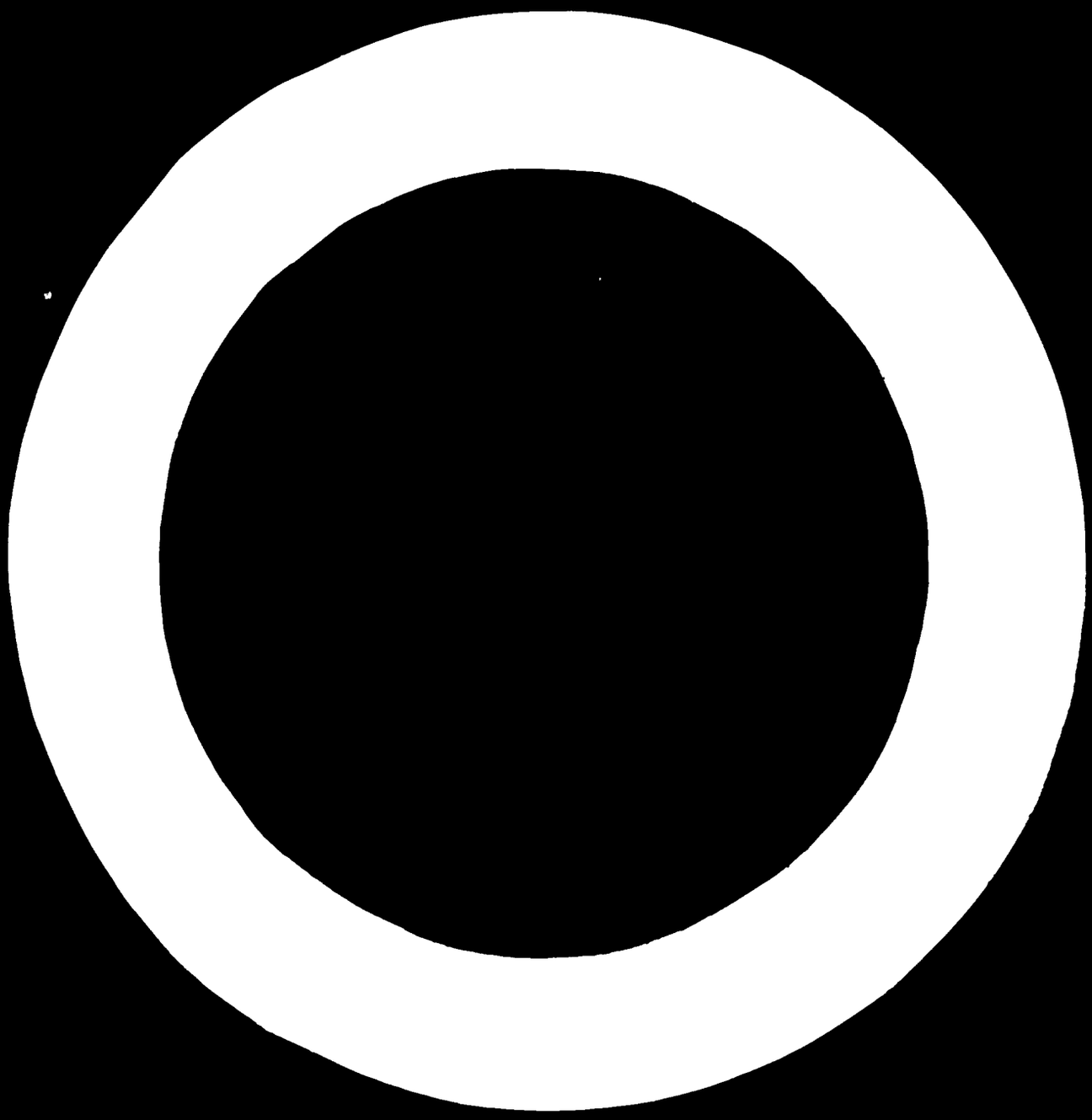
There is another aspect on the technical side about which I have some concern and which I would like to share with you on this occasion. This relates to the relative use of labour and capital in the modern rice mills. Having visited some of them, I have serious doubts as to whether we are making a rational combination of labour and capital inputs in these new processes. In labour-abundant and capital-short economies such as India, it is necessary that we do not encourage techniques and processes that are unnecessarily capital-intensive and labour-displacing. I wonder whether such a rigorous scrutiny of the processes so far developed from this point of view of maximum possible labour utilisation has been undertaken in respect

of this industry. For instance, I see no reason why all aspects connected with movement of paddy inside the rice mills, cleaning, bagging of rice, removal of bran should all be necessarily automatized. There is considerable scope, in my view, for us of manual labour in all these operations, even though at certain points in the processing operations, the speed required for feeding the mills may be such that only mechanical operation would be suitable if the machines are to operate at full capacity. Even here, I would ask the scientists and technologists to consider whether they could not devise a machine with a proper technological mix, admitting manual labcur in the connected operations. There is no particular reason why all the paddy should be processed immediately after harvest. The additional oost of storing as paddy, when compared to storing as rice, has to be balanoed by the need for giving employment opportunities during the off-season, partioularly to landless labourers. This is another area where intensive R and D efforts will, I hope reoeive the attention it deserves from scientists, technologists and the economists involved in this work.

One other aspect that deserves mention in this context is the better use of resultant products such as the husk and bran in modern milling methods, for the produotion of oils, cakes, boards, etc. In fact, with the modernization of our agricultural production techniques, the need for modernizing conneoted operations in the storage, transport and processing has become particularly urgent. In my view, it is by bold innovations and adaptations in this whole ohain of activities that we oan find a solution not only to the problem of reducing wastage that now occurs in the use of our agricultural commodities but also for providing employment to the large number of skilled and unskilled workers in the countryside. We should take a leaf from the success story of Japan in this regard. The number of unemployed persons in the rural areas in our country at present, and the anticipated increase in the labour forces during the current decade are such that even with the most rapid development of industries, agriculture and allied ocoupations will continue to be the mainstay for our population for many more years to come. Employment opportunities have, therefore, to be found in the rural areas themselves taking advantage of the upsurge in agriculture. I have no doubt in my mind that given the right organization and encouragement, our scientists, who helped us to increase crop production in less than half a decade to make the country self-suffioient, will rise to the occasion once more in improving our processing techniques. I, in

fact, regard this as an item of utmost national importance for India and countries similarly placed in these regions during the current decade. My interest in this problem continues not only from my previous link with the Ministry of Agriculture but also from my present concern for overall National Planning, in the context of our commitment to improve the lot of the small farmer, the agricultural labourers and other such weaker sections by provision of productive employment and sustained income to them. In this I pin my hope largely on the scientists and the technologists whose dedication and whose capacity is well-known to all those who, like me, have had the pleasure and privilege of working closely with them.

Let me, in conclusion, thank you once again for the opportunity you have given to meet you all and exchange a few ideas. I do hope that the deliberations at this Seminar will help the governments of rice-producing countries all over the world in assessing the shortcomings in the existing methods of processing and in drawing up plans and programmes for their improvement.



ANNEX 16

Concluding Address by Shri Fakhruddin Ali Ahmed, Minister of Agriculture, Government of India

I have great pleasure to be able to come here and spend some time with you. You have discussed a subject of great importanoe for India and other oountries of Asia and the Far East. Rice is the most important orop of this area. Ninety per cent of the world's rice is produoed and consumed in countries extending from Japan to Iran and the monetary value of the paddy processed by the rice milling industry is of the order of 29,000 million dollars for nearly 190 million tonnes of rice. Again rice contributes approximately 15 per cent to the gross national produot of India, Indonesia and Thailand, 39 per cent to the gross national produot of Burma and 7½ per cent to the gross national product of Korea and Ceylon. In addition, ourrently a break-through in rice production is rapidly taking place in several oountries of this region as a result of the introduction of new high yielding varieties together with the multiple cropping pattern and intensification and improvement of agricultural practices. I must, therefore, in the first instance, oongratulate the UNIDO, FAO and ECAFE on their decision to hold suoh an important and timely Seminar and to afford the honour to India to be the host country. The Seminar has undoubtedly helped to focus attention on all problems connected with rice technology.

I have listened with great interest and advantage to the recommendations and conclusions which you have arrived at after your disoussions over five days. I am impressed with their practical content and the stress on finding urgent solutions to the related problems through the application of soienoe and teohnology. I have noted with particular interest the conlusions that the inorease in the production of paddy is no assurance of a corresponding increase in the quantity of rioe and that to achieve fruitful results urgent action mainly on the following fronts is required:

(i) To oreate adequate and modern storage facilities for paddy and rioe;

(ii) To expand and modernise facilities for processing and present quantities of rice and future increases in rice production;

(iii) To prevent avoidable losses and to obtain the maximum recovery of rice and ensure improved quality of out-turn; and

(iv) To make full and efficient use of the by-product like bran and husk

I have also noted the emphasis which you have laid upon the nutrition of poorer classes in the rice growing countries on rice as a major source of food. I feel, now that the spectre of hunger has practically disappeared from the scene as a result of the dramatic and successful break-through in agricultural production over the past years, more attention to the quality of food of the poorer sections will have to be paid through adoption of such processes as parboiling of rice and raising income levels of large sections of rural population dependent on rice economy in countries of Asia and Far East through the implementation of various recommendations made by you to reduce the field and post-harvest losses in rice and to make economic use of the by-product of rice. We in India have realized the existence of the vast potential for improving the entire post-harvest handling and processing of rice from threshing and drying to storage, processing, packaging and marketing, so as to derive an improved out-turn ratio, a superior quality of milled product, cleaner by-products of greater value, lower cost per tonne of processing and handling and reduction of wastage and storage losses thus securing better economic return to the producers and processors. For achieving these objectives we have already taken some steps such as:

(i) initially importing and setting up of seven rice mills of improved designs in different parts of the country;

(ii) indigenous fabrication and manufacture of machinery of improved design;

(iii) setting up of parboiling units consisting of latest designs developed by the Central Food Technological Research Institute, Mysore;

(iv) appropriate programmes for training of technical and managerial personnel in different aspects of modern rice mills; and

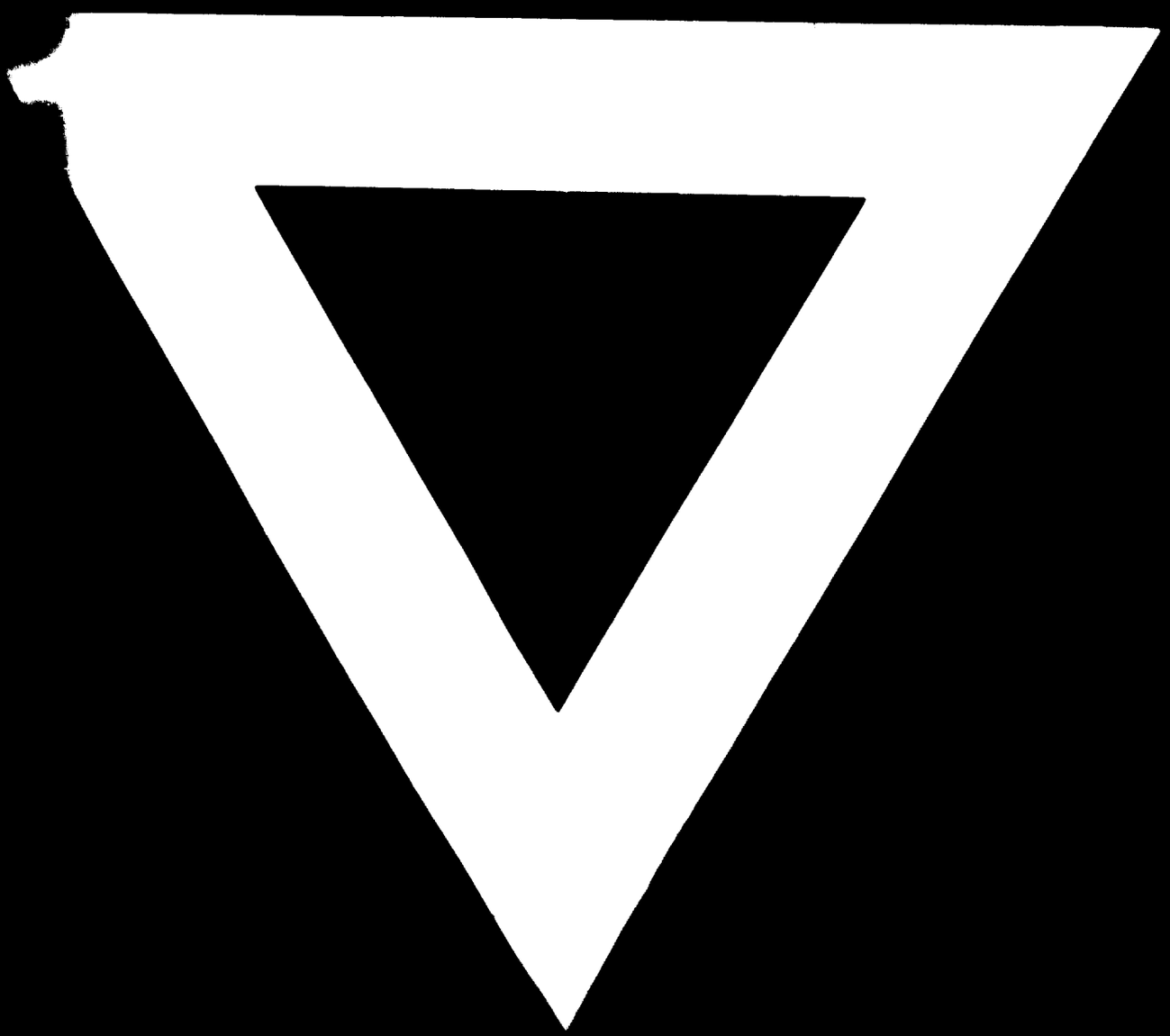
(v) suitable legislative measures under which modernization of existing huller, sheller-cum-huller and better huller units has been made obligatory.

In implementing this programme we have received help from various U.N. agencies and other international organizations. We shall be glad to share with you the experience which we have gained in the field for the benefit of other developing countries through collaborative efforts. At the same time, as it appears from the recommendations made in the Seminar, the experience of establishment of modern rice mills in India and other countries of the region has demonstrated the critical importance of various factors such as pre-investment surveys, pilot studies, proper planning of the location, selection of the types of unit suitable for the area, and availability of adequate finance etc. These steps will ensure that the projects drawn up are economically feasible and give the maximum results. It is here that the role of specialized agencies of the United Nations is of great importance. I express the hope that while there are more collaborative efforts amongst rice-growing countries for developing rice processing industries through exchange of knowledge and information through bilateral and multilateral arrangements, specialised agencies of United Nations and developed countries could help the developing countries with assistance in terms of men, material and equipment to enable the latter to develop the rice processing industries as early as practicable so that full advantage of the latest scientific and technological development is obtained by these countries. Further, steps need to be taken to augment the resources of the developing countries to enable them to conduct the research and create training facilities for the adoption of the technology suitable to the local conditions which your Seminar has concluded differ from country to country.

In conclusion I should say that rice, being a dominant factor in the economies of most of the countries of Asia and Far East, as also some of the countries in Africa and South America whose representatives have gathered here to participate in the Seminar, development of rice processing industry should not only be given the greatest consideration by the national government of the various rice growing countries in formulation of their national policies but specialized agencies of the United Nations should also give this matter a high degree of importance in formulation of their plans and programmes for economic development of these countries.

This will enable large sections of population of these areas who are dependent on these crops and coust tute nearly half of mankind to lead a better life. I will indeed watch with interest the implementation of the recommendations made by you in the Seminar. The Government of India, on its part, will be happy to help in the implementation of the useful and practical recommendations and to offer such assistance as our sister countries in this region and the specialized U.N. agencies feel we might be in a position to give.

In the end, I thank UNIDO, FAO, ECAFE for holding this Seminar. I should like to express the hope that similar seminars on development of other aspects of the food industry which is of such great importance to the countries in these regions will be arranged. The development of these industries will help to generate employment and raise income and levels of rural people thus enabling to close the gap in nutrition and in incomes between the people of the different countries to usher in an era of real peace and prosperity.



3. 12. 73