EVALUATION TEAM REPORT

RICE RESEARCH

&

TRAINING PROJECT

263 - 0027

Egypt

Prepared for
United States Agency for International Development

By

IRI Research Institute, Inc.
One Rockefeller Plaza
New York, N.Y.

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13. SUMMARY

Impressive progress has been achieved in the Rice Research and Training Project, 263-0027, assuring achievement of the Project objective to "provide new information and knowledge for rice production, seed processing and storage by increasing research and training capabilities."

Planning capabilities have been strengthened and research programs are in place with capable program leaders having produced impressive results with the exception of rice mechanization. Progress in this program has not kept pace.

Varietally pure, clean seed has been made available to farmers in increasing quantities. Adequate supplies of seed free of red rice will minimize losses in yield from this source.

Progress in extension efforts as a result of the national production program, Mabrouk 4, has been truly outstanding. This is evidenced by the increasing number of participating farmers, feddans[1] cultivated and increased yields in each year since program inception. Extension is providing the link between researchers and farmers with new technology in one direction and feed-back in the other alerting the researchers to new problems

The entire program is in danger of unravelling and the End of Project Status not be realized since the National Rice Institute as outlined in the Project Paper and mandated in the Grant Agreement has not been endowed with a permanent status. Without permanent status there will be no vehicle to support the multi-disciplinary research and extension programs to achieve the project goals. This is seen as a critical need and must be done in some form which satisfies the mandate and serves the purpose as outlined in the Project Paper.

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[1] 1 feddan = 1.03 acres = 0.4168 hectares

14. EVALUATION METHODOLOGY

Both the Project Paper and the Grant Agreement stipulate an evaluation program as an integral part of the Project. Consequently, an "outside" evaluation of the Rice Research and Training Project (263-0027) was conducted to assess progress during the first four contract years in achieving the project purpose and goal. This review discusses progress in each of the project programs and the constraints hindering such progress. Where appropriate, recommendations are offered for implementation in the project programs during the remainder of the project life.

The U. S. Agency for International Development (USAID) negotiated a work order with the IRI Research Institute, Inc. (IRI), under Indefinite Quantity Contract PDC - 1406 - I- 01 - 4089, to provide a five member evaluation team. On arrival in Cairo, the team was jointed by two Egyptian scientists as representatives of the host country. (See Appendix 1 for composition of team.)

Documents made available to the team included the original USAID Project Paper (with Amendment), the Project Grant Agreement, the Project Contract (with Amendments) between the Ministry of Agriculture and the prime contractor, the Internal Program Review, Proceedings of the National Rice Institute Annual Conferences, Project Progress Reports and other supporting documents and information as requested.

In Cairo, the expatriate members of the review team were briefed by USAID officers and the Project Chief-of-Party and his Deputy. A one-day field trip was made to Sharkia Governorate to view demonstration fields and extension activities. Returning to Cairo the full team was briefed over a two-day period on the Project background and heard short reports on the purpose

and objectives of each of the Project programs. The team then travelled to Sakha Rice Station for three days of tours and for a more intimate look at the various programs in the fields. Brief program discussions were held with the entire Project staff on the final day at Sakha, followed by attendance at the regularly scheduled technical seminar in the field. After a brief tour of the construction site of the National Rice Institute, the review team returned to Cairo for further discussions and interviews as needed and preparation of reports.

Throughout this period, Project staff was available for discussions and provided much information to the team. The team is deeply grateful for the excellent support provided and for the many courtesies shown to them by everyone connected with the Project and the Sakha Research Station. The team is especially grateful to the Minister of Agriculture, Dr. Youssef Wally, for his comments and the time extended to them.

Special thanks are due to Dr. Ray E. Ely, Dr. M. S. Balal and Dr. Jack M. Swagerty of the Project Administration and to Dr. Sidney A. Bowers of USAID.

15. EXTERNAL FACTORS

The basic assumptions as listed in the Project Paper continue to be valid. Rice production, although high compared to world averages, continues to stagnate (although a slight rise in yields has been noted), while population gains continue to accelerate. Availability of farm labor continues to decline.

A major socio-economic condition that continues to have an impact on the Project is the Government policy on rice. Consumers are being subsidized at the expense of farmers by keeping farm-gate prices low in comparison to the world price of rice. It is true that the farmer is subsidized by cost sharing on seed, chemicals, fertilizers, mechanization, etc., and has a ready line of credit (often a major constraint in many countries) for these inputs. Water, which is a high input cost in other parts of the world, is available at no cost to the farmers.

While all the above does help, the entire system is such that rice is kept less profitable when compared to other crops. To maintain production the Government forces the farmers to plant rice and this works to keep them poor.

16. INPUTS

An inability to identify suitable candidates with acceptable English comprehension caused the training component of the Project to fall behind schedule. Extra-ordinary efforts were expended to tutor candidates in English and the Project objective (as amended) will likely come close to the target.

Problems were reported concerning the lack of transportation for program activities. Needed field work is delaved or not done and the program suffers. Two vehicles which have been in the country for some time have been idle and not assigned to Project work. The team was not able to determine a valid reason for this. In addition, another 2 vehicles were idle because of licensing problems. This is an example of government red tape at its worst. By agreement, Project commodities are exempt from duties and levies and problems of this nature should not happen.

It was reported that acute problems were sometimes experienced in the cash flow required to operate the Project due to delays in releasing local funding by USAID.

There are complaints that the University has not assigned enough of their permanent staff to the project. On the other hand, some of the Egyptian counterparts hold multiple appointments and can only be considered part-time. This is especially true in appointment of the Project Director General and this has caused confusion in the project direction.

17. OUTPUTS

Twelve candidates have completed 145 months training including two at the doctorate level, 5 at the post-doctorate level, and 5 in non-degree work. Training was at the Universities of California-Davis and Arkansas and at the International Rice Research Institute.

In 1984, 63 extension field personnel were involved in a training program to review research results and to develop a work plan. Twenty-six national rice advisors and national rice trainers participated in a 30-day training tour in the Philippines and Thailand.

One new rice variety, Giza 173, has been released for production and seven additional promising lines (short grain) are ready for seed increase.

Registered seed has been produced for 3 years without contamination by red rice. Enough certified seed of the new variety, Giza 173, was produced to plant 50% of the country in 1984.

The extension program, Mabrouk 4, has reached over 90,000 farmers cultivating 46,500 feddans. Note: see also data in Item 19 GOAL.

It was evident to the team that there was very little or no coordination or integration with other USAID (or any other) project.

18. PURPOSE

"Provide new information and knowledge for rice production, seed processing and storage by increasing research and training capabilities."

This was to be realized by the formal recognition, staffing and funding of a permanent rice research and extension unit within the framework of the Ministry of Agriculture. This unit would provide a mechanism whereby government support and funding can be channeled to support the multi-disciplinary research programs needed to solve production problems as they arise and to work toward to goal of maximum rice yield.

The National Rice Institute exists as an operating entity. There are in place impressive rice research and extension programs with capable leaders. However, the NRI has not been endowed with permanent status and unless this is done the Project could quite likely fail in its purpose.

Construction of permanent facilities for the research and extension programs and a seed processing units are well underway. However, the contract will need to be extended within current limits of funding to provide expatriate assistance to install laboratory and processing equipment now on hand.

A permanent status for NRI (or some type of unit which satisfies the Grant Agreement mandate) plus the contract extension for the above cited reason will assure research and training capabilities at End of Project Status.

An End of Project Status (EOPS) condition that may not be reached lies with the mechanization component. It is recommended that efforts be concentrated on only one machine (thresher) that will have the greatest potential use by the farmers. Define realistic and measurable objectives and establish target dates

when objectives can reasonably be expected to be reached. If this falls within the Project life, then an extension of the contract (for this component) within funding limits is justified. If not, the program should be scrapped now.

19. GOAL

"The Rice Research and Training Project is designed to improve the social and economic condition of the small rice farmer and increase the quantity and quality of food supplies."

The Project Paper specifically avoided setting any national goal for increased rice production. The End of Project Status (EOPS) as stated in the amended contract predicts "Progress toward a potential increase of 25% in rice yield over ten years."

Extension efforts as a result of the national production program, Mabrouk 4, has reached an increasing number of farmers each year. SInce its inception, more than 90,000 farmers have participated, either directly or indirectly. In 1981-83 the average yield of 3.8 tonnes per feddan (9.0 t/ha) on 46,500 feddans was 59 higher than the national average.

Rice Production, Mabrouk 4 Program

Year	Feddans[2]	Tons	Average Yield t/f	t/ha	Annual Change, %
1981	1,500	5,490	3.66	8.78	--
1982	20,000	71,400	3.57	8.56	-2.5
1983	25,000	98,750	3.95	9.48	+10.6
1984	42,000	NA	NA	NA	NA
Avg.	--	--	3.78	9.07	--

The national yield has increased slightly since 1981 to 2.4 tonnes per feddan which may reflect the impact of this program; however, more time is needed for change.

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[2] 1 feddan = 1.03 acres = 0.4168 hectares

Rice Production in Egypt

Year	Feddans	Tons	Average Yield t/f	t/h
1981	954,142	2,234,046	2.34	5.61
1982	1,023,956	2,438,769	2.38	5.71
1983	1,013,680	2,442,194	2.41	5.78
1984	997,259	2,371,670	2.38	5.71

20. BENEFICIARIES

"The project is aimed at the poorer segment of society, the small peasant farmer who has an average holding of two to three feddans of which one feddan is planted in rice." Quoted from the Project Paper.

Based on the data obtained from a series of farm management surveys in 1982 through 1984 by the economics component of the project, the value of the Mabrouk 4 program is shown in the following:

Cost and Returns of Rice Production, 1983

Type Farm	Farms	Feddans	Total Cost LE	Total Value Crops & Straw	Net Profit
A. Demonstration Villages					
1. Mabrouk 4 farmers	30	<1	286	523	237
	29	1-5	233	421	189
	21	>5	230	398	168
2. Regular farmers	25	<1	322	424	102
	27	1-5	248	384	136
	22	>5	207	387	181
B. Non-demonstration Villages					
1. Regular farmers	29	<1	344	411	67
	31	1-5	281	366	85
	22	>1	206	321	115

This data clearly shows the value of the Mabrouk 4 program to the poorest of farmers whose crop is less than 1 feddan. Added value also accrues to the larger land-holdings but to a lesser extent.

21. UNPLANNED EFFECTS

Not pertinent at this time.

22. LESSONS LEARNED

Ideally, projects should be programmed so that construction of new facilities is completed, and transportation and housing is in place by the time expatriate specialists arrive in the country.

With projects involving cooperative management there should be built-in checks and balances to preclude control becoming unbalanced and one side becoming dominant at the expense of the other.

Two weeks is not ample time in which to do a project evaluation. There should be at least 2 weeks for data gathering, 1 week for report writing, and 1 week for wrap-up by the team coordinator.

23. REMARKS

APPENDICES

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COMPOSITION OF EVALUATION TEAM

From IRI Research Institute:

Dr. John V. Halick	Administration, Team Leader
Dr. C. H. "Jeff" Wang	Agronomy
Dr. Wayne H. Freeman	Breeding, Seed Production
Dr. Allan L. Phillips	Mechanization
Mr. Bobby A. Huey	Extension

From Ministry of Agriculture, Egypt:

Dr. Mohamed K. Hindi	Economics
Dr. Taha A. Ek-Sharkawy	Plant Protection

RECOMMENDATIONS

GENERAL

The evaluation team are unanimously agreed that the present program should be extended within the limits of funding available when the present contract expires. This should be reviewed on a program by program basis.

ADMINISTRATION AND TRAINING

1. Establish the National Rice Institute that is now functioning as an operating entity along the lines outlined in the Project Paper on a permanent basis as mandated by the Grant Agreement.

2. Provide Project and program leaders with English and Arabic translations (as appropriate) of the minutes of the Rice Production Advisory Council.

3. Continue to assure that rice production problems which cut across ministerial lines are included on the agenda of the Rice Production Advisory Council.

4. Define realistic and measurable objectives and provide full support to the rice mechanization program. It may be too late for this.

5. Extend the contract within the limits of funding available so that expatriate specialists can assist in the installation of laboratory equipment when new facilities are completed. This is especially urgent in regard to the seed production program.

6. Make full use of equipment and vehicles now in the project.

7. Appoint full-time Egyptian co-leaders and counterparts to program areas where these are now lacking. This is especially urgent for the rice mechanization, farm management, and economics programs.

EXTENSION

1. The organization and structure for extending informa to Egyptian rice farmers as "Mabrouk 4" program should be continued. Modification is advised such as a subpackage for direct seeding, mechanization or saline soils.

2. Training rice production specialists, advisors and trainers of farmers should be continued with more emphasis being placed on outside training in sub-tropic rice production areas such as Japan or California. Local training with more involvement of the rice research team is needed to build confidence in the research effort as well as better understanding of farm problems. Also, Arabic texts for local training at the governorate level is needed. A production handbook should be developed for each extension rice worker.

3. More extension staff is needed to reach the 1 million Egyptian rice farmers. Increased usage of mass media, especially educational television, is urgently needed and efforts by extension at the national level should be made to acquire more TV time for Mabrouk 4.

4. Since there is a need for more applied research, pure seed production and other tasks that extension can do well, efforts should be made to protect a meager staff so that the primary goal of extension, which is education, is not diluted to the extent that the program will become ineffective. Well planned, simplified field tests strategically located can have multiple purposes for observation, verification, demonstration, teaching, promotion and public relations.

5. Coordination among GOE projects is suggested to provide maximum benefit to the Egyptian farmer and consumer.

6. Every effort should be made to either publicly or privately make necessary production inputs available on a timely

basis as a part of Mabrouk 4. For example, Mabrouk 4 partic should be guaranteed timely supplies.

7. A well defined recognition and promotion program should be developed and utilized as a reward for excellence in performance of extension personnel. Increased funding for salaries and transportation is recommended as an incentive for better performance

8. Demonstrational supplies including small signs to identify Mabrouk 4 participants should be provided.

9. The Rice Production Advisory Council should become more actively involved in solving such problems as delayed delivery of input supplies.

AGRONOMY

1. Studies on direct seeding methods to establish good stands free from more than a tolerable level of weed infestation and red rice needs to be strengthened.

2. Information is needed in the improved technology package to make a fertilizer recommendation based on different soils and to provide a guide to determine if a top dress of nitrogen at the panicle initiation stage is needed. For this, calibration of soil test and plant analysis with rice response to nitrogen, phosphorus and zinc fertilizers needs to be continued. This study may be conducted in collaboration with the extension team as in the past. It is recommended that pot culture may be used to expand the number of soils to 30 or more.

3. Long term soil fertility experiments to determine the nutrient supply capacity of rice soils should be established (N, P, K and Zn) at Sakha rice experiment farm.

4. Urease inhibitor has been reported to substantially reduce the volatilization loss of ammonia to increase the efficiency of urea. In view of the high pH of Egyptian rice soils, it is suggested that the use of urease inhibitor be investigated

to determine the feasibility.

5. Since an instrument to determine N, P and Zn has been purchased by the Project, it is suggested that the use of the laboratory at Sakha be accelerated to complete the analysis of the plant and/or soil samples of the trials completed in the past.

RICE BREEDING

1. Further accelerate the breeding program to develop varieties which can replace the existing tall, lodging susceptible and blast susceptible varieties like Reiho and Giza 159.

2. Accelerate varietal testing to reduce the time required in this phase, by adequately sampling the rice growing regions of Egypt so that any variety-environment interaction could be identified.

3. Expand on-farm variety trials so that the entire rice producing area would be represented each year.

4. Develop screening procedures that would put more stress on the progenies under test. In the case of stem borer, this would require artificial rearing and infesting the screening nursery. For blast better cultural conditions to induce rapid early seedling growth and blast disease.

5. Include susceptible and resistant standards in screening nurseries to gauge pest disease severity.

6. Conduct more epidemidogical studies of blast to enable early detection of changes in race patterns.

7. Establish pest/disease/crop production scouting teams which check crop production throughout the season to detect problems to enable the GOE to take anticipatory action and/or recommendations to farmers for corrective actions.

8. Obtain a consultant for blast screening methodology and epidemiology. Early action this season to bring in such

a specialist could gain a year or more in tackling this critically serious problem.

SEED PRODUCTION

1. The seed production specialist should be extended to the full limit of the contract period to have the seed plant operating one or two seasons and get staff trained to handle its operation and maintenance.

2. The production of certified seed should be separate from the agency performing the certification service of field and seed house inspections.

3. The present use of extension staff for inspection should be ccnsidered only an interim arrangement until a certifying agency can become a functioning unit.

4. Certification standards need to be developed to be used by inspectors based on actual practices used in the project which recognize levels of genetic purity, freedom of contamination of red rice, and germination.

5. A manual for inspectors would set forth procedures for making field and seed house inspections in order to maintain the levels of quality seed production that have been established on an ad hoc basis.

6. Direct seeding practices demonstrated in 1984 should be extended in a phased program to State Farms to enable production on these farms to improve.

ECONOMICS

1. Staff members of the economic program should be appointed on full time basis. Adequate and timely incentives are required. Transportation facilities are needed.

One additional Egyptian Ph.D. full-time agricultural economist with a statistical background should be appointed. His experience of working in the field should not be less than 10 years. Two

MS technicians to supervise the work (one in Sakha) plus five BS graduates with 5 years experience are needed. The number of field workers should be increased to cope with the size of work.

2. A separate budget should be allocated for each program at the beginning of the financial year.

3. Training should be strengthened for technicians and enumerators. Selecting appropriate candidates and ensuring that they are receiving the proper training is of major importance.

4. The project has an Apple computer which is not in use. Technicians should acquire training and the computer should be put in full use.

5. The economics program should develop research studies in coordination with other rice programs especially agronomy and mechanization. Farm management research should be expanded especially the area of input/output studies and the use of resources. Economic studies of crop intensification to find the best crop rotation suited to the farmer under the impact of short season rice varieties should be carried out. In the area of mechanization and in the light of the existing labor shortage situation, a series of comparative economic studies on mechanization technology in transplanting, irrigation, harvesting and threshing should be initiated. Cooperation with other institutions carrying out mechanization research programs, the agricultural engineering departments in Egyptian Universities, should be strengthened. Holding an annual conference would greatly assist in coordinating research work on mechanization.

6. A large part of the 1983 information of the Rice Farm Survey has not yet been tabulated and analysed. It is recommended that the tabulation and analysis should be completed to permit comparisons among provinces and districts. Data for the 1984

Farm Survey are to be collected for 2 provinces only, compared with 6 provinces in 1983. It is recommended to have an annual survey being carried out continuously for the whole universe, i.e., for the six rice provinces to have a measure of change.

7. The gap between farmers' rice yields and experimental yields should be investigated. Farm management studies to identify the factors which impede the full adoption of an improved rice technology are needed.

8. With the development of the Mabrouk 4 package, comparative economic studies should be carried out on mechanization technologies available for transplanting, harvesting, threshing and water pumps for irrigation.

9. Conduct a market study of the rice industry with particular emphasis on alternative rice processing technologies, taking into consideration processing long grain varieties under Egyptian conditions.

10. With the introduction of the Mabrouk 4 package of technology, if rice yield and production improve significantly what would be the effect on reallocation of resources by the farmer? on consumption and exports? on farm inputs such as fertilizers and herbicides?

11. Finally, government policies of fixing relatively low prices for basic agricultural commodities for the farmer with the purpose of providing these commodities to consumers at relatively reasonable prices, have seriously caused much distortion to the economy. Unfortunately rice is one of these commodities. Unless prices for the paddy rice procured by the government are raised, this situation will continue to hamper production and would reduce the farmers incentives to produce. Such government price policies should be changed.

PLANT PROTECTION

PLANT PATHOLOGY

1. Shorten time lag between sample collection and race identification by using growth chambers available at Sakha.

2. Accelerate the process of screening host resistance to last through artificial inoculation in the greenhouse during the off season.

3. Choose a highly fertile area or use high levels of nitrogen in the blast nursery to predispose susceptible reactions.

4. Do not average infection types observed at different locations. Consider the maximum degree of susceptibility exhibited by a given variety as an indication of its reaction.

5. Go much more extensively into the type of broader spectrum of disease resistance "horizontal" as it is usually more stable than the currently more extensively used "vertical" resistance. This should provide longer lasting varieties under the fast and quick turnover in the race picture as was experienced this year with the variety "Reiho."

6. Strengthen research in the relationship of temperature, humidity and the presence of spores in the environment to disease severity.

7. Consider the effect of different frequencies of wetting and drying of infected straw on the viability and infectivity of blast spores, in an attempt to mimic the conditions created by different natural rainfalls assuming that stored straw is a major source for the primary inoculum.

8. Continue investigations into use of chemicals for blast control.

ENTOMOLOGY

1. Continue studies on evaluation of chemicals for best timing of application.

2. Research on the ecology of the insect should be strengthened to gain information necessary for the construction of some models for forecasting the severity of infestation and the degree of expected damage.

3. Because of the generally low level of stem borer infestation, it is recommended that facilities for insect rearing and artificial screening be made available for critical and rigorous evaluation of the relative susceptibility as well as the efficacy of various insecticides. Also, an appropriate control(s) should be included in the field plots constructed for screening to increase confidence in the data obtained.

4. More research should be directed to the exploration of biological control and try to develop this approach as a component of an integrated insect control program.

5. More attention should be given to other insects found in the local environment, as they may undergo changes in both species and population as a result of changes in the microenvironment under the influence of improved technologies.

WEED CONTROL

1. Research should be initiated in collaboration with plant pathologists to study the possible side effects of various herbicides on the infection and development of blast in view of the observation of increased disease severity (panicle infection) in the weed control plots. This should provide information that would be useful in the overall integration of various pest control measures. Laboratory and greenhouse facilities should be made available for such work.

2. There has been some work underway for sometime investigating the vital area of loss assessments as a result of weed and insect infestation as well as infection by blast. It is believed that the body of data compiled should be considered

for analyses so that the appropriate corrections, regressions and conclusions can be drawn without any further delay.

3. Generally, it is hoped that a closer association and ccoperation can be practiced among the three areas of plant protection as is the case with those individual areas and the breeders or the agronomists.

RICE MECHANIZATION

1. Concentrate efforts on a single high priority machine. It is felt that the thresher will have the greatest potential use by the farmers.

2. Define realistic and measurable objectives and establish target dates when objectives can reasonably be expected to be reached.

3. Conduct machinery tests that will provide performance data suitable for comparing mechanization options.

4. Develop cooperative studies with Engineering Departments of Egyptian universities.

5. Interact more with other agencies and institutions, through administrative channels and professional societies.

6. Pursue recommendations of the Internal Review Committee.

7. Strengthen support for the mechanization activities at Sakha.

8. Evaluate rice machinery based on its suitability for other crops in rotation with rice.

9. Evaluate broadcast seeding in comparison to transplanting and seed drilling.

ADMINISTRATION AND TRAINING

A. SUMMARY

Impressive progress has been achieved in the Rice Research and Training Project which assures achievement of the Project goal to "provide significant knowledge and expertise prerequisite to a substantial increase in rice production.

Planning capabilities have been strengthened as evidenced by the establishment of objectives and work plans by the research program leaders. "Forward planning" has become a reality.

Varietally pure, clean seed has been made available to farmers in increasing quantities. Adequate supplies of seed free of red rice will minimize losses in yield from this source.

Progress in extension efforts as a result of the national production program, Mabrouk 4, has been truly outstanding. This is evidenced by the increasing number of participating farmers, area cultivated and increased yields in each year since program inception. Extension is providing the link between researchers and farmers with new technology in one direction and feed-back in the other alerting the researchers to new problems

Research programs are in place and have produced impressive results with the exception of rice mechanization. Progress in this program has not kept pace.

A National Rice Institute within the framework of the Agriculture Research Center - Ministry of Agriculture is functioning but has not been endowed with a permanent status. This is seen as a critical need and must be done or the Grant Agreement requires amendment to remove this mandated prerequisite. Without permanent status there will e no vehicle to support the multi-disciplinary research and extension programs to achieve the Project goal.

B. PURPOSE

The Rice Research and Training Project (263-0027) was established by a Grant Agreement between the governments of Egypt and the United States. Funding is through the U. S. Agency for International Development (USAID) and the Egyptian Ministry of Agriculture (MOA). A five-year contract was executed on 30 June 1980, between the MOA and the University of California-Davis (UCD), with sub-contracts with the University of Arkansas (UA) and the International Rice Research Institute (IRRI).

The primary goal of the contract was to implement a technical assistance program to aid increased production and improved quality of rice in Egypt through the development and adoption of improved agricultural practices and varieties of rice. This assistance included rice research, extension of research results, training of Egyptians in rice-related areas, administrative organization, and improvement of research facilities.

Specific objectives of the Project include:

1. Strengthen planning capabilities in rice research and extension education;
2. devise more effective research and extension administrative structures, policies and procedures;
3. improve the facilities for rice research and extension education;
4. attract the most capable Egyptian and expatriate professionals to rice research and extension on Egyptian rice problems;
5. upgrade Egyptian professionals at all levels by means of a special training program within or outside Egypt, as well as through seminars, short courses, workshops and collaborative projects.

On its part the Ministry was to establish an autonomous, multi-disciplinary, and centrally supported and managed rice research and extension organization embodied as the National Rice Institute (NRI). Disbursement of funds were contingent on the establishment of this organization.

The MOA was also required to establish a Rice Production Advisory Council (RPAC) to provide general advice and assistance to the NRI and to the Project as well as to review Project activities.

C. PROGRESS

1. INSTITUTIONAL

The National Rice Institute was authorized by the Ministry of Agriculture and exists as an operating entity, although it has never been formally established on a permanent basis.

The Rice Production Advisory Council was established and meets semi-annually. (Table 1)

2. PROGRAMS

There is in place an impressive rice research program with capable program leaders. Planning capabilities have been strengthened as evidenced by the establishment of objectives by program area leaders.

Annual conferences are held to report program results and to encourage a cooperative exchange of ideas among program workers of all disciplines. Guest speakers of international repute are invited to discuss the latest technology in rice research. These annual conferences are used not only as a forum to discuss progress in each area, but also to highlight new problems. Plans are developed for the coming year on the basis of this new knowledge, from the interchange of ideas and on the feedback obtained from farmers through the extension programs.

Bi-monthly meetings of the Technical Committee, composed of the Project officers and program leaders, are another example of this process of using the review of progress, problems, ideas, and feed-back to modify work plans toward achievement of objectives. This ability to engage in "forward planning" is the mark of a truly strong institution.

The scope and energy of the extension program, Mabrouk 4, in association with the National Extension Service, is truly impressive. This program has grown each year since its inception in 1981 as measured by farmer participation and area cultivated. The program package includes recommended practices whereby grower may hope to obtain yields of 4 tonnes per feddan (9.6 t/ha). There is every indication that the farmers like the program and will continue the practices when they are no longer active participants.

There is also evidence that problems experienced by the farmers are relayed back to the research program leaders or to administration since several problems relate to timely supply of inputs and management of irrigation water. These problems cut across ministerial lines and was the basis for establishing the Rice Production Advisory Council.

Excellent progress has been made in the production of seed rice free from red rice in the foundation and registered seed categories. National Seed Board personnel have been trained in roguing procedures. In cooperation with the breeding and extension programs adequate seed supplies should be forthcoming of newly released varieties. This is especially important in view of the need for replacement of those varieties currently susceptible to blast.

3. FACILITIES

The building for the administrative offices of the Cairo staff of the NRI has been completed and fully occupied. Temporary facilities have been provided all project programs at the Sakha Station. Construction of permanent facilities for the program areas and the seed processing unit of NRI is well underway with scheduled completion in October 1985. Bids for construction of greenhouses for breeding and plant protection research at the NRI in Sakha will be opened on 1 October, 1984.

Establishment of permanent rice research field facilities on 90 feddans[1] at Sakha have been completed. The layout of the research area with regard to drainage and irrigation, accessibility to research workers, plot preparation and maintenance is very impressive.

4. EQUIPMENT

Equipment for all projects has now been received. Basic equipment to operate agronomy, breeding, soils, entomology, and pathology laboratories has been set up in the temporary facilities at Sakha providing essential but minimal services to these programs. The remaining equipment will not be set up until the new facility is ready for occupancy. This will cause some problems as construction will not be completed until after the presently scheduled close of the contract.

Bids for the seed processing equipment were opened on 15 August, 1984, but the contract has not yet been awarded.

All farm machinery required for farm management of the research field facilities are for seed production has been received with the exception of one tractor still at Alexandria.

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[1] 1 feddan = 1.03 acres = 0.4168 hectares

5. STAFFING

Achievement of the project goal to increase rice production requires a fully organized, multi-disciplinary staff to carry out the research programs. Although there were problems experienced earlier, the expatriate staff is now considered to be complete. Egyptian counterparts are needed in the areas of rice mechanization and farm management. (Table 2)

6. TRAINING

The education and training of qualified and dedicated candidates is one of the best investments that any organization or country can make. WHile the Project Paper specified that 85 candidates would receive a total of 499 months of specialized training, the most recent amendment of the contract modified this number to 40 trainees and 398 months. Training was to be done at the University of Arkansas, the University of California-Davis, and at IRRI. Currently, 12 candidates have completed 145 months representing some 36% of the total specified. The schedule for 1984-85 calls for 81 candidates to receive 137 months of training bringing the total very near to the number specified in the contract. (Tables 3 and 4)

The weekly technical seminars are a valuable adjunct to the training program. Project members are assigned as discussion leaders on subject matters relating to their own programs or to general topics of a more technical nature.

D. PROBLEMS AND OBSERVATIONS

1. INSTITUTIONAL

As previously mentioned, the failure of the MOA to formally establish the National Rice Institute on a permanent basis has to be a cause for real concern. Delay in formally organizing such a unit can cause the entire program to unravel and the project goal will not be achieved. There must be a

mechanism whereby government support and funding can be channeled to support the multi-disciplinary research programs needed to solve production problems as they arise and to work toward the goal of maximum rice yields. Many of the Egyptian counterparts assigned to the Rice Research and Training Project have been seconded from other units within the Ministry. Until the NRI is given permanent status and these appointments are made permanent the efforts of these professionals understandably may not be at an optimal level.

The Rice Production Advisory Council with interministerial representation was established to address the problems and issues of rice production which cut across government and ministerial lines, scientific disciplines, and implementation approaches. The RPAC reviews progress of the NRI, reviews work plans for the next year and advises on program direction and emphasis. The RPAC has held 5 sessions since its inception with minutes of the first three meetings made available in both Arabic and English. However, the minutes of the last two sessions are available only in Arabic. It is difficult to see how the RPAC can fully benefit the project when a portion of the program leaders cannot read the minutes.

The evaluation team saw some evidence that rice production problems which cut across ministerial lines are being considered by the RPAC but a full determination was not done.

2. PROGRAMS

While strong research programs are in place and have produced impressive results, there is one exception. The rice mechanization component has simply not progressed at a comparable rate. This is partly due to a discontinuity in staffing on the part of the contractor as well as the failure to appoint a full-time Egyptian co-leader. In addition, clear-cut and

measurable objectives were never defined. At any rate, progress to date has not justified the effort expended.

Program leaders must become involved in developing operating budgets as a part of forward planning.

3. FACILITIES

It is regrettable that AID projects are not programmed so that construction of facilities are completed at the time that project staffing is initiated. As it is, the programs are having to make do with temporary facilities for offices and laboratories.

4. EQUIPMENT

The above observation is also true to a lesser extent for the purchase of seed processing and laboratory equipment. It is recognized that program specialists provide valuable input into the preparation of purchase specifications after their arrival in the country and after they have gained some familiarization with project needs. As mentioned, basic equipment for the various research laboratories has been received and some is in use to provide essential but minimal information. The remainder will not be installed until after the new facilities now under construction are completed. Since the scheduled completion date is in October, 1985 and the contract extends only to June, 1985, consideration should be given to extending expatriate specialists, or to provide them on a short-term basis, to set up the laboratories, train technicians and put the units on a fully operational status. This observation is especially appropriate to the installation of seed processing equipment since orders for this equipment have not been placed at this time.

Problems were reported concerning the lack of transportation for the program activities. Needed field work is delayed or

not done and the program suffers. Additional vehicles are on order including two trucks (for seed production), one mini-bus, one passenger van, and two Wagoneer type vehicles. However, it was learned that 2 vehicles which have been in the country for some time have been idle and have not been assigned for project work and 2 additional vehicles are idle because of licensing problems. On this basis it is difficult to justify the procurement of additional vehicles.

5. STAFFING

One very desirable output of a cooperative program is the technology transfer that results from the interchange of ideas between counterparts. It is felt that this important asset has not been fully utilized. On the one hand, there are complaints that the University has not assigned enough of their permanent staff to the project. On the other hand, some of the Egyptian counterparts hold multiple appointments and thus can only be considered part-time.

At the same time, the practice of assigning program co-leaders who are on retirement status should be reviewed. Certainly, long service deserves reward and experience gained through that service has great value and should be treasured. The Project should utilize this experience to the greatest extent possible through the appointment of consultants. Program co-leaders should be those fully qualified scientists who are to be the leaders in rice research and extension tomorrow

6. TRAINING

While the training component has had difficulties in achieving Project objectives, the 1984-85 schedule should rectify this. The Project is to be commended for the extraordinary efforts expended to qualify candidates for further training. Commendation is also in order for the use of weekly

seminars as a training tool.

E. RECOMMENDATIONS

1. Establish the National Rice Institute that is now functioning as an operating entity along the lines outlined in the Project Paper on a permanent basis as mandated by the Grant Agreement.

2. Provide Project and program leaders with English and Arabic translations (as appropriate) of the minutes of the Rice Production Advisory Council.

3. Continue to assure that rice production problems which cut across ministerial lines are included on the agenda of the Rice Production Advisory Council.

4. Define realistic and measurable objectives and provide full support to the rice mechanization program. It may be too late for this.

5. Extend the contract within the limits of funding available so that expatriate specialists can assist in the installation of laboratory equipment when new facilities are completed. This is especially urgent in regard to the seed production program.

6. Make full use of equipment and vehicles now in the project.

7. Appoint full-time co-leaders and counterparts to program areas where these are now lacking. This is especially urgent for the rice mechanization, farm management, and economics programs.

J. V. Halick

RICE RESEARCH AND TRAINING PROJECT
Members of the Rice Research Advisory Council

The Minister of Agriculture or his representative			President
Dr. Ahmed Momtaz - Project Director			Vice-President
1.	Project Deputy Director	Dr. Moahmed S. Balal	Member
2.	Head, Agricultural Research Center	Dr. Said M. Dessouki	Member
3.	Director, Seed Production	Mr. Mohamed M. Sabry	Member
4.	Head, Plant Production Organization	Mr. Mahmoud N. Ghanam	Member
5.	Undersecretary, Ministry of Agriculture Kafr El-Shiekh Governorate	Mr. Mahmoud Darrag	Member
6.	Undersecretary, Ministry of Agriculture Dakkahlya Governorate	Mr. Mohamed I. Awdallah	Member
7.	Undersecretary, Ministry of Agriculture for Agricultural Engineering	Dr. Aly El-Hossary	Member
8.	Undersecretary, Ministry of Agriculture Extension	Dr. M. F. Tayel	Member
9.	Head, Agricultural Development Bank	Mr. Fathalla Rafaat	Member
10.	Professor of Agronomy, Ein Shams University	Dr. Mostafa A. Moursi	Member
11.	Professor of Agronomy, Alexandria University	Dr. Ahmed A. Abdel Bari	Member
12.	Professor of Agronomy, Tanta University	Dr. Mohamed S. El-Keridi	Member
13.	Undersecretary, Ministry of Irrigation, Irrigation	Mr. Anwar Higazi	Member
14.	Undersecretary, Ministry of Irrigation, Drainage	Mr. Fatehy Zayed	Member
15.	Head, Rice Marketing Company	Mr. Mohamed A. Gaffar	Member
16.	Head, Rasheed Milling Company	Mr. Sherif El-Harrawy	Member
17.	President, Rice Producers Union	Mr. Ahmed El-Kholli	Member

Revised February 6, 1984

RICE RESEARCH & TRAINING PROJECT
Members of the Rice Research Technical Committee

Chairman:	Dr. Ahmed Momtaz	Project Director General
Members :	Dr. Mohamed S. Balal	Project Deputy Director
	Dr. Ray E. Ely	Chief of Party
	Dr. Jack M. Swagerty	Project Deputy Director
	Dr. Duane S. Mikkelsen	University of California Principal Investigator
	Mr. Sid Bowers	AID Ex-Officio
	Mr. James W. Scott	Management Services Officer

No.	Program	Co - Leader	
		Egyptian	Expatriate
1.	BREEDING	Dr. Mohamed S. Balal	Dr. Ebrahim Ali Siddiq
2.	AGRONOMY:		
	(a) Soil and Water	Dr. Mohamed R. Hemissa	Dr. Duane R. Mikkelsen (Consultant)
	(b) Cultural Practices	Dr. Fawzi N. Mahrous	
	(c) Economics	Dr. Mohamed F. Sharaf	Dr. Carter Price
3.	PLANT PROTECTION:		
	(a) Plant Pathology	Dr. Tewfick Abdel-Hak	Dr. John P. Jones
	(b) Entomology	Dr. Ahmed M. Tantawi	Dr. Philip Tugwell (Consultant)
	(c) Weeds	Dr. Tewfick S. Ismail	Dr. R. Talbert (Consultant)
4.	SEED PRODUCTION	Dr. Abdel-Fattah El-Azizi	Dr. Jack M. Swagerty
5.	MECHANIZATION	Dr. Ali El-Hossary	Mr. Salvador Labro
6.	EXTENSION	Dr. Ahmed K. El-Rafei	Dr. L.D. Haws
7.	RESEARCH FARM MANAGEMENT	Mr. Nabil Kamel	Mr. James F. Jacks

RICE PROJECT CANDIDATES TRAINED IN UCD, ARK AND IRRI

NAME	PASSPORT #	TYPE OF TRAINING	INSTITUTION	PERIOD OF TRAINING	DEPARTURE DATE	ALIGU SCORE	PIO/P
Sobhy Abdel-Halim Ghanem		Degree, Ph.D	UCD	3 years	June 1981	73%	1-90399
Ali Orabi Bastawisi		Degree, Ph.D	UCD	3 years	June 1981	63%	1-90399
Fawzi Naiem Mahrous		Post Doc.	UCD	11 months	May 2, 1981	85%	1-90377
Milad Azer Maximos		Post Doc.	UCD	11 months	May 27,1981	81%	1-90398
Zarif Hafiz Abu-Zeid Osman		Non Degree,Path.	Ark & IRRI	Total 5 months	June 25,1981	78%	
Mahmoud Ali Shata		Non-Degree, Rice Cleaning	UCD	6 months	March 5, 1982	65%	
Fahmy El-Dakroury Abdallah		Post Doc., Ent.	Ark.& IRRI	Total 6 months	July 1, 1982	57%	
Talaat Wissa Ghobrial		GEU	IRRI	5 months	Aug.13, 1982	62%	
Abdel Salam E. Draz		GEU	IRRI	5 months	Aug.13, 1982	64%	
Abdel Hamid I. Zahir		GEU	IRRI	4 months	Feb. 2, 1983	83%	
Ahmed A. Abdel-Rahman		Post Doc. Agron.	UCD & IRRI	Total 10 mo.	May 12, 1983	60%	
Mohamed Rushdy Sehly		Post Doc.Ent.	ARK &IRRI	" " "	May 12, 1983	50%	

TABLE 4

TRAINING SCHEDULE - 1984-85 *

Component	Number of Trainees	Location of Training	Man-month Estimates 1984	1985
Research	20		36	56
Ph. D. degree	2		24	12
- Plant breeding	1	UC	12	6
- Agronomy (Soils)	1	UC	12	6
Post Graduate	14		12	28
- Plant breeding	1	UC/IRRI	2/	2/4
- Agronomy	1	IRRI	2	
- Agronomy	1	UC/IRRI	2/	2/4
- Pathology	1	IRRI	2	
- Weed control	1	Arkansas/IRRI	2/	2/4
- Extension	1	UC/IRRI	2/	2/4
- Technical Committee	8	UC/IRRI		4
Non-Degree	4			16
- INSFER 2		IRRI		8
- GEU	2	IRRI		8
Extension - Agents	56	Philippines-IRRI	28	
Mechanization	2	IRRI	3	3
Seed Production	2	UC/Mississippi	4	4
Library-Information Services	1	IRRI		3
Totals	81		71	66

* Training Schedule as approved in 1984-85 budget.

April 26, 1984

EXTENSION

A. SUMMARY

The mechanism for extending new rice production technology from research scientists to farmers was implemented basically through the "Mabrouk 4" program beginning in 1981 and has achieved a high level of success. This involves packaging production technology that can potentially produce 4 t/f (9.6 t/ha) or more of rice. Since its inception, more than 90,000 farmers have participated either direct by or indirect by. In 1981-83 the average yield of 3.9 t/f (9.36 t/ha) on 46,500 feddans[1] was 59% more than the national average. The national yield has increased slightly since 1981 to 2.4 t/f (5.76 t/ha) which may reflect the impact of this program; however, more time is needed for change. Overall, the Mabrouk 4 program has been well received by farmers and is an outstanding model that can be used to increase rice yield in Egypt. Also there is ample evidence that this mechanism is functioning as a feed-back to transfer production problems to the research team as well as to suppliers of production inputs.

B. PURPOSE

The purpose of the extension rice production program is to transfer the necessary technology from scientific research to the rice farmer for efficient production and to channel production problems back to research for study and solutions.

The general objective of the extension rice production program is to efficiently narrow the yield gap of rice that now exists between the average national yield of 2.4 t/f (5.76 t/ha) and the potential yield of 4.0 t/f (9.6 t/ha). Accomplishing this will allow for future self sufficiency as population growth

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[1] 1 feddan = 1.03 acres = 0.4168 hectares

increases and will lead to improvement in the standard of living of Egyptians.

Specific objectives are:

a. to establish a structure for continuous transfer of rice production technology from research to farmers;

b. to organize and train a group of extension workers as competent technologists in rice production.

c. to train rice farmers to produce high rice yield.

C. PROGRESS

General

There is a slight trend in increased yield for Egypt as shown in Table 1.

TABLE 1. Rice Production In Egypt

YEAR	FEDDANS	TONS	AVG. YIELD t/f	t/ha
1981	954,142	2,234,046	2.34	5.61
1982	1,023,956	2,438,769	2.38	5.71
1983	1,013,680	2,442,194	2.41	5.78
Avg.	997,259	2,371,670	2.38	5.71

The average yield of the Mabrouk 4 program as shown in Table 2 indicates an increase yield of 58.8% above the national average.

TABLE 2. Rice Production, Mabrouk 4 Program

YEAR	FEDDANS	TONS	AVG. YIELD t/f	t/ha	% ANNUAL CHANGE
1981	1,500	5,490	3.66	8.78	-
1982	20,000	71,400	3.57	8.56	-2.5%
1983	25,000	98,750	3.95	9.48	-
1984	42,000	NA	NA	NA	NA
Avg.	-	-	3.78	9.07	-

In 1984, participation in the Mabrouk 4 program increased to 18,440 farmers involving 42,000 feddans. This represents a 68% increase in land area over 1983. Yield prospect appears to be above average and should show a significant contribution to increased national production after the harvest data becomes available. Another program benefit not planned for is the increase in certified seed being produced on the demonstration farms which will provide improvement in the pure seed supply.

Progress in Structure

A structure has been established to transfer rice production technology to Egyptian rice farmers. An administrative restructuring placed extension in a direct line of communication between research scientists and farmers. Three Egyptian extension specialist positions have been created and are each assigned to varietal and seed improvement, crop production practices and soil plant/water relations. These specialists offer guidance and assistance to a staff of 22 Egyptian extension field personnel called rice advisors. The rice advisors are responsible for on-farm demonstrations, teaching production practices to rice trainers and farmers.

Progress in Training Extension Personnel

In 1984, 63 extension field personnel were involved in a training program to review research results and to develop a work plan. Twenty six national rice advisors and national rice trainers participated in a 30 day training tour in the Philippines and Thailand. In addition, on-job training was provided on a weekly and sometimes daily basis. Over all, satisfactory progress has been made to up-grade extension workers in rice production technology.

The trained extension personnel which averages only 36 years of age will have a lasting benefit as will the Mabrouk 4 model which shall continue after the rice project ceases.

Progress in Training Farmers

In 1984, the extension delivery structure included 3 Rice Specialists, 22 Rice Advisors, and 43 Trainers. This staff taught 35,958 farmers and 3,096 officials in 41 general and 921 coop meetings in 6 rice producing governorates; conducted 250 "classroom" fields including 41,838 feddans; and established 8 applied research trials. To date 90,000 farmers have received increased knowledge regarding rice production and a total of 300,000 have received some knowledge of the Mabrouk 4 Program through additional mass media efforts including the display of 20 3x8 m signboards along highways, a T.V. program entitled Our Green Land" and other television, radio and news programs. 12,000 leaflets, 4,000 copies of the Minister of Agriculture's letter and 1,600 flip charts were also used as a start in training 1 million rice farmers.

The Mabrouk 4 program is the basic delivery system for transferring research technology to farmers' fields. The program was modeled after successful programs in India and Philippines and is well organized. It is a package of the best technology

available based on the most recent research findings and was field tested. The package is simple, concise, and contains recommendations on the essentials of successful rice production including planting, weed and pest control, fertilization and harvesting. The program is promoted by use of highway billboard signs, radio and television which indicates wise use of available funds. The extension personnel are well organized, enthusiastic and confident of success.

Progress in Feed-back

Observations were made of the transfer or "feed-back" of production problems to the research team as well as to suppliers of production inputs. For example, applied research plots used to verify recommendations in farmer fields established the need for more research on nitrogen rates, herbicide rates, and disease reaction as it relates to variety development.

An evaluation team member made an impromptu appearance at one of the weekly extension meetings conducted for rice advisors and trainers which is a source of channeling both positive and negative feed-back to research. The following observations were made:

1. They had discovered the out break of blast, particularly on the Reiho variety and discussed ways to control it. Concern was expressed regarding the effect this might have on future aspects of the program, seed availability and availability of effective fungicides.

2. They had received a written documentation concerning a farmer's complaint of higher than anticipated seed cost.

3. Past crop yields were being collected.

4. They had enthusiasm about Mabrouk 4 and seemed confident that no lasting criticism would occur because of the blast outbreak since no specific variety was promoted above others in the package.

In early 1984, the extension expatriate reported the first incident of blast in the "resistant" variety Reiho. Research pathologists and plant breeders were inspecting the Mabrouk 4 rice shortly after receiving knowledge of the outbreak. As the season progressed, there was widespread and serious damage which caused decisions to be changed in varieties to be saved for seed, breeding program, evaluation of blast tests and reconstruction by planning for the 1985 crop. This substantiates the mechanism to relay feed-back to research is in place and is working reasonably well.

Another example of feed-back is the rather strong plea by farmers directed through extension concerning the problem of inputs such as seed, fertilizer and pesticides not being available on time.

D. PROBLEMS AND OBSERVATIONS

Historically, the link between research and the farmer has been weak. Only recently have organizational ties in extension been strengthened from the national to the local level and this may be more in name than in practice at this time. Part of the weak link problem has to do with the vast number (1 million) of farmers to reach with a meager extension staff. Mass media methods, especially educational television could help but is not being fully utilized because of various constraints, mainly access and funding. Apparently farmers have mistrust, lack of confidence or no knowledge of research as indicated by only casual interest in research tests at experimental stations. This increases the need to "field test" technology that is often only "new" to the area. These tests are time consuming if complicated with several treatments, replicated several times at different locations. Also, there is risk of misinterpretations of results if too much emphasis is placed on trials because of variable

management. Some testing in farmers' fields is advisable but, this should be limited to verification only after a sufficient research data base (perhaps 3 years) has been accumulated by research teams. Also, extension is supervising certified seed production which admittedly is badly needed. They may also be asked to test irrigation pumps. These tasks consume the scarce time for educational activities and rightly belong to other project programs (research and mechanization). Staffing for these programs should take these needs into account. Inspection of seed certification fields is under the provenance of the Seed Board which is not a part of the Project.

Transportation for extension employees has improved but efforts are needed to increase funds to eliminate travel restrictions of extension educators as a constraint. A request for motorcycles for this purpose was denied by USAID.

Small signs for each Mabrouk 4 field would help with public relation and promotion. Funds and materials are in short supply for demonstration supplies.

Clear-cut guidelines for awards, recognition, advancement and pay incentives for extension employees dealing with rice are inadequate. There is concern that if present funding for the rice project is reduced or ceases the staff which is mostly "borrowed" from other jobs may be lost.

Even though training has improved the level of expertise, every specialist, advisor and trainer should understand the principles of rice production locally and be capable to successfully produce rice commercially. Fortunately, some of the trainers have actual rice production experience. A rice production manual patterned after IRRI, Mississippi or Arkansas should be made available to each extension rice worker for handy reference.

Competition exists between divisions such as the National Machinery Program and the Rice Project's mechanization program which could be healthy if controlled but is now most likely a hinderance to real progress. Little real evidence was observed that mechanization has significantly increased in the Mabrouk 4 program.

Even though the Mabrouk 4 program is a good delivery vehicle, there is the possibility of loss of confidence if the recommendatior are too rigid. Some loss of confidence may occur in 1984 as a result of the blast problem on Reiho, a variety that has been widely promoted. Furthermore if only one input such as a specific variety, herbicide, fungicide or even method of planting is identified with the program exclusive of other inputs that are just as effective, the program will suffer if that input fails.

The most often criticism of the Mabrouk 4 program was not lack of benefit but the inability to obtain the production inputs on time. Even though a Rice Production Advisory Council (RPAC) is charged with the responsibility of addressing such problems that cut across ministerial lines, no evidence of action to alleviate these problems was observed nor was there evidence that these problems had been brought to the attention of the RPAC. Although availability of less costly inputs such as a specific type of pump or pesticide is desirable, effectiveness should be stressed over cost savings.

No real coordination exists with the extension activities in the rice project and related GOE project activities such as in water use management and agricultural mechanization. Actually, the programs may be in conflict. This project is so structured in design as to not interact very well with other activities, the exception being with national extension.

E. RECOMMENDATIONS

1. The organization and structure for extending information to Egyptian rice farmers as "Mabrouk 4" program should be continued. Modification is advised such as a subpackage for direct seeding, mechanization or saline soils.

2. Training rice production specialists, advisors and trainers of farmers should be continued with more emphasis being placed on outside training in sub-tropic or temperate rice production areas such as Japan or California. Local training with more involvement of the rice research team is needed to build confidence in the research effort as well as better understanding of farm problems. Also, Arabic texts for local training at the governorate level is needed. A production handbook should be developed for each extention rice worker.

3. More extension staff is needed to reach the 1 million Egyptian rice farmers. Increased usage of mass media, especially educational television, is urgently needed and efforts by extension at the national level should be made to acquire more TV time for Mabrouk 4.

4. Since there is a need for more applied research, pure seed production and other tasks that extension can do well, efforts should be made to protect a meager staff so that the primary goal of extension, which is education, is not diluted to the extent that the program will become ineffective. Well planned, simplified field tests strategically located can have multiple purposes for observation, verification, demonstration, teaching, promotion and public relations.

5. Coordination among GOE projects is suggested to provide maximum benefit to the Egyptian farmer and consumer.

6. Every effort should be made to either publicly or privately make necessary production inputs available on a timely

basis as a part of Mabrouk 4. For example, Mabrouk 4 participants should be guaranteed timely supplies.

7. A well defined recognition and promotion program should be developed and utilized as a reward for excellence in performance of extension personnel. Increased funding for salaries and transportation is recommended as an incentive for better performance.

8. Demonstrational supplies including small signs to identify Mabrouk 4 participants should be provided.

9. The Rice Production Advisory Council should become more actively involved in solving such problems as delayed delivery of input supplies.

B. A. Huey

AGRONOMY

A. SUMMARY

The major objective of the agronomy program is a systematic investigation to identify crop, soils and water management constraints and to develop improved cultural practices which can produce high and stable yields of rice and rotation crops in Egypt. Equally important, the agronomy program will also train host country rice agronomists to maintain a high level of research activities after the completion of the project.

To this end, many field experiments have been conducted, with very impressive achievements. Six agronomists at the doctorate and post-doctorate level have or will have been trained in USA/ Philippines or elsewhere at noted institutions. They form a strong research team, especially if they are assigned to work full time in the new NRI.

Methods to produce quality seedlings and improved methods to plant rice have been confirmed. The best methods to prepare the seed bed and better methods to apply fertilizer, especially nitrogen have been established. The effectiveness of phosphorus and zinc has been also studied. The best timing of planting different varieties has been confirmed. The optimum agronomic practices for semidwarf and short duration varieties to produce maximum yields have been established. Different methods of planting (transplanting and direct seeding) in relation to nitrogen requirements and chemical weed control have been studied. The best water regimens under the current irrigation conditions have been identified. The feasibility of two crops of rice and more intensive crop patterns through the use of short duration varieties has been examined.

Based on available information, the project was able to identify the major yield constraints and formulate a new technology

package in the Mabrouk 4 Program. The new technology package when used by numerous demonstration farmers increased rice yields by 45% up to 64% compared to the national average. Since no technology package can be claimed as perfect, there is still plenty of room for improvement in the new package used by Mabrouk 4 Program. The information obtained in the agronomy investigations mentioned above can be used to verify and refine the package.

While the recommendations suggested in the internal review report are endorsed, a few specific recommendations are proposed. They are 1) strengthen the investigations on direct seeding culture, 2) continue calibration of soils and plant analyses with fertilizer response, 3) carry out long term soil fertility experiments to determine the nutrient supply capacity of rice soils, 4) investigate the use of urease inhibitor to increase nitrogen efficiency and 5) more use of the local laboratory for soils and plant analyses.

B. PURPOSE

The purpose of the agronomy component is to develop appropriate cultural and soil-water management practices for different varieties under different conditions (soils, salinity and crop pattern) so that sustained high yields of rice can be obtained.

C. PROGRESS

The agronomy investigation is divided into two areas--cultural practices and soils-water management.

Cultural Practices

Under cultural practices a number of field experiments have been conducted. In Table 1 the topic investigated over the 4 years 1981-1984 are listed.

By listing all of the topics investigated according to chronological order in a table, it is possible to see more clearly the trend in which research is oriented and the achievements

obtained.

From Table 1 , it is seen that in the early days, more attention was paid to identify or determine the best methods to prepare the seed bed, quality seedlings and planting. In these experiments, low plant density and the poor quality seedlings used by farmers were identified as one of the most important yield constraints.

Land preparation studies have suggested that improved methods (chisel or moldboard plowing followed by dry levelling) are not only cheaper but also generally superior to the traditional method (chisel plowing followed by puddling).

Date of planting trials for several varieties showed that if rice is planted either too early (before early May) or too late (after late June), the yield may be greatly reduced.

In direct seeding studies if weeds can be successfully controlled by chemicals, broadcast seeded or drilled seeded fields can yield as well as transplanting methods. This suggests a promising hope for farmers to use direct seeding to overcome the problems of the labor shortage and the rising cost of transplanting. For successful chemical control, quality of land preparation and proper water management are crucial factors.

The investigations on ratooning suggest that cutting height is the most important factor. Ratooning, however, does not appear to be promising. The feasibility of intensifying cropping by introducing short duration varieties has been studied.

Preliminary observation of mechanical transplanting by IRRI planters and Japanese planters suggested that the wide spacing used by Japanese planters may induce serious weed infestation while the use of IRRI planters may offer a suitable technology.

Investigations on agronomic practices to optimize the yield of some new varieties/lines under transplanted and direct seeded

conditions have been conducted.

International rice weather field nursery tests have been initiated. The data from this test and the trials which involve date of planting may determine if the solar radiation received by rice plants during the reproductive and ripening stages plays the most important role in determining the yield capacity. If confirmed, the optimum date to plant can be calculated for any new varieties if their life cycles are known.

TABLE 1

Experiments conducted for cultural practices studies in 1981 through 1984.

Topics	Years 1981	1982	1983	1984
1. Improvement of rice seed bed preparation in permanent field (6 improved method and 1 traditional)				X
2. Combined effect of improved land preparation and planting method on rice field (2 improved land preparation methods and 2 control, 5 planting methods)		X	X	
3. Improving seedling establishment and grain field using nursery applied with tachigaren	X			
4. Developing rice ratooning practices (3varieties X 3N level X 3 cutting heights)		X	X	
5. Agronomy practices to optimize yield of new variety "Reiho" (seeding dates & seeding ages & spacings X N level)	X	X	X	
6. Effect of plant population and N level on broadcast seeded rices		X	X	
7. Effect of land preparation methods and herbicides on yields of drilled seeded rice		X	X	
8. Agronomy practices (seeding date X spacing X N rates) to optimize yield of new varieties (Giza 173, 174 & 181, transplanted)			X	X
9. Agronomy practices (seeding N rates) to optimize yield of new varieties (Reiho, and Fujihikari, direct seeding)				X
10. N rates and weed control on yield of transplanted rice				X
11. International rice weather yield nursery				X

X Experiment conducted.

Soils-Water Management

The topics investigated under soils-water management studies over 4 years (1981-1984) are given in Table 2. As can be seen from Table 2, 12 out of 14 topics involved management of nitrogen fertilizer.

Modern high yielding varieties are bred to respond to high levels of nitrogen fertilizer to realize high yield. To produce 1 t/ha of paddy, 20kg N is needed. In most rice soils nitrogen is limited.

Since either too little or too much nitrogen fertilizer may reduce rice yield, optimum nitrogen fertilizer management is essential to obtain high and stable yields. Significant progress has been made to determine the optimum nitrogen requirement for different varieties under different conditions.

Legume crops apparently may leave more residual nitrogen in soils, therefore, rice after legume crops may require less nitrogen than rice after non-legume crops. In saline soils the nitrogen requirement is reduced. Semi-dwarf varieties may stand more nitrogen dosage under conditions in which blast is not a problem. Most modern high yielding semi-dwarf varieties are bred to have a high degree of blast resistance.

Many factors may influence nitrogen efficiency in low land rice. The fate of nitrogen in low land using N^{15} (depleted or enriched) has been studied although the analytical data are not complete.

It is well known that in low land rice, the loss of nitrogen through volatilization (NH_3) and denitrification may be minimized by placing the nitrogen deep in the soils. This is confirmed in field trials, and the application of urea on dry soil, incorporated into the soil and then submerged immediately, an innovation in Mabrouk 4 program package, follows such a principle.

Significantly poorer nitrogen efficiency was generally obtained when nitrogen was applied at 15 DAT than at 35 DAT.[1] This suggested that nitrogen loss through volatilization (NH_3) and denitrification is substantially greater when rice roots have not fully developed at 15 DAT than at 35 DAT when rice roots are more developped.

A study on the correlation of soil nitrogen tests with rice yield response to nitrogen fertilizer showed a very high and significant correlation coefficient for total soil nitrogen. If this finding can be verified in more soils and trials, the use of total nitrogen analyses to predict nitrogen requirements for different soils may be promising.

Not all Egyptian soils are deficient in phosphorus and zinc. In fact, only a few trials have been found to have significant responses to phosphorus and zinc. Most trials appeared to have some responses which are not significant statistically. Plant analysis may allow a more accurate diagnosis to indicate if phosphorus is really deficient.

Ways to increase the efficiency of zinc utilization have been investigated. Foliar applications of macro and micro elements and the effect of some growth regulators have been studied.

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[1] Days after transplanting.

TABLE 2

Experiments conducted for soils-water management studies in 1981 through 1984.

Topics	Year 1981	1982	1983	1984	
1. N Fertilizer efficiency in wet land rice (sources and rates)	X	X	X		
2. Phosphorus sources for paddy	X				
3. Zinc sources for paddy	X				
4. Foliar spay and soil application of macro and micro elements for paddy	X				
5. Response of Reiho variety to fertilizers	X				
6. Response of rice to N rates under different water regimens	X	X	X	X	
7. N recovery by paddy using N^{15} depleted	X	X			
8. Fate of N^{15} (enriched) as affected by timing and method of application				X	X
9. Physiological studies on salinity X fertility X rice varieties	X				
10. Calibration of soil tests for fertilizer recommendation (N, P & Zn)		X	X		
11. N fertilization (timing X method) in saline soils		X	X		X
12. Nitrifying inhibitor effect		X	X		
13. Physiological response of rice to growth regulators and micronutrients		X	X		
14. Nutritional requirement for the newly released varieties (G 160, 174 and IR 1626)			X	X	

D. PROBLEMS AND OBSERVATIONS

Some of the problems mentioned in last years internal program review (October 1983) such as lack of sufficient transportation and field and laboratory equipment have been improved. However, for one reason or another the use of laboratory equipment and facilities has not been fully realized. Many of the results obtained in soils-water management investigations need laboratory analyses to substantiate the conclusions. Some field trials which were carried out 2 to 3 years earlier still do not have such analytical data. The data are also needed to refine or revise the hypothesis or field layout of future trials.

Some basic studies on soils-water may be more easily conducted by pot culture under greenhouse or screenhouse conditions. This approach has not been fully used.

E. RECOMMENDATIONS

While we agree with the recommendations suggested in the internal review, some specific recommendations are proposed as follows:

It is expected that more farmers will use the direct seeding method because of labor shortage. Studies on direct seeding methods to establish good stands free from more than a tolerable level of weed infestation and red rice needs to be strengthened.

2. Information is needed in the improved technology package to make a fertilizer recommendation based on different soils and to provide a guide to determine if a top dress of nitrogen at the panicle initiation stage is needed. For this, calibration of soil test and plant analysis with rice response to nitrogen, phosphorus and zinc fertilizers needs to be continued. This study may be conducted in collaboration with the extension team as in the past. It is recommended that pot culture may be used

to expand the number of soils to 30 or more.

3. Long term soil fertility experiments to determine the nutrient supply capacity of rice soils should be established (N, P, K and Zn) at Sakha rice experiment farm.

4. Urease inhibitor has been reported to substantially reduce the volatilization loss of ammonia to increase the efficiency of urea. In view of the high pH of Egyptian rice soils, it is suggested that the use of urease inhibitor be investigated to determine the feasibility.

5. Since the instrument to determine N, P and Zn has been purchased, it is suggested that the use of the local laboratory be accelerated to complete the analysis of the plant and/or soil samples of the trials completed in the past. As was stated, the data are needed for more confident conclusions or to revise the hypothesis or the design of trials in the future.

C. H. Wang

RICE BREEDING

A. SUMMARY

Given the unique Egyptian environment and the predominance of Japanese type rices, the Egyptian rice program is to a great extent dependent on its own indigenious program for the development of improved varieties.

This has been true in the past as evidenced by the composition of varieties grown by farmers.

The program is well designed and advanced toward meeting this challenge.

The magnitude of the breeding program; the crop culture essential to valid selections; the crossing and selections to achieve objectives are especially good features of the program. Rapid generation advances are provided by utilizing facilities at IRRI for making crosses and advancing F1 in the off season. High yielding, fertilizer responsive, short statured, early maturing, lodging resistant varieties have been identified which will provide Egyptian farmers varieties just as productive as the long duration varieties but which will provide opportunity for greater crop intensification and opportunity for mechanizing the harvest of the crop because of the non-lodging characteristics of these varieties.

The performance of Giza 173 (Reiho) under attack by an apparently new strain of blast punctuates with serious emphasis the need for an acceleration in breeding for host plant resistance in such a way as to assure adequate levels of resistance in the farmers' fields.

Breeding for grain quality can be easily achieved but needs to be pursued in proportion to the capability of mills and export to handle the production.

B. PURPOSE

The breeding program needs to develop new adapted varieties which are earlier in maturity, fertilizer responsive, dwarf statured and nonlodging, which incorporate low levels of susceptibility to blast and stem borer, and tolerance to salinity with some varieties having special grain qualities for export.

C. PROGRESS

The breeding program was presented to the entire team at briefing sessions in Cairo and in field visits at Sakha. Then more in depth studies were made by the team member assigned, both in the field and in reports submitted for review.

The breeding program objectives relate to the overall project goals and cover the project objectives. The relative emphasis on the breeding objectives before and after the project are summarized in Table 1 submitted by the breeding group. Since most of the objectives overlap it is difficult to completely separate, e.g., yield, from the other objectives of the breeding program.

The breeding program has carried out a volume of crosses and progenies to identify selections to fill the objectives of the program. The number of crosses made increased from over 200% to over 500% as compared to the years previous to initiation of the project. Progenies in the pedigree nurseries increased 58% during the same period with 23% addressing tolerance to soil salinity. Previously this had not been a strong breeding objective although the Giza 159 had been released earlier as a salt tolerant variety.

Rice in Egypt is essentially 100% of the Japanese type and is the type most accepted by the rice eating population. To develop rices for the export market a breeding objective has been included. The introduction of IR 28 by the National

Academy as a shorter duration variety for possible double cropping to increase crop intensification is an *indica* with only moderately acceptable grain type. This variety now covers about 40000 feddans and is near the limit of the milling capacity (estimated at 50000 tonnes annually) of mills that can handle this grain type. (Village mills and older mills produce a high percentage of broken grains when processing this grain type in these mills). The variety has a high level of resistance to blast and productivity is good.

IR1626-203 is a possible replacement of IR28 in view of its better grain quality and equally good agronomic and disease resistance characteristics.

Milling capacity would appear to be a major constraint to further expansion of production of this type of rice.

The inclusion of long grain types as a breeding objective is justified but would need to be kept in proportion to the magnitude of its utilization. Crosses listed in Table 1 would appear to maintain this concept. However observation in the yield trials showed a high proportion of *indica* selections in these trials. Information was requested on the composition of the trails and breeding material according to subspecies in order to assess the relative importance attached to this objective.

Table 2 presents this tabulation. The percentage of *indicas* in trials averaged 43% with a range from 30% to 83% in individual trials. This would appear far too great a proportion considering the relative importance of this grain type to farmers and to Egypt. In the breeding material there is also a higher proportion of *indica* materials especially in the F2.

Table 1

Crossing program as related to breeding objectives

Objective	Average No. of Crosses per Year			
	1970-80	%	1981-83	%
Field (plant type)	26	12	173	32
Salinity Tolerance	25	12	80	15
Early Maturity	26	12	129	24
Grain quality (long grain *indica*)	8	4	17	3
Blast resistance	32	15	42	8
Stem borer resistance	99	46	99	18
Total per year	216	100	540	100

TABLE 2

Breeding and testing materials classified by subspecies source

Generation or trial	Tot.	Japonica		Indica		Indica-Japonica	
		No.	%	No.	%	No.	%
Breeding Material							
F2	334	53	15	184	52	97	29
F3	141	31	22	30	22	80	56
F4	26	9	34	--	--	17	65
F5	37	11	30	1	3	25	67
Fn	31	22	70	--	--	9	30
Total	569	126	22	215	38	228	40
Entries in yield trials							
Prelim. Med.	27	6	23	19	20	2	7
" Early	17	5	30	8	47	4	23
" Salinity	18	2	10	8	45	8	45
" Gizcal	28	28	100	--	--	--	--
Reg. Med.	13	1	8	9	70	3	23
" Early	14	6	43	8	57	--	--
Final Med.	7	3	40	2	30	2	30
" Early	6	2	34	4	66	--	--
" Salinity	6	--	--	5	83	1	17
Total		63	43	63	43	20	14

Reasons for this would appear to be the availability of indicas in the international trials received from IRRI. Composition of these trials is predominantly indica varieties and performance in Egypt would suggest that the better selections should be further tested in national trials. Indicas generally carry a higher level of blast resistance which accounts for part of the emphasis on breeding indicas-japonica varieties.

A project objective was to develop early maturing varieties to replace the long duration varieties now grown. Early maturity is receiving strong emphasis as a breeding objective and in trial evaluation the local checks are generally the latest entries in the trials. Some of these early selections have been advanced to the seed multiplication stage. A brief summary of some of these selections compared to their respective check varieties is presented in Table 3. These summary data were supplied by the breeding team and modified to accentuate the value of earliness as a factor in production and crop intensification. There is an increase in yield in absolute terms and on a per day basis within the range of earliness achieved in these new selections. The earliest varieties were 18 days earlier than the check, Giza 171. Still earlier varieties can probably be identified without sacrificing yield in real terms so that more time would be available to farmers for growing other crops.

Salinity tolerance has been a separate breeding objective for the past four years and separate nursery and varietal trials are conducted at Sirw to identify varieties productive under these conditions. The present salt tolerant variety, Giza 159, is still very good for this character but lacks resistance to blast. A separate location, Karada, is nearby Sakha so that trials and progenies could be observed in more detail. The site was also being used for agronomic trials as well. The

growth conditions appeared quite favorable so that it did not appear that salinity was really a factor in crop performance. Lysimeters at Sakha are being used to grow the same trials and some breeding materials. Under controlled conditions at three levels of salinity good differences should be obtained in tolerance to salinity which could possibly be used to detect field depression of salt susceptible varieties at Karada. In both the Karada site and the lysimeters, collaboration was with the agronomists to monitor salinity conditions of the trials.

Rice in Egypt is an exceptional crop in that besides having a very favorable environment for crop growth the environment has a minimum number of visiccitudes. Blast is the major rice disease and only brown spot, Helminthosporium oryzae, as a second fungal disease is of less consequence. Insects are also minimal, with the only insect of importance being, Chilo agamemmon, a stem borer endemic only to Egypt.

Assessment of losses to this insect in farmers' fields run about 6%. Present varieties carry a good level of resistance. The small number of pest problems enables a sharp focus on these problems with good opportunity for success.

TABLE 3

Some promising new lines compared with the performance of comparable check varieties.

Variety/parentage	yield			Days duration		Plant ht.
	T/Ha	kg/ha/day	%Incr.	Tot.	less than check	cm.
Reiho (giza 173), Hoyoko/ Ayanishiki	10.49	76	13	138	10	100
Giza 172, Ck, Nahda/Kinmaze	9.87	67	--	148	--	122
Gz951-7 (Giza 174), IR 24/Cr260	10.42	73	22	142	18	102
Gz 882-2, CR 260/Reiho	10.18	72	20	142	18	100
Giza 171, ck, Nahda/ Calady 40	9.68	60	--	160	--	136
Gz 587-2 (Giza 160), Reiho/CR 260	8.94	63	17	141	13	101
Giza 159, ck, Agami/Giza 14	8.32	54	--	154	--	136
IR 1626-203,* IR24/IR22	10.85	76	12	142	2	88
Giza 180, ck* IR8/TADUKAN	9.80	68	--	144	--	89

* Indica, all others are Japonica

This year has witnessed an unusual outbreak of blast on Reiho, a new variety released in 1983 as Giza 173 and grown on an estimated 400,000 feddans this year. The damage is spotted with reported losses of as much as 100% in areas of as much as 2000 feddans.

Fortunately most losses would range perhaps 5 to 20% and a detailed crop survey is planned to enable areas and extent of losses to be determined. For those farmers having heavy losses it could be near disaster save for interventions which may be provided by government.

It will be some time before an accurate race picture is determined. Whether it is a build up of a race identified in 1982 to which Giza 173 was susceptible or is an entirely new race to attack Giza 173 is not known.

The outbreak serves to emphasize the need to more carefully evaluate breeding materials. The breeders, with good collaboration from the pathologists have screening nurseries involving all breeding materials. The score of Reiho in the Sakha screening nursery was 7-8 out of a possible highly susceptible score of 9. This is the first time Reiho has scored above 5 in these nurseries.

The methodology for screening is standard but levels of intensity may not have been heavy enough to subject progenies to heavy enough pressure to allow detection of susceptibility earlier. Including all materials is a normal approach to breeding for resistance. Resistance is also the first recourse to control. An integrated approach to disease control would still have to be dependent upon resistance as the major component of integrated disease management.

Unfortunately other promising varieties included in seed

multiplication this year contain Reiho as a parent (see Table 3) and they too had a level of susceptibility in seed multiplication fields which may preclude their further use in production.

Fortunately the existing varieties Giza 171, Giza 172 and Giza 159 appear to be no more heavily attacked than in previous years. These have been included in crossing programs and segregates with short stature and earliness have been identified. Some of these should have a better level of resistance than existing varieties used as parents.

The early effort by UCD to accelerate breeding for japonica types may not be fruitful without further crossing. UCD made crosses of Egyptian material with California varieties which had yield, plant type and other desirable characteristics. Unfortunately the California varieties lack blast resistance in general.

Field observations indicate that some of these have excellent promise and hopefully some can be found which carry a satisfactory level of blast resistance. Some are in preliminary field trial this year, and if blast resistant, could move rapidly forward in the varietal evaluation and seed multiplication process.

The ongoing program has been accelerated by sending F1 crosses to IRRI to be advanced to F2 in the off season so that segregating progenies can be grown the next crop season following the season in which the cross was made. Other crosses are being made at IRRI which could accelerate the program where there is a specific problem like blast resistance.

In 1983 a number of varieties were multiplied in 5-10 ton seed quantities in anticipation that they might be used as varieties as the evaluation process was completed. This is an excellent practice and the program is fortunate to be able to follow this policy. In view of the urgency to identify and multiply blast

resistant varieties these multiplications done on "SPEC" can gain at least a year in the multiplication process.

Screening for stem borer resistance is being done in collaboration with the entomology team but does not include all the breeding material as is done for blast screening. The materials in field trial are included in these plantings. There was a total of 256 varieties and selections screened this year. The levels of infestation are generally low.

Giza 159 is used as a susceptible variety in one of the plots in the planting but not systematically planted throughout the trial so it could be used as a moving standard. The actual methodology of examining a number of individual plants of the different selections provides a good quantification of the incidence of the pest.

D. PROBLEMS AND OBSERVATIONS

The expatriate rice breeder has been on the project only one year. In addition to assistance with the breeding program he has been able to consolidate much information on breeding rice in Egypt which is to be presented in the forth-coming symposium in 1985. The training program includes one Ph.D. student who will be completing his degree program soon. Three others have been in non-degree programs at UCD and IRRI.

Construction is in progress but full laboratory facilities will not be available for seed storage and quality evaluation until some time in 1985. These activities have been carried on under existing conditions either in ARC, Giza or Sakha.

E. RECOMMENDATIONS

1. Further accelerate the breeding program to develop varieties which can replace the existing tall, lodging susceptible and blast susceptible varieties like Reiho and Giza 159.

2. Accelerate varietal testing to reduce the time required

in this phase, by adequately sampling the rice growing regions of Egypt so that any variety-environment interaction could be identified. If not present this will provide more station-years of data in one year to assess varietal performance more accurately.

3. Expand on-farm variety trials so that the entire rice producing area would be represented each year. These would not need more than two replicates per location and would provide opportunity for each rice advisor and his staff to personally evaluate new varieties.

4. Develop screening procedures that would put more stress on the progenies under test. In the case of stem borer, this would require artificial rearing and infesting the screening nursery. For blast better cultural conditions to induce rapid early seedling growth and blast disease. Race evaluation against potential new varieties is an essential part of screening.

5. Include susceptible and resistant standards in screening nurseries to gauge pest disease severity. A breeding axiom is "accept the susceptible score and question the resistant score." Average scores at Sakha and Gemmeiza would mask susceptible scores which would be the ones with greater value.

6. Conduct more epidemidogical studies of blast to enable early detection of changes in race patterns.

7. Establish pest/disease/crop production scouting team which check crop production throughout the season to detect problems to enable the GOE to take anticipatory action and/or recommendations to farmers for corrective actions.

8. Obtain a consultant for blast screening methodology and epidemiology. Early action this season to bring in such a specialist could gain a year or more in tackling this critically serious problem.

W. H. Freeman

SEED PRODUCTION

A. SUMMARY

The Seed Production Program has been successful in the level of purity achieved, in the productivity of the seed fields, in expansion of production in excess of goals, and in cooperative efforts which utilized extension demonstration areas in the Mabrouk 4 program to provide certified seed as well as demonstrate production practices and varieties. Registered seed has been produced for 3 years without contamination by red rice. Genetic purity has also been improved to within defined limits of breeder and registered seed by a methodic progeny rowing process providing a traceable seed history to this source for 7 varieties. The team supervises six hundred feddans and cooperates with State farms to produce an additional 3000 feddans of registered seed.

The establishment of the seed processing unit at Sakha will further improve the seed production program and enable the complete process of seed multiplication, processing, storage, and utilization of high quality seed.

B. PURPOSE

The purpose of the seed production component is to establish a system of varietal maintenance, multiplication, storage and distribution so that genetic purity of varieties can be maintained; a system of field production instituted and practiced to eliminate red rice from foundation and registered seeds which could supply adequate quantities of registered seed to produce certified seed for 75% to 100% of the area planted by farmers; maintenance of a known seed history; and production practices especially on State Farms that could make pure seed production by these units more economical and productive.

C. PROGRESS

Many aspects of the seed production program have been eminently successful and the project and GOE are to be complimented for including this in the project and to have such a successful program.

Understandably much of the program is ad hoc. The varietal purification system is carried in conjunction with the breeding program. Personnel in the seed program are primarily responsible for the progeny row system of varietal maintenance breeding. These persons were a part of the breeding section and know breeding principles and methods of maintenance. The general uniformity of the progeny rows was evidence of previous rigorous selection.

Zero tolerance for red rice in breeder and registered seed has been achieved by severe and timely rogueing. Continuation of this vigilant system can maintain red rice at a low level in commercial rice production.

In addition to the elimination of red rice, varietal mixtures have been largely eliminated. Standards of varietal purity can be implemented very effectively as new dwarf statured rice varieties move into the seed certification program. Off types are generally taller and can be identified and removed and standards and acceptable tolerances established to maintain off types at a specified low level in certified seed fields.

Seed production fields for breeder and registered seed in the Sakha area were exceptionally good. Purity was good and crop growth was very good so production per feddan should be high. By contrast one field of production on a State Farm field on the way to Karada had been transplanted by mechanical transplanter. Growth was poor and stands were very gappy. Yield will likely be poor. There is still much scope for improvement which can be achieved by using some of the production practices

used in the project fields.

Table 1 summarizes the production program for breeder seed, foundation seed (7 varieties) and registered seed (5 varieties) handled by the seed production team at Sakha. With ore exception, rogueing had all the fields exceptionally pure with a minimum of off-types. Additional rogueing between now and harvest will further improve the purity of these fields.

The table notes the areas of the registered seed fields planted by different methods. Drill seeding had been used in portions or all of five seed production fields and broadcast seeding in two. Manual transplanting had been used in the balance of the registered seed production and all the foundation seed production fields. The progeny rows were also manually transplanted which should be a continuing practice especially as long as red rice is a menace to pure seed production and commercial rice production.

We were informed that with the arrival of herbicide application equipment and proper chemicals it would be possible to use direct seeding practices in State Farm production and eliminate hand transplanting which is becoming expensive or difficult to do at all because of the scarcity of labourers. This offers real opportunity for State Farms to produce rice economically and have fields which could qualify as seed fields. Some hand labour would still be required for some handweeding.

The chain of seed production extends to the certified seed stage where fields are planted with registered seed. This seed is pure as to variety and free of red rice. To make the best use of registered seed, the certified seed production program was linked with extension demonstrations. As a part of the package of practices, reduction of seeds required for nurseries and reduction in seedling per hill economized on seed use while

other cultural practices assured good yields of certified seed. This dual use of the demonstrations has been especially beneficial in establishing levels of purity, field inspection methods, roguing and production practices among contract growers of certified seed.

One aspect of seed production that helps maintain purity is the practice on State Farms of rotating fields so that rice does not follow rice. It is understood that rice is planted on the same field only once in three years with other summer crops like maize or cotton in the intervening years.

D. PROBLEMS AND OBSERVATIONS

Considering the magnitude of the program the team has done exceptionally well to supervise, rogue, train, and do all the other operations related to production. It would appear that for the longer term such a program is understaffed. Transportation also was mentioned as a constraint but additional vehicles on order should help correct this problem.

Training staff of the State Farms in production methods should assure a better level of production. Training Seed Board staff in field inspection could enable transfer of this responsibility from the seed team and the extension personnel to the agency more logically responsible for regulatory work. We were assured that the Seed Board personnel would assume those responsibilities. A written set of standards, inspection report forms and an inspectors handbook will be needed to assist in training and transfer of responsibility.

The new seed plant is under construction but will be some time before it is fully operational and staff trained to operate the machinery to fully utilize the facility and integrate it into the pure seed system that is being developed.

The essential waiver of certification to allow B class seed to be marketed damaged the image of certified seed and did a disservice to farmers receiving such seed. At present no more than 50% of the seed which farmers plant is certified. This means that the other 50% comes from farmer-to-farmer sources. The chances are that these sources are no worse and could even be better than B class seed and should be allowed to be used.

Since the government procures from contract growers only a portion of seed eligible for certification, the potential exists for the establishment of local farmer-seed sources which leave the field with the certified level of purity.

E. RECOMMENDATIONS

In view of the success of the project in instituting a pure seed program that can produce high quality seed in volume through a methodic, meticulous program of maintenance breeding, breeder, foundation registered and certified seed the team recommends that:

1. The seed production specialist should be extended to the full limit of the contract period to have the seed plant operating one or two seasons and get staff trained to handle its operation and maintenance.

2. The production of certified seed should be separate from the agency performing the certification service of field and seed house inspections.

3. The present use of extension staff for inspection should be considered only an interim arrangement until a certifying agency can become a functioning unit.

4. Certification standards need to be developed to be used by inspectors based on actual practices used in the project which recognize levels of genetic purity, freedom of contamination of red rice, and germination.

5. A manual for inspectors would set forth procedures for making field and seed house inspections in order to maintain the levels of quality seed production that have been established on an ad hoc basis.

6. Direct seeding practices demonstrated in 1984 should be extended in a phased program to State Farms to enable production on these farms to improve.

W. H. Freeman

TABLE I Summary of Seed Productionfor breed, foundation and registered seed managed by Project Staff, 1984

VARIETY	Progeny Head Rows for Breeder Seed Prod.	Feddans		Method of Planting *		
		Foundat.	Register.	M	D	B
Reiho (Giza 173)	300	44	50	26	24	--
Reiho (Giza 173)	--	--	106	60	--	46
GZ951-7 (Giza 174)	300	25	70	35	35	--
Giza 171	200	20	--	--	--	--
GZ587-2 (Giza 160)	200	25	136	--	40	80
GZ882-2	100	10	--	--	--	--
IR28	100	10	20	--	20	--
IR1626	100	10	11	11	--	--
TOTAL		144	393	132	119	126

* Registered Seed fields were planted by the following methods

- M - Manual transplanting
- D - Drill planting
- B - Broadcast planting

ECONOMICS

A. SUMMARY

In 1982, even with the late beginning of the program in August, a sample methodology was prepared which enabled interviewing some 552 farmers. The sample selected made possible the comparison between farmers who received technology assistance from the project extension workers and farmers outside the program. Results were reported at the February 1983 National Rice Institute Conference and were considered preliminary. The second objective of collecting and analyzing experimental data to compare inputs used in the improved methods of rice production with the traditional techniques, was not worked out because available experimental data did not lend themselves to economic evaluation.

In 1983, the tabulation of the 1982 rice survey was completed. The 1982 questionnaire was revised and a new questionnaire was designed for 1983. A sampling methodology was applied in 36 leading districts in 6 governorates representing 98% of Egypt's planted rice area, to obtain cost records from farmers. The design was to select farmers from two Mabrouk 4 Program villages and from two villages not receiving technology assistance. The design also permitted to have results grouped according to size of farms. Crop cutting method was applied before harvest to assure objectivity. The working plan for 1983 included three interviews with the farmer to obtain the data. Interviewers were selected from the Ministry of Agriculture staff in the different governorates who are responsible for collecting and reporting crop estimates. They are well trained enumerators in their field and they received additional training in relation to the rice farmer survey. Several useful tables were produced.[1]

[1] Some of these tables were reported in the Proceedings of the 4th National Rice Institute Conference, Feb. 1984, p. p. 238-270.

For 1984 refinement of questionnaire is continued so that more accurate observations can be made of those factors which are found to be most closely identified with field variation. The 1984 rice farmer survey will only cover two provinces, Kafr El-Sheikh and Gharbia covering about 530 farmers in 12 districts accounting for about 30% of the total rice area. This is compared with 6 provinces covering 1058 farmer in 35 districts and accounting for 98% of the total rice area in 1983.

Results from the analysis of data in 1982 and 1983 showed the following:

1. Mabrouk 4 technology seems to be definitely field increasing by may not be cost reducing [2]

2. Lower relative costs for Mabrouk 4 farmers were not reflected in the 1983 national average as they were in 1982.

3. There seems to be a tendency for farmers who are in the demonstration villages but not receiving direct assistance to benefit from the Mabrouk 4 technology.

B. PURPOSE

Objective: [3]

To collect and analyse date relating to inputs and outputs, costs and returns, for the traditional and improved methods of rice production, which would help to identify reasons for rice field differences, evaluate revenue cost relationships, evaluate project potential results from increased quantities of rice in Egyptian producing and marketing channels. This information should provide a basis to identify and analyse the farm level constraints to adopt the field increasing and quality

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[2] If costs are calculated on per ton basis, then the cost per ton with Mabrouk 4 technology should be decreasing.

[3] There is no clear cut over all objective for the Economics program and the project paper. The objective has been developed over time.

improvement technologies and to analyse the consequences of adopting higher yielding technologies and cultural practices.

This will be accomplished by establishing a coordinated rice research training program and training a cadre of well qualified researchers and training specialists.

Goal:

The Economics Program in cooperation with other programs should lead to increasing the quantity and improve quality of rice with the final aim to improve the social and economic condition of the small rice farmer as well as the Egyptian economy.

Economics work in relation to Egyptian Rice Production has from the start been considered as a necessary component of the Rice Research and Training Project. The economics program started in August 1982, mid season of rice production and after other programs started their activities.

The 1982 objectives were:

1. Designing and testing a model questionnaire to be adjusted and prepared for wide general use in 1983.

2. Collecting and analysing experimental data to compare inputs used in the improved methods of rice production with those required for traditional techniques used.

In 1983, objectives were revised to be:

1. Establish as a reference point an estimate of resource inputs by Egyptian rice growers.

2. Identify reasons for rice field differences.

3. Evaluate revenue cost relationships.

4. Project potential results from increased quantities of rice in the Egyptian producing and marketing channels.

The 1984 objectives include:

1. Evaluate profitability of alternative methods of planting rice within an annual crop rotation.

2. Evaluate innovative rice production practices employed in the experiments of other RRTP disciplines.

3. Evaluate the most promising practices in rice cultivation at the experimental level to assess the costs and returns.

4. Initiate a study of the consequences of increased rice production in Egypt.

C. PROGRESS

1. The work under the economics program started in mid August 1982, two years after other programs began, because of administrative and organizational difficulties in the early stages of the project. The work which has been carried out conforms with the planned objective for each year.

2. Goals for successive years have been broadened to cope with additional detailed information on rice fields, costs and returns for different techniques of planting based on a well designed sampling survey.

3. Interviewers were selected among the Ministry of Agriculture staff in different governorates who are responsible for crop reporting. They are well trained enumerators.

4. Difficulties arose with the tabulation and analysis of this huge size of data. Only a part of the information collected was hand tabulated and analysed because of a shortage in technical staff and facilities. Much of the 1983 data are waiting to be tabluated and analysed at the University of Arkansas.

5. In addition, for budgetary reasons the 1984 farm survey will cover only 2 provinces compared with 6 provinces in 1983 which would be a misrepresentation of the sample to the National level situation and there will be a loss in measuring the change for many years.

The progress and maturity of economic research was clear. Estimating costs of rice production as a benchmark has been

changed to estimate costs by different methods of planting which permits the evaluation of farmers' profitability under different methods of planting and by size of farm. The success of adapting new technologies could be accurately evaluated.

D. PROBLEMS AND OBSERVATIONS

1. Staffing is not adequate:

The economics program needs additional staffing. The staff at present is:

Dr. Mohamed F. Sharaf		Program Leader
Dr. Carter Price		Program Co Leader
Dr. Mounir F. Saba		Researcher
Mr. Ali Rizk (MS)		Assistant Res.
Mr. Sheikhoun E. Mohamed (BS)		Assistant Res.
Enumerators	15 districts	(30)

All the staff, with the exception of Dr. Carter are on part-time basis. Taking into consideration the size of work to be carried out, especially most of the researchers and assistant researchers who do not live in the area of their work, this small number can neither cope with the size of work nor be able to do the work efficiently. In the light of future work and the establishment of the National Rice Institute, there should be adequate staff of a different arrangement.

2. Budget:

A separate budget for each program should be allocated at the beginning of the financial year within which each program can allocate funds to different activities according to priorities over the year.

Because no separate budget exists, difficulties are created when there is competition among different programs to have funds. The absence of a separate budget for the economics program hampered its activities.

3. Training:

Training should be strenghened under the economics program in the fields of Economics and Statistics. The program has not developed a training strategy which would help to improve and upgrade the levels of technicians especially in the light of the establishment of the National Rice Institute. Formal training should be provided. Short term intensive study trips would provide another alternative for training. A part of the training certainly would occur through collaborative research, through seminars and work shops.

4. Timely tabulation and analysis of collected data:

The size of information collected through the Rice Farmer Survey is huge, taking into consideration 1983 and 1984. This needs a larger staff to tabulate and analyse the data. There is need for data computerization.

The project has a computer which is not in use. To have full use of the computer, technicians should acquire training according to a designed program. The use of the computer will reduce human effort, saves time and it will be possible to have early and timely results.

E. RECOMMENDATIONS

1. It is recommended that the staff members of the Economic Program be appointed on full time basis. Adequate and timely incentives are required. Transportation facilities are needed.

One additional Egyptian Ph. D. full time agricultural economist with a statistical background should be appointed. His experience of working in the field should not be less than 10 years. Two MS technicians to supervise the work (one in Sakha) plus five BS graduates with 5 years experience are needed. The number of field workers should be increased to cope with the size of work.

2. A separate budget should be allocated for each program at the beginning of the financial year.

3. A training strategy is needed. Training should be strengthened for technicians and enumerators. Selecting appropriate candidates and ensuring that they are receiving the proper training is of major importance.

4. The project has an Apple computer which is not in use. Technicians should acquire training and the computer should be put in full use.

5. The economics program should develop research studies in coordination with other rice programs especially agronomy and mechanization. Farm management research should be expanded especially the area of input/output studies and the use of resources. Economic studies of crop intensification to find the best crop rotation suited to the farmer under the impact of short season rice varieties should be carried out. In the area of mechanization and in the light of the existing labor shortage situation, a series of comparative economic studies on mechanization technology in transplanting, irrigation, harvesting and threshing should be initiated. Cooperation with other institution carrying out mechanization research programs, the agricultural engineering departments in Egyptian Universities, should be strenghened. Holding an annual conference would greatly assist in coordinating research work on mechanization.

6. A large part of the 1983 information of the Rice Farm Survey has not yet been tabulated and analysed. It is recommended that the tabulation and analysis should be completed to permit comparisons among provinces and districts. Data for 1984 Farm Survey are to be collected for 2 provinces only, compared with 6 pro- inces in 1983. It is recommended to have an annual survey being carried out continiously for the whole universe, i.e., for

the six rice provinces to have a measure of change.

7. The gap between farmers rice yields and experimental yields should be investigated. It is recommended to carry out farm management studies to identify the factors which impede the full adoption of an improved rice technology.

8. With the new development of Mabrouk 4 package of technologies, comparative economic studies should be carried out on mechanization technologies available for transplanting, harvesting, threshing and water pumps for irrigation.

9. Conduct a market study of the rice industry with particular emphasis on alternative rice processing technologies, taking into consideration processing long grain varieties under Egyptian conditions.

10. With the introduction of the Mabrouk 4 package of technology, if rice yield and production improve significantly what would be the effect on reallocation of resources by the farmer? on consumption and exports? on farm inputs such as fertilizers and herbicides?

11. Finally, government policies of fixing relatively low prices for basic agricultural commodities for the farmer with the purpose of providing these commodities to consumers at relatively reasonable prices, have seriously caused much distortion to the economy. Unfortunately rice is one of these commodities. Unless prices for the paddy rice procured by the government are raised, this situation will continue to hamper production and would reduce the farmers incentives to produce. Such government price policies should be changed.

F. CONCLUSIONS

1. Results from the analysis of the Rice Farmer Survey data of 1982 and 1983 showed that:

a. Mabrouk 4 technology seems to be definitely yield

increasing but may not be cost reducing. On a "per ton" basis cost will be decreasing.

b. Lower relative costs for Mabrouk 4 farmers were not reflected in the 1983 survey as they were in 1982.

c. There seems to be a tendency for farmers who are in the demonstration villages but not receiving direct assistance, to benifit from the Mabrouk 4 technology.

2. Even with the late start of the economics program in the early stages of the Rice Research and Training Project, it conforms with the objectives. Many developments are expected under the program with the full staffing and training of personnel to cope with the work and to meet the needs of the National Rice Institute. We are looking forward to see the economics program growing and in cooperation with other RRTP programs leading to increasing the quantity and improving quality of rice with the final aim to improve the social and economic conditions of the small rice farmer as well as the Egyptian economy.

3. In the light of the importance of the project from an institutional point of view, it is recommended to extend it for another period of 5 years.

M. K. Hindy

PLANT PROTECTION

A. SUMMARY

The Rice Research and Training Project started in mid 1980; however, the active research effort commenced in the crop season of 1981. During the past three years, and through intensive efforts expended by various scientists in different areas and disciplines and through the tremendous activity in the area of extension at various levels, outstanding achievements had been made.

Undoubtedly, the "Mabrouk 4" package encompassing the ideal recommendations generated through research has become well-known and has resulted in a great stride toward achieving the major goals of the project. It has been quite obvious that a significant increase in yield was obtained in the extension demonstration fields which amounted to about 65% over the national yield average in 1983.

It is quite difficult to break this increase down into different attributes as it is a function of an integrated effect of various research and extension efforts. It is believed, however, that there still is room for improving yield quantity and quality through additional improvements in rice technologies and overcoming constraints faced by the farmers.

B. PROGRESS, OBSERVATIONS AND RECOMMENDATIONS

Plant protection, being one of the main production components, has accomplished a great deal during the past period; however, certain specific comments and suggestions are presented.

PLANT PATHOLOGY

Scientists in charge of this part of plant protection have complied with the stated objectives and have accomplished a great deal with respect to the rice blast disease which is by

far the most important and destructive disease under local conditions. Their efforts covered a variety of aspects which help in reaching an effective disease control.

1. Race identification: A yearly follow-up of the race picture of the pathogen is being carried out. Results have indicated a continuous change in the population and the development of races that could attack previously resistant varieties.

It has been noticed that there has been a time lag between sample collection and race identification. Such a delay has to be avoided to have immediate information on the virulence genes in the population. Such information is quite valuable for selecting lines and varieties to be continued or recommended.

The unavailability of greenhouse facilities at Sakha could be one of the reasons for such a delay, however, some testing could have been made in the available growth chambers at the station.

Also, a more extensive disease survey and sample collection has to be implemented and given all accommodations, facilities and personnel.

2. Host resistance: Screening for disease resistance is an important part of the program carried out in collaboration with the breeders and has contributed significantly to the project. There is an urgent need for accelerating the process of screening host resistance to blast through artificial inoculation in the greenhouse during the off season to cut down on the number of entries to be handled in the disease nursery.

In addition, the blast nursery has to be improved significantly by choosing a highly fertile area or improving the fertility of the standing field for rice research in view of the fact that plants can be predisposed through manipulating the level of nitrogen fertilization.

Also, the layout of entries in the nursery has to be improved with respect to spacing and the use of short statured spreaders.

It is very important not- to average the infection types observed at different locations. It is more appropriate to consider the maximum degree of susceptibility exhibited by a given variety as an indication of its reaction. This provides more safety margins in varietal choice and recommendation.

It is also recommended to go much more extensively into the type of broader spectrum of disease resistance "horizontal" as it is usually more stable than the currently more extensively used "vertical" resistance. This should provide longer lasting varieties under the fast and quick turnover in the race picture as was experienced this year with the variety "Reiho."

3. Epidemiology: A certain amount of information has been complied with respect to temperature and humidity in relation to disease severity. These two factors were assigned an important role in initiating infection and disease development as well, provided enough inoculum is available at the appropriate time. Efforts are being made to follow the density and timing of spore showers in an attempt to draw definite conclusions in this respect.

It is believed that this area of research has to be strengthened and investigating the possible impact of seed quality on disease development should be considered.

Another point to consider is the effect of different frequencies of wetting and drying of infected straw on the viability and infectivity of blast spores, in an attempt to mimic the conditions created by different natural rainfalls assuming that stored straw is a major source for the primary inoculum.

4. Chemical control: This area of research also made some accomplishment in providing information about effective chemicals that can be used in coping with unexpected outbreaks

such as encountered in some "Reiho" fields this year. The unavailability of such chemicals is of a great concern.

ENTOMOLOGY

A great deal of effort has been concentrated on researching various aspects of the rice stem borer, which is considered a major insect problem for the rice producers in Egypt.

1. Research on chemical control has put forward some additional chemicals that are equally effective or even superior to the long recommended chemical, lindane. Also, the best timing for application has been determined based on following the population dynamics of the insect. Research on the ecology of the insect should be strengthened to gain information necessary for the construction of some models for forecasting the severity of infestation and the degree of expected damage.

2. Screening for stem borer resistance: Research carried out in this area under natural infestation has indicated a great deal of variability among different varieties as to their relative susceptibility.

Because of the generally low level of infestation, it is recommended that facilities for insect rearing and artificial screening be made available for critical and rigorous evaluation of the relative susceptibility as well as the efficacy of various insecticides. Also, an appropriate control(s) should be included in the field plots constructed for screening to increase confidence in the data obtained.

3. It is believed that more research should be directed to the exploration of biological control and try to develop this approach as a component of an integrated insect control program.

4. It is also believed that more attention should be given to other insects found in the local environment, as they

may undergo changes in both species and population as a result of changes in the microenvironment under the influence of improved technologies.

WEED CONTROL

This is a very important component of the plant protection scheme as weeds exert a tremendously bad influence on the yielding capacity of rice. Great advancement has been made in this area and the intensive reliance on herbicides is becoming very important in the mechanized system of productior The developed technology has been found extremely effective and beneficial.

1. It is suggested that some research effort be initiated in collaboration with plant pathologists to study the possible side effects of various herbicides on the infection and development of blast in view of the observation of increased disease severity (panicle infection) in the weed control plots. This should provide information that would be useful in the overall integration of various pest control measures. Laboratory and greenhouse facilities should be made available for such work.

2. There has been some work underway for sometime investigating the vital area of loss assessments as a result of weed and insect infestation as well as infection by blast. It is believed that the body of data compiled should be considered for analyses so that the appropriate corrections, regressions and conclusions can be drawn without any further delay.

3. Generally, it is hoped that a closer association and cooperation can be practiced among the three areas of plant protection as is the case with those individual areas and the breeders or the agronomists.

Taha El Sharkawy

PLANT PROTECTION PROGRAM - ENTOMOLOGY

A. SUMMARY

Egypt is fortunate in having a limited number of insect pests of rice. Of the pests identified, only the stem borer, Chilo agamemnon, causes marginal economic damage (5-6%) in the field, and blood worm, Chironomus sp., cause some damage in seedling nurseries.

The plant protection program relies heavily on present levels of host plant resistance and predators (primarily Trichogramma) to establish a very effective pest management program so that minimal areas of production (perhaps 5%) need chemical treatment for additional control. The research program is designed to build on this present management system and collaborative work with rice breeders evaluates promising new selections resistant to stem borer. Breeders have stem borer resistance as a specific breeding objective and produce crosses with known sources of resistance as a means of incorporating resistance into new progenies

The research program has experiments on chemical control to have a fully documented back-up system to activate if necessary.

Limited scouting activity assesses seasonal insect populations and damage in one governorate and assessments of losses near harvest in six governorates. Pest monitoring at three sites is provided by light traps.

As new dwarf varieties are introduced and crop management improves to increase productivity more active monitoring will be required to alert researchers to change in insect populations and species. In the screening process new breeding lines need to be subjected to heavier insect populations to enable positive identification of resistant segretates in a shorter time.

B. PURPOSE

Entomological research seeks to develop control measures for the major insect pests of rice -- stem borer in the field and bloodworm in the nurseries by host plant resistance, biological control and chemical control. Other research activities study the dynamics of insect biology, estimates of yield losses incurred in production, monitors pest incidence and variations that occur annually and regionally to anticipate outbreaks, and provide improved pest control strategies which can be incorporated into rice production technologies to stabilize yields at higher levels of production.

C. PROGRESS

Although yield losses due to pest attack are estimated at only 5-6%, this still amounts to a loss of more than 100,000 t. annually. Yield losses are held at this low level primarily by host plant resistance and predation. An estimated 5% of the rice area is treated with insecticides as a further control measure. Because of the damage to predators the value of chemical measures could be subject to question. The goal of entomological research is to have a pest management program that further strengthens host plant resistance and biological control. The latter has received less attention than perhaps biological control should, but it should be an integral part of all chemical control trials and monitoring in farmers' fields.

In collaboration with the breeding section, screening for stem borer is carried out on about 250 of the more advanced selections which have reached the yield trial stage. Assessment of infestation is carried out at three stages in the crop growing period. There are differences in infestation which reportedly enables classification of varieties as susceptible which have an average of only 5-6% damage and resistant if damage ranges

from 1.0 to2.0%. Observations in the breeding nursery would indicate that real genetic differences exist and selection against susceptibility can be effective even at low levels of natural infestation. However, under such low levels of natural infestation chance variations require assessment for a number of years to determine levels of resistance.

It appears that indica varieties in general are more susceptible than japonicas, although incidence is still low. It was reported that some susceptible varieties could have as much as 100% infestation although this was not observed during the visit. Screening trials would and should normally have a susceptible and resistant check planted systematically throughout the screening nursery so that an index of infestation would be determined.

As a back-up control, chemical control trials seek to identify effective insecticides, rates and times to apply which could be used on a commercial scale if necessary.

As a guide to farmers and extension personnel damage and loss studies have established that at an incidence level of 5% dead hearts, chemical control measures should be used to minimize damage to the crop.

Early conclusions from the loss assessment studies were that: (1) The Mabrouk 4 program increased yield without increasing stem borer incidence; (2) Yield losses from year to year varied less than 1.0% although from one governorate to another this might increase slightly; (3) Yield losses were 5-6%; (4) Yield losses could be correlated with white heads with about 2% yield loss for each 1% of white heads; (5) 1983 data indicated this might have a different yield loss value by variety with a range in loss from 0.97% in yield for each percent of white head damage to 3.33% loss. Both of these varieties are rated as susceptible to stem borer but the highest loss was in the japonica type.

Resistant japonica varieties fell in the range of 2% grain loss to 1% of white heads.

As a further refinement of previous loss estimates studies, 1984 plantings of Reiho (resistant japonica) and Giza 180 (susceptible dwarf indica) are grown under natural conditions and under chemical insect control and infestations and damage recorded under the four situations. Sampling of demonstration and farmers' fields will be continued this year.

Insect monitoring is carried out with light traps at three locations to establish correlations between light trap catches and field infestations and to have a record of variations in insect populations from week to week throughout the crop season.

Pest scouting is done in only Kafr El Sheikh Governorate. Assessment of losses are carried out at harvest time cooperatively in extension demonstration fields and other farmers' fields in six governorates.

To better serve farmers and to be able to anticipate attacks in more areas, more systematic pest scouting and monitoring merits justification. Although levels of incidence at the moment may not seem to justify intensification of effort, entomologists must be on the alert for changes that may be gradually occurring from season to season and from region to region within seasons.

This could be especially true as plant populations change as the result of Mabrouk 4; as plant stature changes with the introduction of semidwarf varieties; as maturities change; and as increased fertilization is used on more fertilizer responsive varieties. Insect pests such as plant hoppers that have been reported could become insects of economic proportions as these crop conditions and patterns change.

D. PROBLEMS AND OBSERVATIONS

The entomology program has been hampered by the lack of full scale laboratory facilities and mobility to do more effective pest scouting beyond Kafr El Sheikh governorate.

The new buildings, screen houses, and greenhouses should do much to remove the facility constraint. Additional vehicles being procured should enable an effective pest scouting program to be followed.

E. RECOMMENDATIONS

In order to keep the entomological research program on fully alert status the team recommends that:

1. Measures be established to rear stem borers and artificially infest varieties and breeding lines so that effective identification of resistant materials can be made under heavier insect infestations either in the field, screen house, or greenhouse.

2. A thorough monitoring program be developed to follow insect population development throughout the season and from year to year. This would include pest scouting in collaboration with pathologists and agronomists and extension subject matter specialists so that pest detection can be of immediate service to farmers as well as to recognize any shifts in insect populations or species changes over seasons and years.

3. A reanalysis of the loss assessment data be made. This year will complete the fourth year of loss assessment studies. This data should be reanalyzed, regressions determined and conclusions drawn on the use of the information. If white heads can be used as an indicator of crop loss then crop loss estimates can be made quickly and without the laborious detailed plant analysis that has been pursued the past four years. Light trap catches and white head counts could monitor population changes that could occur from year to year.

4. Predators as a factor in pest management appears to play an important role. Population dynamics with and without insecticides and predation levels could provide more information on effectiveness and management of insecticides to retain predators pest management component.

W. H. Freeman

MECHANIZATION

A. SUMMARY

1. Objectives

To contribute to the Project's purpose of increasing rice production and quality and improving the income and economic welfare of rice farmers, five objectives are listed as follows:

- o identify appropriate levels and types of mechanization;
- o test existing, modified, or newly designed equipment and facilitate their manufacture;
- o provide training in equipment design, operation and utilization;
- o purchase existing equipment for testing; and
- o provide engineering supervision and advice during critical testing periods.

This statement of objectives does not lead to measurable indicators of progress. Efforts have focused on four IRRI designs with a view to having them accepted by Egyptian farmers: The axial-flow pump, the manual transplanter, the one-meter reaper, and the axial-flow thresher. The lack of quantifiable objectives has been a weakness of the mechanization program that needs to be corrected so that accomplishment of objectives will lead directly to achieving the Project's purpose and producing benefits.

2. Program and accomplishments

The planned staffing of the mechanization program was quite limited in relation to the task at hand, and when the achieved personnel inputs fell behind the planned level, the number of engineers and support staff was very inadequate. There were gaps in the continuity of contractor staff, and lack of counterpart staff at all levels. The impact of the mechanization program will be minimal in its present form. The current design engineer and his counterparts have improved the performance

of the mechanization section during recent months but even with these efforts it is doubtful that any of the machine types targeted for development will be in widespread use in the near future.

3. Recommendations

1. Separate the functions of the mechanization program into three distinct groups:

Research

Engineering Design

Operations and Maintenance

Increase staffing accordingly.

2. Work cooperatively with engineering departments of Egyptian universities.

3. Concentrate short-range efforts in machine design and development on one or two high-priority machines.

4. Conduct machinery tests that will provide performance data suitable for comparing mechanization options.

5. Interact with other agencies and institutions through administrative channels and professional societies.

6. Pursue recommendations of the Internal Review Committee.

7. Strengthen support for mechanization activities at Sakha.

8. Evaluate rice machinery based on its suitability for other crops in the rotation.

9. Evaluate broadcast seeding and bring in whirlwind seeders.

B. PURPOSE

The Rice Research and Training Project is designed to increase production and quality of rice in Egypt. The purpose of the mechanization program as stated in Appendix II of the contract between the Arab Republic of Egypt and the University of California

(page II-3) is to design and test practical small-scale equipment for land preparation, harvesting, threshing, and possibly drying of rice.

In the 1982 Progress Report this is restated thus: "...to improve the incomes and economic welfare of small rice farmers by development and introduction of adaptive, low-cost, labor-saving and thus profit-enhancing rice farming machinery and cultural practices.

Early amendments to the Project removed postharvest operations of drying and processing from the scope of work.

The approach to mechanization has followed the long-established IRRI tradition, concentrating on machines that are very low in initial cost and which can be manufactured and repaired in primitive workshops. The machines identified for special attention have been based on designs that have been previously developed and tested in the Philippines.

Clearly, agricultural mechanization is not an end in itself. It is done to increase productivity and reduce costs, and therefore to benefit farmers and society by increasing farm income, doing away with drudgery, improving product quality and keeping food prices from rising to excessive levels.

There is no physical environment on earth more favorable to mechanization than the Nile Delta. The land is level, the soil is deep and free of stones, water can be controlled to a very high degree of precision, there is almost no rain, the growing season is year-round and a wide range of crops and crop varieties that can be grown. The constraints to mechanization are social and economic: small farm size, low purchasing power of farmers, farm laborers with no training or experience in mechanized farming. These are man-made constraints, and man can find ways to remove these constraints.

In order to get machinery manufactured and adopted for use by the farmers, the project should focus on people as the targets of development efforts, rather than machines: the people who will design, develop, manufacture and use them.

The review team is concerned that the mechanization goals are in danger of aiming at a level of prosperity that condemns the Egyptian farmer to small-scale status for several future generations. Development efforts should aim at a level of prosperity which is above the subsistence level, and thus offers some hope of upward economic mobility for farm families.

C. PROGRESS

1. Formulation of Objectives

The stated goals of the mechanization program are listed in the original contract as follows:

- o identify appropriate levels and types of mechanization of rice production;
- o test existing, modified, or newly designed equipment under all conditions of use and facilitate their manufacture;
- o provide training in equipment design, operation and utilization;
- o purchase existing small equipment for testing in land preparation, direct seeding, and threshing;
- o provide engineering supervision and advice during critical testing periods.

2. Identifying Appropriate Levels and Types of Mechanization

Solving the problems of agricultural mechanization requires both scientific research and engineering design. There is a fundamental difference in the methodology of these two processes, and it is important to distinguish between them in planning project activities. Scientific research is an inductive

process, where a series of observations will show patterns upon which a hypothesis can be formulated and tested. Engineering design makes use of deductive reasoning where all results are based on proven engineering principles and laws of nature, and nothing is left to chance. Scientific research involving agronomy and economics along with engineering should be used to determine what should be done, whereas engineering design will then tackle the problem of how to do it.

The design of a machine or system of machinery must be consistent with the design conditions and existing constraints which limit the designer's freedom of choice. The design options should not be restricted by constraints that are not real. A case in point is the constraint of low purchasing power of rice farmers. The more important consideration is the total system cost per unit of machine use, taking into account operating costs as well as initial costs. Farmers have access to credit, custom hire operations and shared ownership and these conditions can alleviate the constraint of low purchasing power.

Farmers grow rice in rotation with berseem, wheat, cotton, maize, barley and other crops. Mechanization needs should be identified for multiple crop farming and machinery systems and machines designed and selected accordingly. Analyses of cost effectiveness of machines must take into account their performance on other crops in addition to rice.

Tillage is a major input and should be given more attention. Plowing at the wrong soil moisture content results in clods, which require much secondary tillage. Minimum tillage done at optimum soil moisture content can produce good tilth. The project has barely scratched the surface regarding the subject of minimum tillage.

3. Machinery Development, Testing and Manufacture

The types of machines identified for testing and adoption in the program are:

- o the lowlift propeller pump, also called the axial-flow pump;
- o the manually-operated transplanter;
- o the one-meter reaper;
- o the axial-flow threshers.

Other IRRI-developed machines acquired for use at the Project are:

- o the power tiller; and
- o the seed cleaner.

The seed drill for direct seeding has also been considered.

The objectives for the introduction of machinery do not appear to be expressed in quantitative terms in the Project plan of work. For example there seem to be no targets for numbers of pumps manufactured and sold, percentage of farmers using a project designed machine, number of manufacturers cooperating with the program, etc. Lacking these quantitative measures of progress, evaluation may be done in relation to reasonable expectations based on the judgment of the review team.

a. The lowlift axial-flow pump

The review team found no evidence that this design was being used by any rice farmers. Manufacturers who had been approached to use the design were not interested. This design would compete with the animal-powered involute waterwheels, and with the diesel-powered centrifugal pumps which are in widespread use.

The centrifugal pumps are more expensive, at LE 1500 for a 6 inch by 5 inch pump with a 7 horsepower engine mounted on a wheeled cart, compared to LE 350 plus engine cost for the

axial-flow pump. However, the fuel price is 3 piasters per liter for diesel and 15 piasters per liter for gasoline. Good service and spare parts are available for the diesel pump. Furthermore, the axial-flow pump can not be inclined more than 20 degrees from the horizontal without danger of inhibiting the proper flow of lubricating oil. This problem could be overcome by using two-stroke cycle engines, or by modifying the design so that it would be used with a vertical axis engine. Still, the basic advantage of the centrifugal pump with a flexible intake hose is that it is better suited to the prevailing configurations of canals and water distribution structures. Regarding portability, the axial-flow pump (6 inch diameter) weighs 45 kg including the engine and thus can be carried by two men. But, how far would they want to carry it? The diesel powered centrifugal pump on wheels can be pulled to most pumping sites.

Another option that should be evaluated is the conversion of existing water wheels from animal power to engine power by adapting a suitable drive mechanism.

Apparently the fabrication of the axial-flow pump in Egypt was not completed until the current mechanization specialist arrived on the project and installed water-lubricated plastic sleeve bearings on the propeller shaft. Performance and cost data were not available for comparing the axial-flow pump to other alternative pumping methods.

Clearly, the farmers will not adopt the axial_flow pump in view of the reasons given above.

b. The manually-operated transplanter

The review team was not able to see the transplanter in operation during their September visit, which does not coincide with the transplanting season. However, they did look at fields of nearly mature rice which had been transplanted and the results

were of good quality compared to hand transplanting. Also, they saw a demonstration of the way the transplanter functions.

No manufacturers have agreed to manufacture the manually-operated transplanter.

The manually-operated transplanter is really a mechanical aid to hand transplanting. It increases the productivity of the workers by a factor of two to four, depending on the skill of the operator. It can also help to maintain correct row spacing. Preparation of the seed bed requires additional labor inputs, compared to hand transplanting. Traditional hand-transplanting is normally done by women and children, and although a strong adult can operate the transplanter without too much strenuous effort, it is not suitable for small women or children. The stronger men are used during transplanting to carry seedlings from the nursery to the field and most of the transplanting in the field is done by women and children who do not have the size and strength to operate the transplanter easily. More performance and cost data are needed, under Egyptian conditions, to evaluate these factors before promoting the manufacture and use of the manually-operated transplanter.

After land preparation, it is necessary to let the soil settle for two to four days before using the manually-operated transplanter. This is important to good seedling placement.

The competition for this transplanter includes hand transplanting, imported power transplanters, and direct seeding. The power transplanters are extremely expensive, and the units imported in large numbers by the Mechanization Centers have a fixed row spacing of 30 cm, whereas the preferred row spacing for Egyptian conditions is 20 cm (25 hills per square meter).

Direct seeding may very well become the preferred practice. The prevailing conditions of soil, climate and water control

favor direct seeding. If the rice breeding program is successful in achieving the goal of developing good short duration varieties, if the plant protection program is successful in achieving the goal of chemical weed control, if the seed production program is successful in achieving the goal of providing certified seed free of red rice, if the agronomy program is successful in achieving its goals for water management and cultural practices, and if the economics program is successful in achieving its goals of a profitable rotation of crops which provides for an adequate growing season for direct-seeded rice, then there will be no need for transplanting.

c. The one-meter reaper

The review team found no evidence that the reaper was field tested prior to 1984 except to a very limited extent in the 1983 rice harvest season. It was also tested in the wheat and barley harvest season during early 1984, but not evaluated in comparison with alternative methods.

A Cairo manufacturer was contracted to produce several units for sale to the Project at LE 2300 each. Some of these units have been delivered to Sakha but need some modifications before being operated successfully. An IRRI-supplied unit was used to demonstrate the performance for the review team. This reaper functioned reasonably well, but there are some improvements which would be desirable. The ground speed was too fast compared to the cutter-bar speed. Unless the reaper is provided with steering clutches, and separate clutches for forward motion and cutter-bar motion, it will be strenuous to operate.

During a visit to the Cairo manufacturer's workshop, it was observed by the review team that the sheave diameters had been changed to reduce the ground speed relative to the cutter-bar speed on reapers being assembled there.

If good quality control can be achieved by the manufacturer and the design further improved, the prospects for acceptance by the farmers are good. The fact that it is a multiple purpose reaper that could also harvest wheat and barley improves its acceptability and distributes its cost over a wider base.

The reaper competes with other imported reapers that tend to be expensive, and with the imported sickle-bar mowers with swather attachments. It also competes with combines, which although expensive can be competitive if used on several different crops and by several different farmers, on either a custom hire basis or a cooperative basis.

d. The axial-flow thresher

It is imperative that mechanical threshers be used if excessive losses are to be avoided, rice milling quality maintained at a high level, and production costs limited.

The IRRI threshers designed and developed for short-straw varieties with high moisture contents are not appropriate for the longer strawed rice of the Egyptian farms. The TH-8 model would therefore be the one with the best prospects for adoption by the manufacturers and farmers, but this model has not yet been acquired at the Project site.

One manufacturer at Tanta has built a model TH-7 thresher with some modifications from the Project design.

If production and evaluation of the threshers had been accomplished earlier in the Project, it would be possible to have some performance and cost data by now.

If suitable combines can be developed for Egyptian conditions, the need for both reapers and threshers will be obviated.

4. Progress in Training

The goals in training for the mechanization program have been quantified in the Project Paper Amendment, Annex VI,

page 8. These include degree study at American universities at the MSc level for two engineers, and a total of 24 months of non-degree training at IRRI for four trainees in the rice mechanization program.

These goals have not yet been achieved. Two of the counterpart staff have been identified for participation in the IRRI training session, one is tentatively scheduled to go to IRRI in November 1984 and the other in April 1985.

Training of support staff and technicians has been undertaken by the incumbent Mechanization Design Engineer on the operation, service and maintenance of the Project machines.

5. Purchasing and Testing Existing Equipment

A wide range of farm machinery is available to farmers from local machinery dealers. Some units have been acquired and used to a very limited extent, but the review team has found no evidence of systematic testing being done to generate performance and cost data. This should be done on both IRRI developed designs and other machine designs, to provide a basis for evaluation and comparison. Results must be documented in quantitative terms.

Adapting a machine to new conditions can be accomplished by modifying the conditions or by modifying the machine, or a combination of both. Often it is a combination of modifying machines and conditions that leads to successful adaptation.

6. Engineering Supervision and Support

The mechanization section has provided assistance and support to other Project sections including seed production, breeding, weed control and economics in relation to the use of equipment for land preparation, seedbed preparation, transplanting, direct seeding and evaluation. The mechanization staff works closely with farm management on maintenance and

operation of Project equipment. This cooperation appears to be very worthwhile in achieving overall Project goals.

The mechanization section participated in research on agronomy cultural practices, contributing to the data on combined effect of land preparation and planting methods on rice grain yield. This was reported in the Proceedings of the Fourth National Rice Institute Conference, pages 204-218. This is a good example of the kinds of research that can provide useful information on mechanization needs. The study is being continued during a second season in a commmendable way as observed by the review team.

7. Impact of Mechanization Accomplishments

The review team has not found evidence that the mechanization component has generated technologies which impact on rice farmers and rice yields to any great extent.

The Mabrouk 4 extension program does not include recommendations that rely on the use of project-developed machines. Mechanical transplanters have been used on a very limited scale in demonstration fields, and it is planned to use several reapers during the 1984 harvest, and a few mechanical threshers.

The mechanization program suffers from a lack of suitable objectives which define the goals and purpose in quantified, measurable terms. No forecasts are made as to when the machinery under study will be available to farmers.

The mechanization section has not produced a paper based on work done in Egypt for any of the first four annual Proceedings of National Rice Institute Conferences, although some of the research results reported under Agronomy and other sections were based on collaborative work involving mechanization. It is only the most recent progress report covering the period January-June 1984 in which the mechanization program reports

results and accomplishments in measured, quantified terms. The incumbent mechanization specialist and his counterparts at Sakha should be given credit for their efforts and accomplishments in pushing forward with machinery development and testing during 1984.

There has been communication between this project and other related GOE projects such as the "Agricultural Mechanization" and "Rice Processing and Milling" but intensive in-depth coordination and integration does not seem to be present. The review team is concerned that the problems of drying, processing and milling quality are not given more attention in the Project. The medium-grain and long-grain varieties can produce an export-quality grade of rice only if the percent of broken grains can be kept down to low levels, and this milling quality is influenced by such factors as time of harvest, moisture content at cutting and threshing, and threshing methods, so that consideration of milling quality must begin in the field.

The potential for institutionalization of accomplishments of mechanization will be difficult because of the problems in identifying and recruiting counterpart staff and trainees.

D. PROBLEMS AND OBSERVATIONS

1. Personnel

The total number of man-months for long-term specialists in approaching the 36 months specified in the implementation plan and schedule. This position has been filled by three different individuals, with a gap of several months time between the departure of the first and the arrival of the second. The third and current specialist is stationed at Sakha, and this has helped to make his work more effective.

The third long-term specialist first came to the project as a short-term specialist and served three months in Egypt,

then returned to IRRI and was reassigned as the Design Engineer. One additional short-term specialist from IRRI worked at the project.

The Ministry of Agriculture and Food Security has not appointed a full-time high ranking counterpart for the Design Engineer. This is an administrative weakness of the mechanization program.

The early progress reports of the Project, and the Internal Review Report, point out the problem of counterpart support for the mechanization program, and the difficulty of identifying candidates with good language ability for overseas training. The review team encountered several engineers with good English language ability working in other government agencies and the private sector.

At the time of the visit of the review team, the mechanization specialist had working with him at Sakha farm engineering and technician counterparts and two mechanics, so that the situation of personnel inputs has been improved in this regard. There appears to be a need for more continuity and higher standards in selecting and training support personnel. Mechanization is a relatively new experience for many support staff.

2. Facilities

The occasional lack of availability of a vehicle for the mechanization section has hampered activities.

The workshop space and equipment are very limited.

SUMMARY OF PERSONNEL AND TRAINING INPUTS

FOR THE MECHANIZATION COMPONENT

MAN-MONTHS

Year of the Project	1st	2nd	3rd	4th	5th	Total
DESIGN ENGINEER:						
Planned	12	12	12	--	--	36
Achieved	9	9	9	9	(12)	48
SHORT-TERM SPECIALISTS:						
Planned	--	1	1	1	1	4
Achieved	--	--	--	3	1	4
DEGREE TRAINING (MSc)						
Planned						48
Achieved						0
NON-DEGREE						
Planned						24
Achieved						0

E. RECOMMENDATIONS

1. Separate the Functions of the Mechanization Program into Three Distinct Groups: Research, Engineering Design, and Operations and Maintenance of Project Machinery, and increase staffing.

The work load placed on the mechanization section under current Project arrangements is out of proportion of the manpower available. Qualified Egyptian engineers should be assigned to these tasks and expatriate engineers as needed should be provided on short-term and long-term basis, at least one engineer for each of the three groups. In order to achieve rapid progress in design and development, there should be several design engineers: one for harvesting machinery, one for land preparation machinery, one for drilling and transplanting mechanization, etc.

2. Work with Engineering Departments of Egyptian Universities

There are several universities with graduate students in Agricultural Engineering who could carry out thesis projects on various aspects of rice mechanization. This could be initiated by providing to these departments a preliminary list of thesis topics, and an offer of support in the form of access to Project facilities and interaction with Project staff.

These universities would include, but are not limited to, the following:

Agricultural Engineering, Department, Faculty of Agriculture, Alexandria University;

Agricultural Engineering Division, College of Agriculture, Cairo University.

3. Concentrate Short-Range Efforts in Machine Design and Development on a Single, High-Priority Machine

Trying to develop five or six different types of machines with scarce manpower has not produced significant accomplishments

with any machine type. Until more manpower is available, the Mechanization Section should concentrate all its efforts on a single machine and work diligently until that machine becomes acceptable as a part of the extension package of recommended practices.

The selection of specific machine would be a decision reached after careful consideration.

The thresher is a strong candidate for concentrated effort. In the pragmatic sense, it is too late to have an impact on the 1984 rice harvest, partly because of the unfortunate delay in receiving the TH-8 thresher which is the model of most promise. The Project is scheduled to end before the 1985 rice harvest, although it does extend beyond the 1985 wheat and barley harvest which could provide a testing and evaluation opportunity. In the long-term approach to mechanization, harvesting and threshing need to be given a high priority. Rice competes with cotton for agricultural labor during the harvest time, and labor scarcities are foreseen. The need to reduce harvest and post-harvest losses and to maintain grain quality are also important considerations.

4. Conduct Machinery Tests that Will Provide Performance Data Suitable for Comparing Mechanization Options

Both IRRI designed and other machines should be performance tested in such a way that the results can lead to comparisons and evaluations. Quantitative results are needed. To make statements such as "...the pump was performance tested and pumped an acceptable amount of water" is an unacceptable result.

5. Interact More with Other Agencies and Institutions Through Administrative Channels and Professional Societies

More active collaboration with the Egyptian Agricultural Mechanization Project, the Rice Technology Training Center, and similar agencies and institutions should be pursued using

the proper administrative channels to ensure coordination and cooperation on joint efforts.

A professional society of agricultural engineers would foster the interchange of technical information and provide useful contacts to enhance cooperation and program development. The engineers on the project should participate in existing societies and support their colleagues in efforts to organize an Egyptian division of the Congress Internacional du Genie Rurale (CIGR) or the American Society of Agricultural Engineers which in spite of its name is a very international professional society.

6. Pursue Recommendations of the Internal Review Committee

Special emphasis should be given to vigorously pursuing the recommendations to expand engineering counterpart participation, in-country training, and integration of mechanization activities.

7. Strengthen Support for Mechanization Activities at Sakha

A vehicle should be immediately made available to fulfill the needs of the mechanization program. Workshop space should be increased and better equipped. Support staff should be carefully selected emphasizing aptitude, educational and skill levels, reliability and continuity of employment.

8. Evaluate Rice Machinery Based on its Suitability for Other Crops in the Rotation, As Well As for Rice

Because rice is only one crop in the rotation, it is important that the farmers be able to use machines for other crops as well in order to distribute costs. Land preparation machinery, seed drills, reapers, threshers and combines are examples of machine types amenable to multiple crop use.

9. Evaluate Broadcast Seeding in Comparison to Transplanting and Seed Drilling

Labor for transplanting becomes increasingly scarce, and will for the next few years as Ramadan coincides with the transplanting season. Direct seeding is well suited to Egyptian conditions, and broadcasting has come advantages over drilling, not the least of which is low equipment cost. The hand operated whirlwind seeders should be brought in, tested and demonstrated as soon as possible.

A. L. Phillips